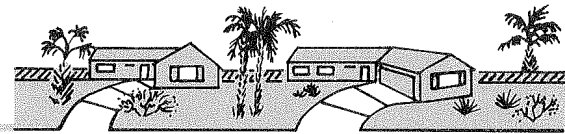
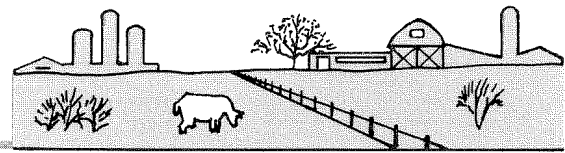
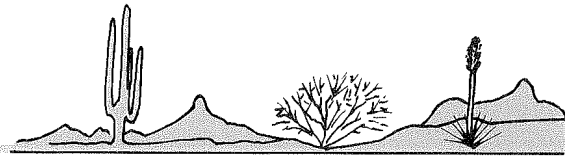
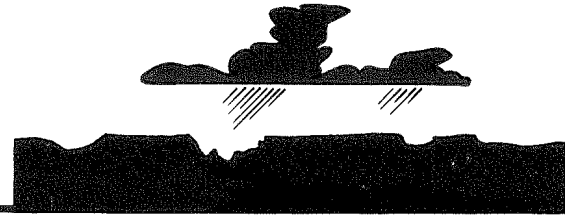


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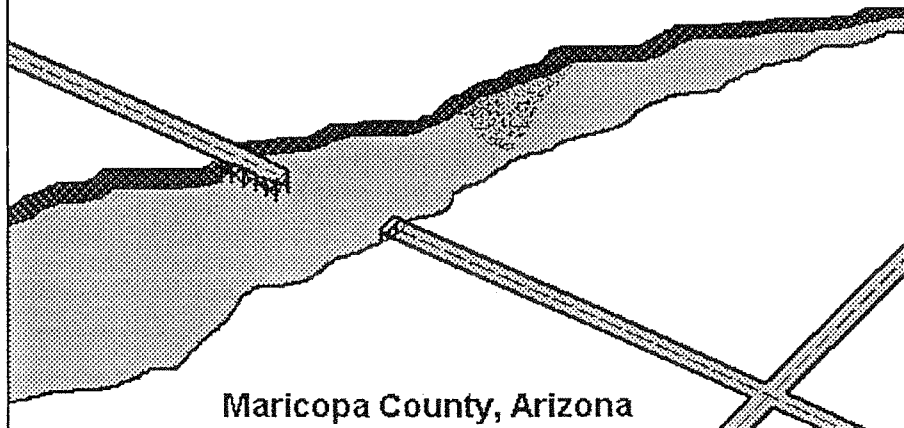
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Storm Report

January 1993

FLOOD CONTROL
DISTRICT
OF
MARICOPA
COUNTY

AFTER-ACTION REPORT
The Floods of January 1993



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TABLE OF CONTENTS

	<u>Page</u>
Introduction	1
Meteorology	2
Rainfall	5
Runoff	7
ALERT System Performance & Emergency Operations	10
Summary	12
References	13

Appendix A: ALERT Precipitation Gage Daily Rainfall Totals for December 23, 1992 through January 22, 1993.

Appendix B: Report on Flood Damage and Assessment for Board of Supervisors Meeting (by MC Dept. of Emergency Management).

TABLES AND FIGURES

TABLES

- 1 Monthly Precipitation Report for December 1992.
- 2 Monthly Precipitation Report for January 1993
- 3 Precipitation Report for January 6th-18th, 1993
- 4 Daily Precipitation Report, Period Ending 1/8/93 07:00
- 5 Recorded Maximum Discharges at FCD Stream Gages
- 6 Floodwater Storage Impoundments at FCD Structures
- 7 Emergency Notification Elevations for FCD Structures
- 8 Travel Times from Coolidge Dam for Various Flood Levels

FIGURES

- 1 Isohyetal Map for Maricopa County, 12/27/92 - 1/19/93
- 2 January 1993 Rainfall for Cooks Mesa Gage
- 3 January 1993 Rainfall for Mt. Union Gage
- 4 January 1993 Rainfall for Seven Springs Gage
- 5 January 1993 Rainfall for Durango Complex Gage
- 6 Cave Creek Watershed Rainfall Distributions
- 7 ALERT Real-time Rainfall Map - Agua Fria Watershed
- 8 Monthly Total Rainfall in the Phoenix Metro Area
- 9 Gila River at Estrella Parkway Hydrograph
- 10 Indian Bend Wash at Indian Bend Rd. Hydrograph: 1/7 - 1/21
- 11 Indian Bend Wash at Indian Bend Rd. Hydrograph: 1/10 - 1/12
- 12 ACDC at 67th Avenue Hydrograph
- 13 Cave Buttes Dam Stage Hydrograph
- 14 New River Dam Stage Hydrograph
- 15 Cave Creek Watershed Hyetograph and Hydrographs
- 16 New River Watershed Hyetographs and Hydrograph
- 17 SRP Hydrograph - Combined Inflows to Roosevelt Lake
- 18 SRP Hydrograph - Verde River at Tangle Creek
- 19 Real-time Structure Information Screen - Cave Buttes Dam
- 20 Real-time Structure Information Screen - New River Dam
- 21 Real-time Structure Information Screen - Adobe Dam
- 22 FCD Flood Emergency Procedures Flowchart
- 23 Projected Discharges in the Salt and Gila Rivers: 1/18/93
- 24 Projected Discharges in the Salt and Gila Rivers: 1/20/93
- 25 Projected Discharges in the Salt and Gila Rivers: 1/22/93

INTRODUCTION

The purpose of this report is to present in a concise manner selected meteorological, hydrologic, and statistical data from the storm events of December 1992 and January 1993. The majority of the data presented were collected by the Flood Control District's (FCD) ALERT system, with contributions from Salt River Project (SRP), the National Weather Service (NWS), the United States Bureau of Reclamation (USBR), and the United States Geological Survey (USGS).

The goal of this report is to present the data for general information purposes, and to function as a condensed historical archive. It is hoped the data will also serve as a guide for future prediction of water levels in FCD structures and discharge rates along the major rivers in Maricopa County.

METEOROLOGY and STORM SUMMARY

The following section is an excerpt from a preliminary report obtained from the Phoenix National Weather Service office entitled "Record Arizona Floods of January 1993, A Hydrometeorological Overview" (NWS, 1993):

Arizona's flooding and flash flooding during January 1993 was strongly influenced by two factors in the middle and upper atmosphere: 1) a vigorous subtropical jetstream whose mean position was farther north than is usually the case, and 2) a persistent area of high pressure centered over the Gulf of Alaska. Another contributing factor was nearly saturated antecedent soil conditions and water-laden snowpack (resulting from late December 1992 precipitation events) over many Arizona watersheds.

The persistence of unusually warm water in the equatorial central and eastern Pacific Ocean (El Nino) played a role in the evolution of the subtropical jet stream early this winter. Specifically, the unusually warm water helped to intensify shower and thunderstorm activity near the International Date Line (central Pacific Ocean). This in turn affected the location of the subtropical jet as well as the amount of mid-and-upper level moisture it transported.

During early December, the polar jet maintained an unusually strong west-to-east flow as it crossed the Pacific Ocean. By late December, the polar jet stream changed, forming a strong area of high pressure in the Eastern Pacific with upper level north-to-south winds evolving from the Arctic to the West Coast. An intense storm moving through the central Pacific amplified the high pressure area over the Gulf of Alaska and caused a "secondary" polar jet stream to form just north of Hawaii. This weather pattern persisted for several weeks, and led to colder than normal conditions, with periodic Arctic outbreaks along the west coast of Canada, the northwest United States, and adjoining coastal waters. An area of low pressure developed just off the

West Coast.

Storms moving through the primary branch of the polar jet (the northern stream) around the Arctic Circle were steered southward along the west coast of the US, then eastward toward Arizona. These storms became more intense as they moved through the West Coast low. The first in a series of storms brought heavy rains to the valleys and snows to the upper elevations of Arizona during the last week of December. Additionally, a succession of weaker storms in the "secondary" polar jet moved toward Arizona.

These storms sometimes interacted with disturbances in the subtropical jet stream to generate significant "southern stream" (also referred to as the "pineapple express") disturbances. These disturbances caused several significant precipitation events that affected Arizona, and were more frequent visitors than disturbances moving through the primary polar jet stream.

During January, a number of precipitation episodes affected Arizona. The most significant of these events occurred during the following periods: 6th-8th, 10th-11th, 14th-15th, and 17th-18th. Details of these events will be covered in other reports (not attached, but covered in the Precipitation section of this report). As an overview, many (NWS) stations in Arizona established new record rainfalls for the month of January. The rate of streamflow on the Salt River through Phoenix was the greatest it had been since 1980. Heavy rainfall occurring over a short period of time on already saturated ground was the primary factor contributing to the runoff and associated flooding in many areas.

Another factor contributing to the unusually high runoff and associated flooding was snow melt. Since the subtropical jet stream's position was farther north than is usually the case in January, subtropical heat and moisture was pushed further north than usual. As a result, areas that usually do not experience snow melt until spring

received rain on top of the snow pack that had accumulated from early-winter snows. For example, the snow level during the January 6-8 event rose to about 8500 ft msl, several thousand feet above typical January snow levels.

Other severe weather events occurred in association with these storms. Tornadoes were observed in Arizona's south-central desert region on January 17th and 18th. A strong, short-lived tornado caused extensive damage over a residential area in north Scottsdale around 12:30 pm, January 17th. Several tornadoes were observed near the metropolitan Phoenix area on January 18th, but apparently caused little or no damage. Large hail, damaging winds and a possible tornado struck portions of North Phoenix during the evening of January 14th, and hail fell from some of the storms on January 18th.

The last major storm system generated in association with the upper air pattern that brought so many storms to Arizona moved out of the state on January 19th. Significant changes in the upper air kept Arizona relatively dry for the following ten days. These changes included a southward shift of the subtropical jet and associated tropical moisture and dissipation of the high pressure ridge over the Gulf of Alaska. Storm systems associated with the "primary" polar jet affected areas north of Arizona, while storms associated with the subtropical jet affected areas south and east of Arizona. The drier weather allowed the washes and rivers to recede significantly.

In summary, the combination of a northward-displaced subtropical jet, with its abundant moisture supply and associated disturbances, and a southward-displaced polar jet, with its storm track, led to the abnormally wet period from just after Christmas to mid-January. Both displacements were associated with the persistent El Nino event occurring in the equatorial Pacific Ocean. The hemispheric upper air pattern also supported evolution of a high pressure ridge across the eastern Pacific, so events occurring thousands of miles west and east of Arizona played a significant role in the unusually wet weather Arizona experienced.

RAINFALL

Appendix A lists rainfall totals for the 128 FCD ALERT precipitation gages for the period 12/23/92 through 01/22/93. Although this is a report on the January 1993 floods, the late December rainfall is included because it elevated the soil moisture to a point where the January rainfalls produced exceptionally high runoff ratios. At-station return frequencies are difficult if not impossible to estimate for multi-day duration storms in this area because of the shortage of data for these types of storms, however, most stations which recorded heavy rain received less than 2 inches in any 24-hour period, which is approximately a 5-year return period. Nine ALERT gages received over 3 inches of rain on January 8th, representing return periods of approximately 10 to 40 years. The major cause of flooding from this storm was repeated heavy volumes of orographically induced precipitation falling on saturated or near-saturated ground, or in a few places in the County, snow.

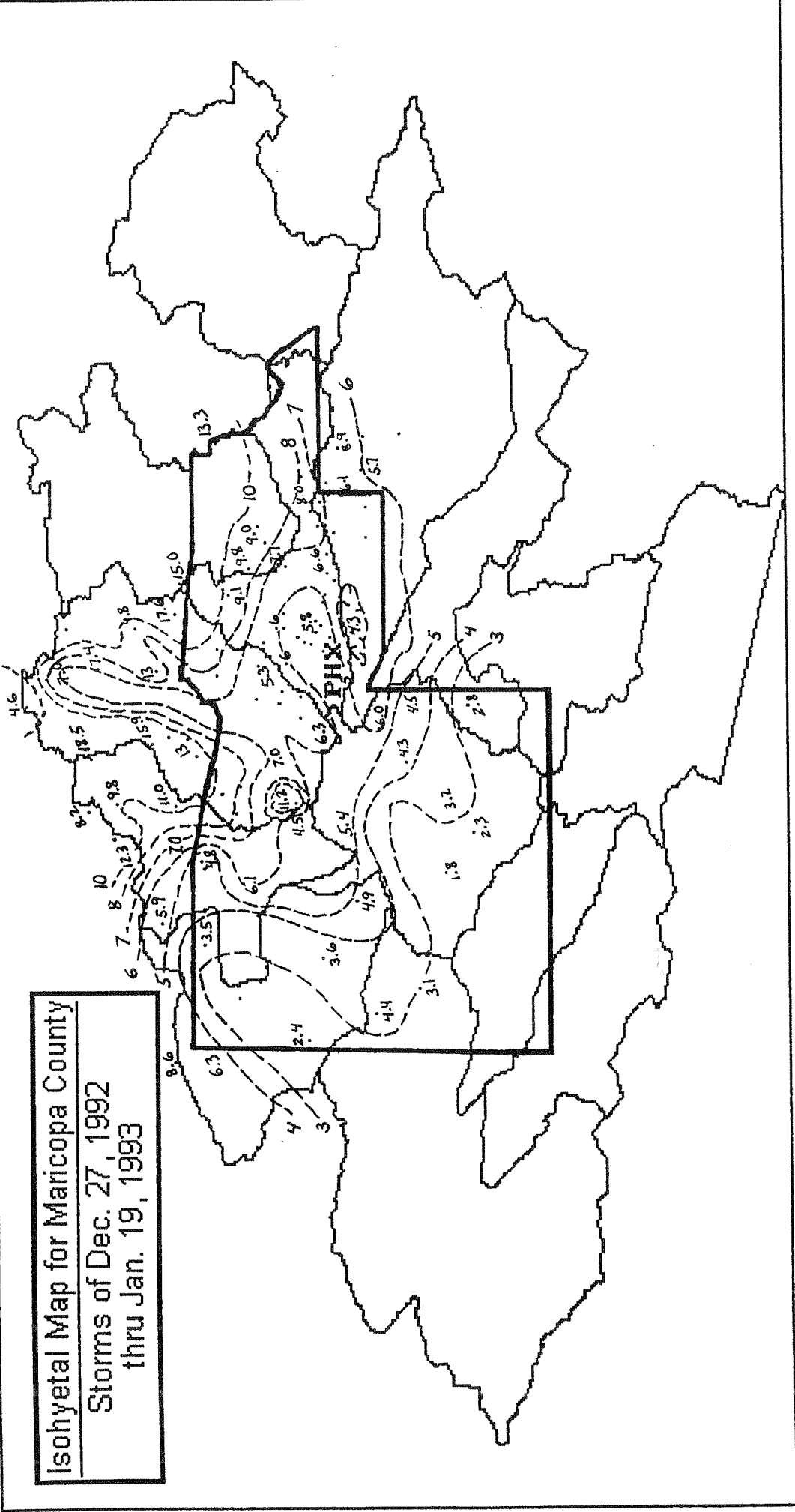
Listed below are selected January 1993 rainfall statistics for the District's 128 telemetered raingages:

1. Number of precipitation gages removed or destroyed during the floods: 3
2. Greatest amount of rainfall recorded: 16.50 inches at Mt. Union (Bradshaw Mtns.)
3. Least amount of rainfall recorded: 1.65 in. at Saucedo Wash (SW of Gila Bend)
4. Number of gages recording 15 inches of precipitation or more: 2
5. Number of gages recording 10 inches of precipitation or more: 10
6. Number of gages recording 8 inches of precipitation or more: 21
7. Number of gages recording 6 inches of precipitation or more: 42
8. Number of gages recording 5 inches of precipitation or more: 70
9. Number of gages recording 4 inches of precipitation or more: 98
10. Number of gages recording 3 inches of precipitation or more: 117

Figure 1 is an isohyetal map of the storm total (12/27/92 - 1/19/93) precipitation for Maricopa County with isohyets ranging from 3 to 10 inches. Areas receiving greater than 10 inches were generally at high elevations and contouring of these small areas is difficult on a map of this scale. Figures 2, 3, 4, and 5 are bar graphs of daily rainfall for three of the "wettest" ALERT gages for the month of January, plus the Durango Complex gage is provided as a comparison to the amounts of rainfall received in the Valley. Figure 6 shows the hourly rainfall distributions for the gages at and above Cave Buttes dam for the heaviest rainfall episode on January 6th through the 8th. Note that the highest intensities occur toward the end of the storm after the ground has had a thorough soaking, resulting in high runoff rates on the 8th. Tables 1-4 summarize precipitation totals at ALERT stations for the month of December 1992, the month of January 1993, the period January 6th-18th, and a 24-hr period ending January 8th at 07:00 respectively. Figure 7 is a copy of a "real time" graphic map from the ALERT system showing the previous 24-hour rainfall over the Agua Fria watershed on January 17th. Finally, Figure 8 is a historical compilation of monthly rainfall totals at a typical metro-Phoenix raingage. The figure is provided to illustrate the dramatic increase in rainfall over the past few years, but unfortunately does not contain enough data to make any predictions concerning climatic behavior.

FIGURE 1

Isohyetal Map for Maricopa County
Storms of Dec. 27, 1992
thru Jan. 19, 1993



January 1993 Rainfall for Cooks Mesa Gage

Upper New River Watershed

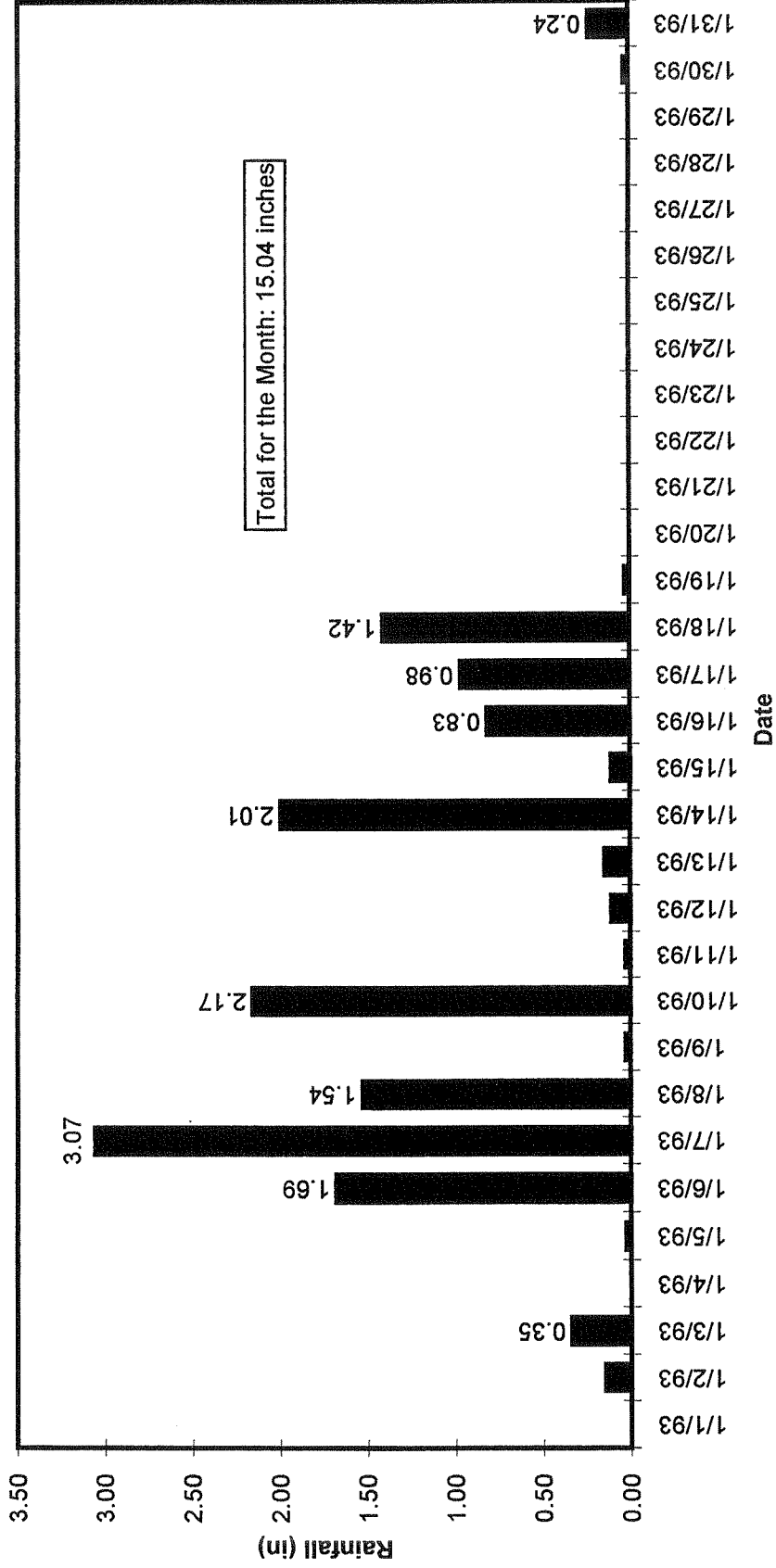


FIGURE 2

January 1993 Rainfall for Mt. Union Gage

Northern Bradshaw Mtns., South of Prescott

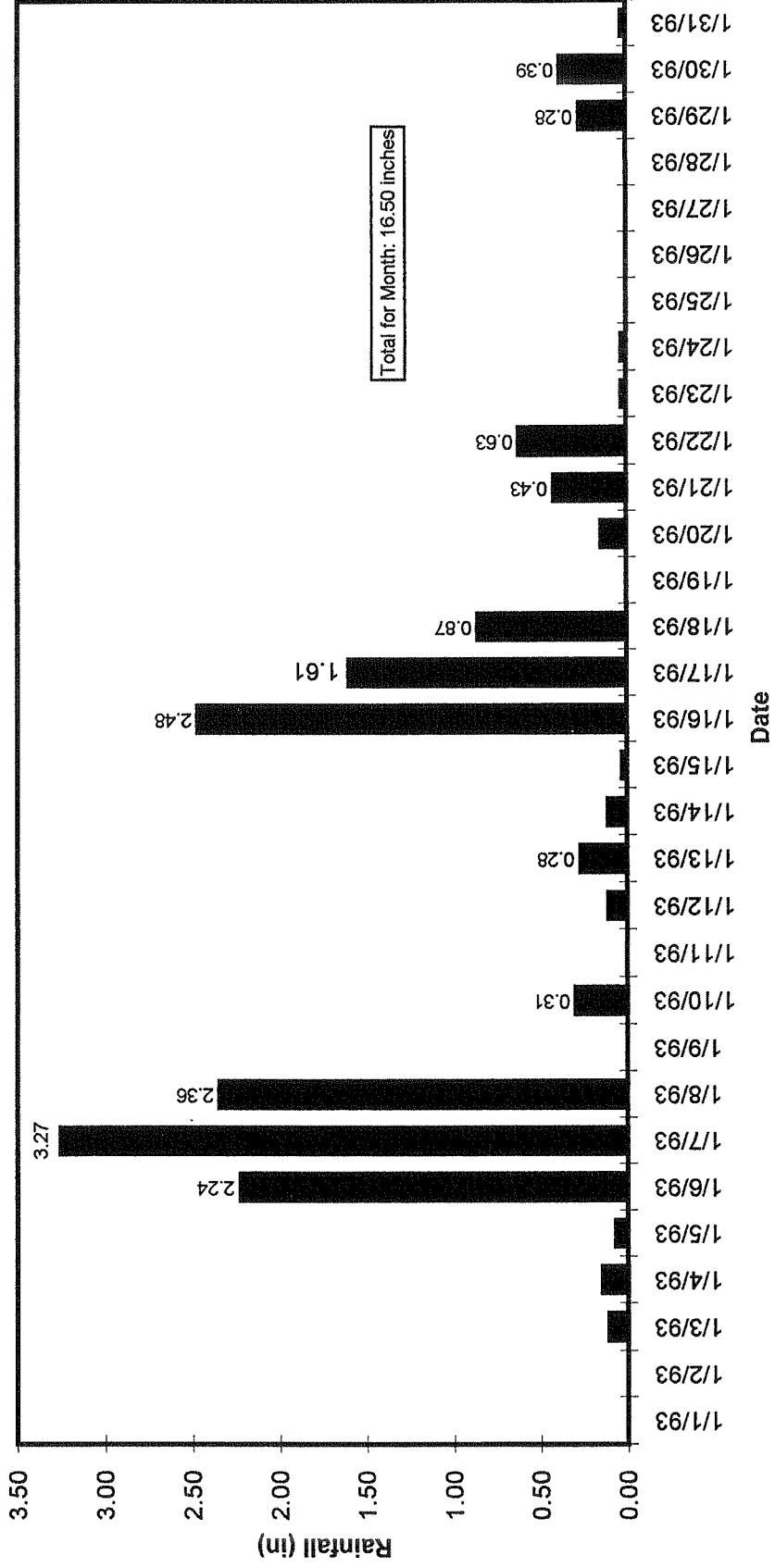


FIGURE 3

January 1993 Rainfall for Seven Springs Gage

Upper Cave Creek Watershed

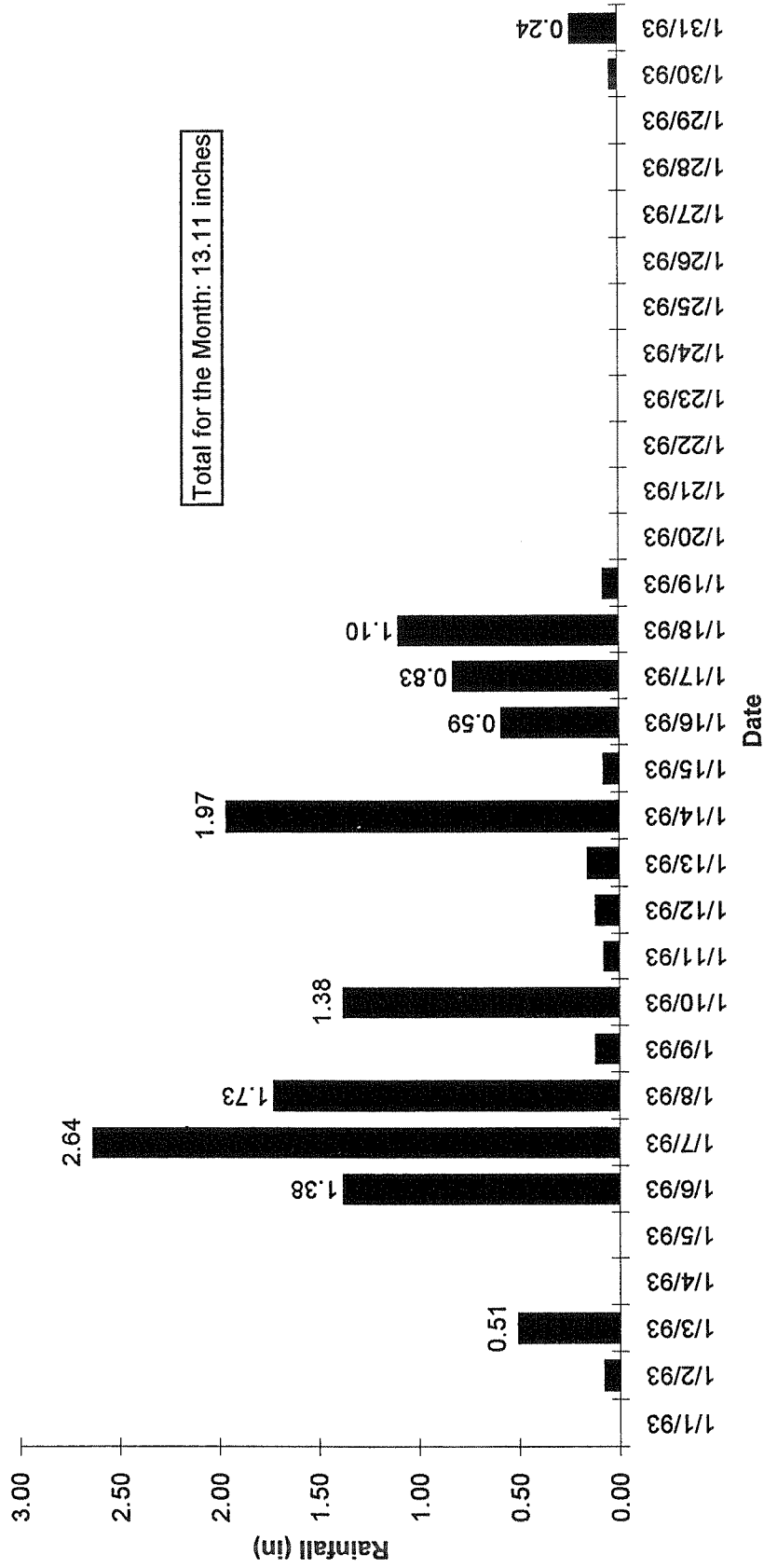


FIGURE 4

January 1993 Rainfall for Durango Complex Gage

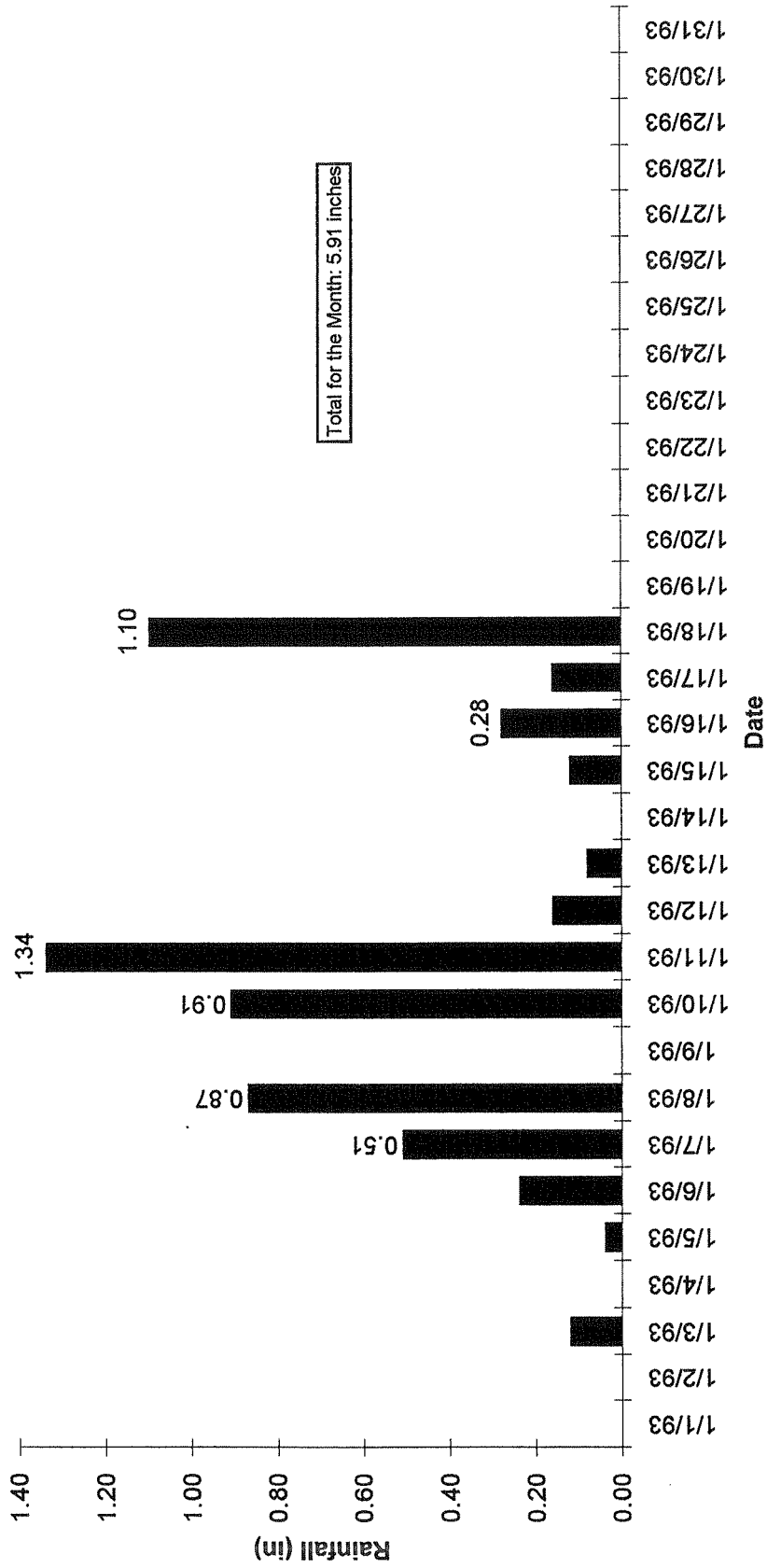


FIGURE 5

CAVE CREEK WATERSHED RAINFALL DISTRIBUTIONS

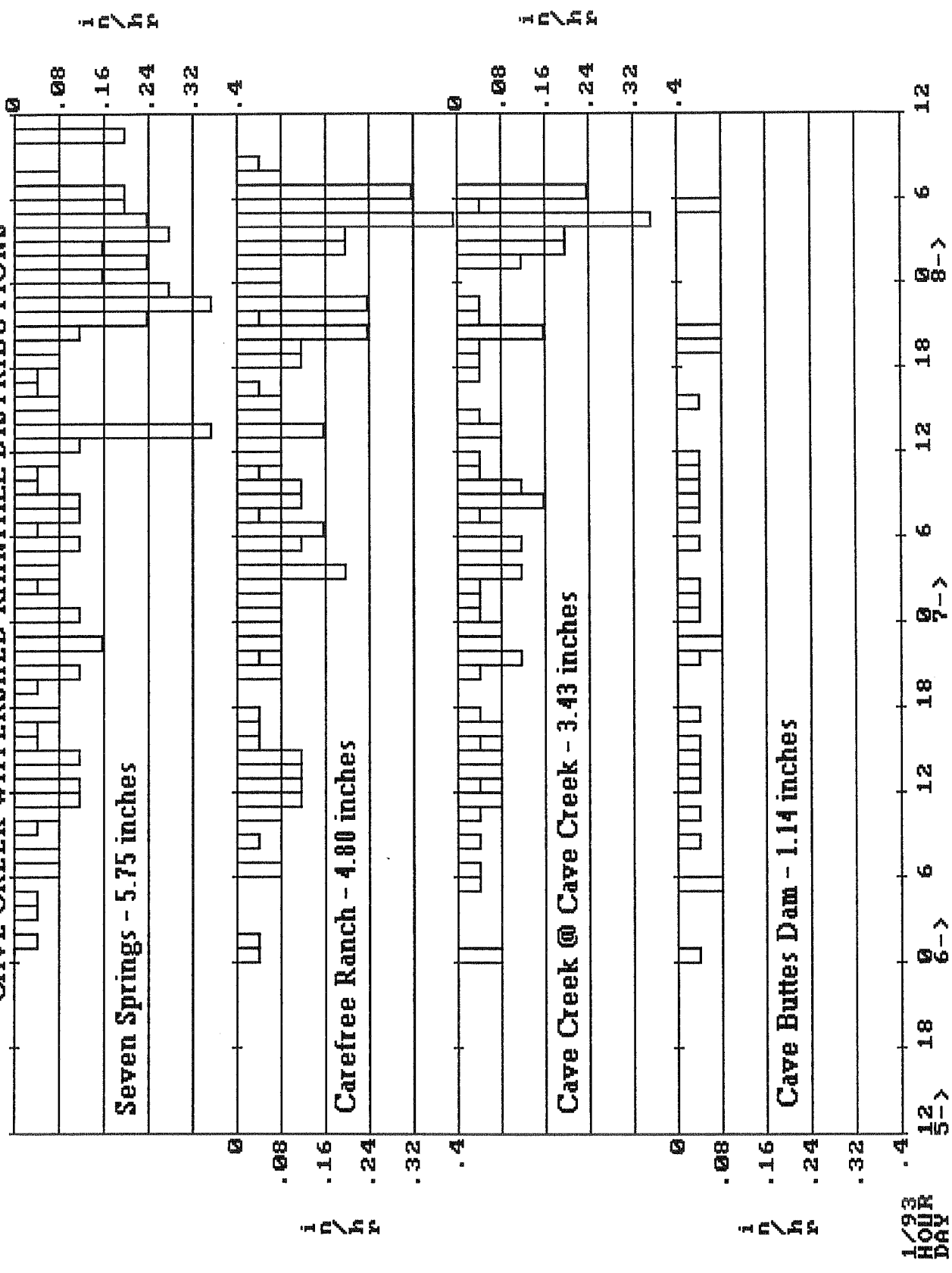


FIGURE 6

Flood Control District of Maricopa County
Monthly Precipitation Report - December
 Month Ending: 12/31/92 2400

Gage Name	Measured Rainfall (in)	ID #
Horsethief Basin	7.01	5700
Cooks Mesa	6.61	5640
Mt. Union	6.34	5380
Mt. Ord	5.79	5960
McDowell Mtn. Park	5.75	5915
Seven Springs	5.59	6450
Munds Park	5.28	140
Hassy Bridge	5.16	5350
Sunset Point	5.08	5730
Garfias Mtn. Ranch	5.00	5670
Columbia Hill	4.92	5685
Minnehaha	4.84	5335
Fraesfield Mountain	4.76	5930
White Tanks E.P.	4.72	5430
Crown King	4.69	5715
Upper Skunk Creek	4.49	5580
Kings Ranch	4.37	6745
Horseshoe Ranch	4.33	5745
Asher Hills	4.29	5900
I-17 and 169	4.25	5790
Sunup Ranch	4.25	5625
Thompson Peak	4.25	5945
Carefree Ranch	4.17	6430
McMicken Dam	4.17	5445
IBW Interceptor	4.02	6120
Lost Dog Wash	4.02	6160
Chrysler Proving Ground	4.02	5460
Arizona Hunt Club	3.98	5775
Florence Junction	3.90	6730
Dysart @ Bell Rd.	3.90	5510
Cave Creek	3.78	6410
Homer Mtn. Ranch	3.74	5760
South Mountain Park	3.70	6510
Agua Fria @ Buckeye	3.70	5400
IBW @ Indian Bend	3.66	6110
New River Dam	3.62	5610
Circle City	3.62	5475
Grapevine	3.54	6420
Towers Mtn.	3.50	5340
Lake Pleasant	3.50	5650
Centennial Railroad	3.46	5100
City of Glendale	3.46	6270
Usery Mtn. Park	3.46	6640
Apache FRS	3.43	6670

Estrella Fan	2.72	6890
Thomas @ 48th St.	2.68	6250
Dreamy Draw	2.68	6300
Vulture Mine	2.68	5260
ParadiseValley Park	2.64	6150
Gila Bend Mountains	2.64	5050
NewRiver @ Glendale	2.64	5505
Phoenix Municipal	2.60	6210
EMF @ Arizona Ave.	2.60	6595
Bender Wash	2.60	6960
Patton Rd.	2.56	5450
Upper Waterman	2.52	6900
Alvord Park	2.52	6000
Durango Complex	2.52	6200
EMF @ Broadway	2.52	6565
Sedona Airport	2.48	150
Upper Tiger Wash	2.44	5130
Sand Tanks Wash	2.40	6940
Magma FRS	2.36	6715
Gladden	2.32	5170
Thunderbird Academy	2.28	6130
Saddleback FRS	2.17	5110
Prescott Valley	2.17	5820
EMF @ Queen Creek	2.13	6580
South Mountain West	2.13	6550
Thomas & 16th St.	2.05	6220
Jackrabbit Wash	2.01	5215
Centennial Levee	1.89	5120
Sweetwater	1.85	6140
Sols Wash	1.77	5275
Vekol Wash	1.73	6980
Sauceda Wash	1.65	6920
Sunset FRS	1.61	5230
Sunnycove FRS	1.57	5245
Centennial Wash	0.79	5180

Flood Control District of Maricopa County
Monthly Precipitation Report - January
 Month Ending: 1/31/93 2400

Gage Name	Measured Rainfall (in)	ID #
Mt. Union	16.50	5380
Cooks Mesa	15.04	5640
Carefree Ranch	13.31	6430
Horse thief Basin	13.31	5700
Seven Springs	13.11	6450
Columbia Hill	12.36	5685
Yarnell Hill	11.73	5290
Mt. Ord	11.18	5960
Garfias Mtn. Ranch	10.98	5670
Sunset Point	10.71	5730
Munds Park	9.88	140
White Tanks E.P.	9.72	5430
Crown King	9.53	5715
Minnehaha	9.09	5335
Red Hill	8.98	120
Grapevine	8.54	6420
Horseshoe Ranch	8.46	5745
McDowell Mtn. Park	8.43	5915
Fraesfield Mountain	8.39	5930
O'Brian	8.11	5320
Humboldt Mtn.	8.11	6440
Upper Skunk Creek	7.91	5580
Lower Goldwater Lake	7.83	310
Sunup Ranch	7.76	5625
Towers Mtn.	7.56	5340
Hassy Bridge	7.56	5350
Kings Ranch	7.48	6745
Smith Peak	7.36	5190
I-17 and 169	7.32	5790
Castle Hot Springs	6.97	5490
Wilhoit	6.89	5365
Usery Mtn. Park	6.81	6640
Asher Hills	6.54	5900
Skunk Creek & I-17	6.50	5565
Upper Tiger Wash	6.50	5130
Homer Mtn. Ranch	6.42	5760
Lake Pleasant	6.38	5650
Arizona Hunt Club	6.30	5775
Dewey	6.30	5805
Signal Butte FRS	6.18	6625
Thompson Peak	6.18	5945
Adobe Dam	6.02	5535
Durango Complex	5.91	6200
White Tanks 3	5.91	5415

Signal Butte FRS	3.43	6625
Lower Goldwater Lake	3.43	310
Powerline FRS	3.39	6680
Castle Hot Springs	3.39	5490
Dewey	3.39	5805
Maryvale Muni Golf	3.35	6260
Vineyard FRS	3.35	6685
McMicken Floodway	3.35	5435
A.C.D.C. & 43rd Ave	3.31	6320
Deer Valley Airport	3.27	5550
Pima Wash	3.27	6530
Buckeye FRS #1	3.23	5200
Humboldt Mtn.	3.23	6440
White Tanks 3	3.19	5415
Holly Acres	3.19	6860
O'Brian	3.19	5320
Adobe Dam	3.19	5535
Spookhill FRS	3.15	6060
Guadalupe FRS	3.15	6500
Box Canyon	3.11	5305
Smith Peak	3.07	5190
Cave Buttes Dam	3.03	6400
Thunder Mountain	3.03	6655
Buckeye FRS #2	3.03	5205
Skunk Creek & I-17	3.03	5565
Morristown	3.03	5220
Rittenhouse FRS	3.03	6700
Cave Creek & Cactus	2.99	6330
Kleinman Park	2.99	6030
Buckeye FRS #3	2.95	6810
Queen Creek Rd.	2.95	6610
Wilhoit	2.95	5365
White Tanks 4	2.95	6820
Greenway & 32nd Ave	2.95	6340
P.V. Country Club	2.91	6290
Perry Park	2.91	6230
New River @ Bell	2.87	5595
Mountain View Park	2.87	6050
Carrage Lane Park	2.83	6520
Roeser @ 2nd. St.	2.83	6010
Salt & 24th St.	2.83	6020
Missouri @ 16th St.	2.80	6280
Mesa Tower	2.80	6540
Mt. Oatman	2.80	5000
IBW @ McKellips Rd.	2.76	6100
Waterman Wash	2.76	6880
Wittmann	2.76	5455
Papago Park	2.76	6240
A.C.D.C. & 67th Ave	2.76	5520
Fitch Park	2.72	6040
Estrella Park	2.72	6840

Perry Park	5.83	6230
Morristown	5.83	5220
Deer Valley Airport	5.83	5550
Spookhill FRS	5.75	6060
Apache FRS	5.63	6670
Chrysler P.G.	5.59	5460
Maryvale Muni Golf	5.59	6260
Florence Junction	5.55	6730
Circle City	5.55	5475
Missouri @ 16th St.	5.51	6280
Sweetwater	5.47	6140
Centennial Wash	5.47	5180
Powerline FRS	5.43	6680
Box Canyon	5.39	5305
Sedona Airport	5.35	150
Dysart @ Bell Rd.	5.31	5510
Phoenix Municipal	5.31	6210
Dreamy Draw	5.28	6300
ParadiseValley Park	5.28	6150
Vineyard FRS	5.20	6685
Estrella Park	5.20	6840
Jackrabbit Wash	5.20	5215
Wittmann	5.12	5455
Agua Fria @ Buckeye	5.04	5400
City of Glendale	5.04	6270
Lost Dog Wash	5.00	6160
IBW @ Indian Bend	4.96	6110
A.C.D.C. & 43rd Ave	4.96	6320
Thomas @ 48th St.	4.92	6250
Rittenhouse FRS	4.92	6700
Cave Creek & Cactus	4.92	6330
Greenway & 32nd Ave	4.88	6340
Mountain View Park	4.76	6050
Sols Wash	4.69	5275
Thomas & 16th St.	4.65	6220
A.C.D.C. & 67th Ave	4.65	5520
Thunder Mountain	4.65	6655
Fitch Park	4.57	6040
Thunderbird Academy	4.53	6130
New River @ Bell	4.49	5595
Roeser @ 2nd. St.	4.49	6010
IBW @ McKellips Rd.	4.45	6100
Alvord Park	4.45	6000
White Tanks 4	4.45	6820
McMicken Floodway	4.33	5435
Patton Rd.	4.33	5450
New River Dam	4.29	5610
Kleinman Park	4.25	6030
Prescott Valley	4.25	5820
EMF @ Broadway	4.21	6565
McMicken Dam	4.21	5445

Centennial Railroad	4.09	5100
Cave Buttes Dam	4.09	6400
P.V. Country Club	4.02	6290
Sunnycove FRS	3.98	5245
Sunset FRS	3.98	5230
South Mountain Park	3.90	6510
Estrella Fan	3.82	6890
Buckeye FRS #1	3.78	5200
Buckeye FRS #3	3.78	6810
Gila Bend Mountains	3.74	5050
Vulture Mine	3.70	5260
Queen Creek Rd.	3.66	6610
IBW Interceptor	3.66	6120
Papago Park	3.54	6240
Guadalupe FRS	3.54	6500
NewRiver @ Glendale	3.54	5505
Mesa Tower	3.50	6540
Waterman Wash	3.50	6880
Buckeye FRS #2	3.43	5205
Pima Wash	3.23	6530
Carrage Lane Park	3.07	6520
EMF @ Arizona Ave.	3.03	6595
Saddleback FRS	2.99	5110
EMF @ Queen Creek	2.72	6580
Gladden	2.68	5170
South Mountain West	2.48	6550
Mt. Oatman	2.48	5000
Upper Waterman	2.48	6900
Vekol Wash	2.32	6980
Magma FRS	2.05	6715
Centennial Levee	1.93	5120
Bender Wash	1.77	6960
Sand Tanks Wash	1.77	6940
Sauceda Wash	1.65	6920

Flood Control District of Maricopa County
Precipitation Report
January 6th - 18th, 1993

Gage Name	Measured Rainfall (in)	ID #
Cooks Mesa	14.17	5640
Mt. Union	13.94	5380
Horsethief Basin	12.44	5700
Seven Springs	12.17	6450
Columbia Hill	12.05	5685
Yarnell Hill	11.22	5290
Garfias Mtn. Ranch	10.67	5670
Mt. Ord	10.39	5960
Sunset Point	10.20	5730
White Tanks E.P.	9.57	5430
Minnehaha	8.46	5335
Grapevine	8.31	6420
Fraesfield Mountain	8.23	5930
McDowell Mtn. Park	8.19	5915
Humboldt Mtn.	7.87	6440
Crown King	7.76	5715
Sunup Ranch	7.60	5625
Upper Skunk Creek	7.60	5580
Horseshoe Ranch	7.32	5745
Smith Peak	7.28	5190
Carefree Ranch	7.24	6430
Kings Ranch	7.24	6745
Hassy Bridge	7.17	5350
Castle Hot Springs	6.73	5490
Towers Mtn.	6.69	5340
Usery Mtn. Park	6.65	6640
Asher Hills	6.46	5900
Upper Tiger Wash	6.38	5130
I-17 and 169	6.34	5790
Lake Pleasant	6.30	5650
Skunk Creek & I-17	6.30	5565
Wilhoit	6.22	5365
Signal Butte FRS	6.10	6625
Thompson Peak	6.02	5945
Horner Mtn. Ranch	5.91	5760
Adobe Dam	5.87	5535
White Tanks 3	5.83	5415
Durango Complex	5.75	6200

Deer Valley Airport	5.67	5550
Perry Park	5.67	6230
Morristown	5.63	5220
Spookhill FRS	5.63	6060
Arizona Hunt Club	5.55	5775
Chrysler P.G.	5.51	5460
Apache FRS	5.51	6670
Maryvale Muni Golf	5.47	6260
Dewey	5.43	5805
Circle City	5.39	5475
Centennial Wash	5.39	5180
Missouri @ 16th St.	5.39	6280
Sweetwater	5.31	6140
Florence Junction	5.28	6730
Box Canyon	5.24	5305
Dysart @ Bell Rd.	5.20	5510
Phoenix Municipal	5.20	6210
Powerline FRS	5.20	6680
ParadiseValley Park	5.16	6150
Dreamy Draw	5.16	6300
Jackrabbit Wash	5.12	5215
Estrella Park	5.08	6840
Wittmann	5.04	5455
Vineyard FRS	4.96	6685
Agua Fria @ Buckeye	4.96	5400
IBW @ Indian Bend	4.84	6110
City of Glendale	4.84	6270
O'Brian	4.84	5320
Lost Dog Wash	4.80	6160
A.C.D.C. & 43rd Ave	4.76	6320
Cave Creek & Cactus	4.76	6330
Thomas @ 48th St.	4.76	6250
Greenway & 32nd Ave	4.76	6340
Rittenhouse FRS	4.69	6700
Mountain View Park	4.61	6050
Sols Wash	4.61	5275
A.C.D.C. & 67th Ave	4.57	5520
Thunder Mountain	4.53	6655
Thomas & 16th St.	4.49	6220
Thunderbird Academy	4.45	6130
IBW @ McKellips Rd.	4.41	6100
White Tanks 4	4.41	6820
Fitch Park	4.41	6040
New River @ Bell	4.37	5595
Roeser @ 2nd. St.	4.33	6010
Alvord Park	4.29	6000

Patton Rd.	4.21	5450
McMicken Floodway	4.21	5435
McMicken Dam	4.17	5445
New River Dam	4.13	5610
EMF @ Broadway	4.13	6565
Kleinman Park	4.06	6030
Cave Buttes Dam	3.98	6400
Centennial Railroad	3.98	5100
P.V. Country Club	3.94	6290
Sunnycove FRS	3.90	5245
South Mountain Park	3.78	6510
Buckeye FRS #1	3.74	5200
Buckeye FRS #3	3.74	6810
Prescott Valley	3.70	5820
Gila Bend Mountains	3.70	5050
Estrella Fan	3.66	6890
IBW Interceptor	3.54	6120
Queen Creek Rd.	3.46	6610
Sunset FRS	3.46	5230
Buckeye FRS #2	3.43	5205
Cave Creek	3.43	6410
NewRiver @ Glendale	3.43	5505
Guadalupe FRS	3.39	6500
Waterman Wash	3.39	6880
Mesa Tower	3.39	6540
Vulture Mine	3.31	5260
Pima Wash	3.11	6530
Saddleback FRS	2.95	5110
Carrage Lane Park	2.91	6520
EMF @ Arizona Ave.	2.87	6595
Gladden	2.68	5170
Papago Park	2.64	6240
EMF @ Queen Creek	2.56	6580
Mt. Oatman	2.44	5000
Upper Waterman	2.40	6900
South Mountain West	2.40	6550
Vekol Wash	2.13	6980
Centennial Levee	1.93	5120
Magma FRS	1.73	6715
Salt & 24th St.	1.73	6020
Bender Wash	1.69	6960
Sand Tanks Wash	1.61	6940
Sauceda Wash	1.46	6920

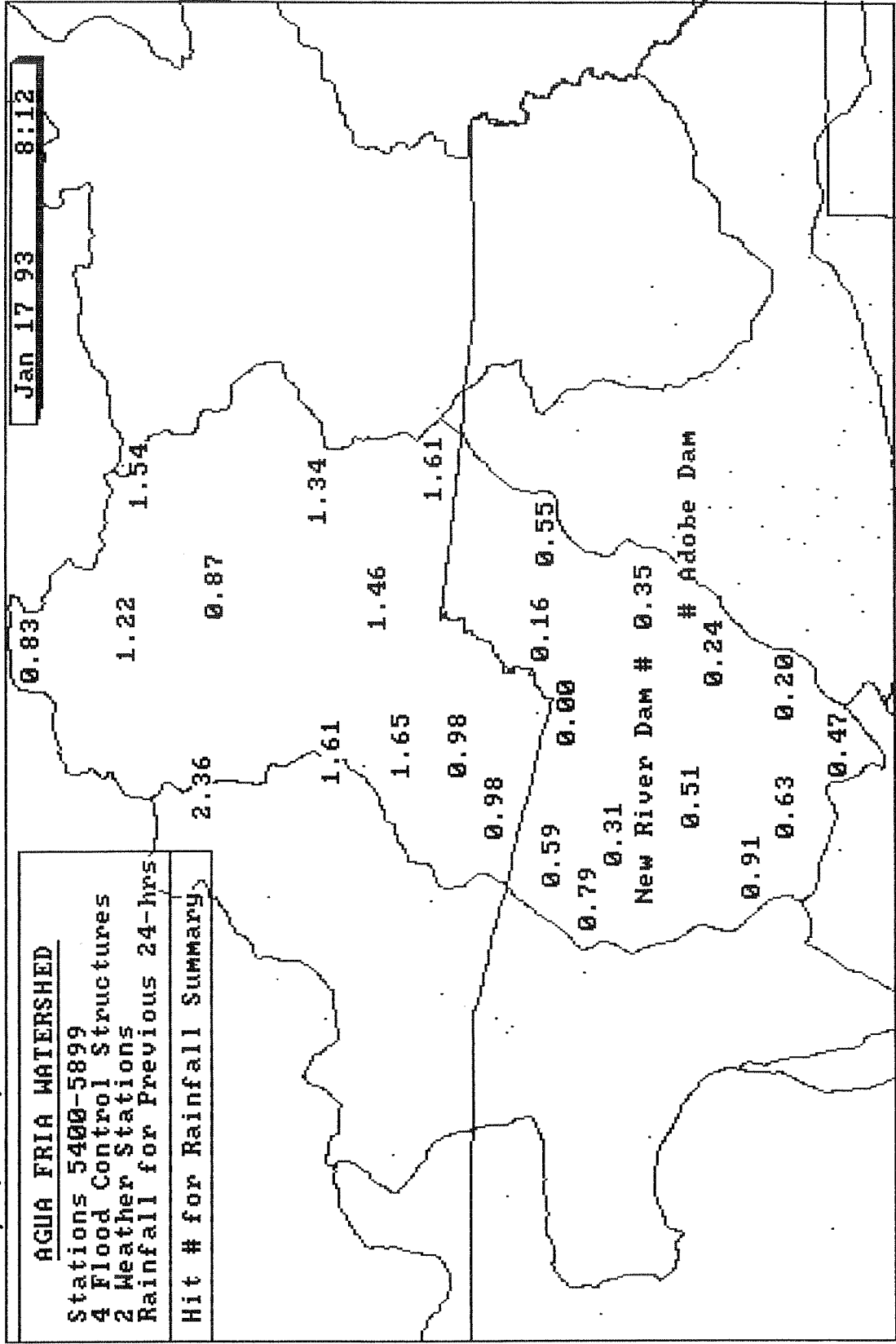
Flood Control District of Maricopa County
Daily Precipitation Report
Ending 1/ 8/93 0700

Gage Location	Daily Total	Monthly Total	Water Year to Date	Gage ID #
Mt. Union	4.69	7.99	7.99	5380
Cooks Mesa	4.06	6.77	6.77	5640
White Tanks E.P.	3.78	5.31	5.31	5430
Mt. Ord	3.74	6.06	6.06	5960
Seven Springs	3.62	6.06	6.06	6450
Horsehief Basin	3.43	5.98	5.98	5700
Garfias Mtn. Ranch	3.39	5.75	5.75	5670
Columbia Hill	3.35	5.39	5.39	5685
Yarnell Hill	3.11	5.59	5.59	5290
Smith Peak	2.95	3.70	3.70	5190
Carefree Ranch	2.83	4.84	4.84	6430
Williams Peak	2.83	4.84	4.84	350
Towers Mtn.	2.80	4.09	4.09	5340
Munds Park	2.72	4.41	4.41	140
Sunset Point	2.48	4.09	4.09	5730
Upper Skunk Creek	2.40	4.21	4.21	5580
Crown King	2.40	3.98	3.98	5715
Horseshoe Ranch	2.20	3.23	3.23	5745
Sunup Ranch	2.17	3.11	3.11	5625
Lower Goldwater Lake	2.13	3.66	3.66	310
Fraesfield Mountain	2.09	3.62	3.62	5930
Cave Creek	2.01	3.62	3.62	6410
Humboldt Mtn.	2.01	3.58	3.58	6440
Kings Ranch	1.97	2.99	2.99	6745
Castle Hot Springs	1.97	3.46	3.46	5490
Usery Mtn. Park	1.97	2.76	2.76	6640
Lake Pleasant	1.89	3.03	3.03	5650
Minnehaha	1.85	3.46	3.46	5335
Spookhill FRS	1.77	2.56	2.56	6060
McDowell Mtn. Park	1.77	3.31	3.31	5915
Upper Tiger Wash	1.77	2.68	2.68	5130
Morristown	1.73	2.56	2.56	5220
Horner Mtn. Ranch	1.69	2.28	2.28	5760
Centennial Wash	1.61	2.13	2.13	5180
Hassy Bridge	1.61	2.83	2.83	5350
Jackrabbit Wash	1.57	2.17	2.17	5215
Wilhoit	1.57	2.76	2.76	5365
IBW Interceptor	1.57	2.40	2.40	6120
Thunder Mountain	1.50	2.13	2.13	6655
Adobe Dam	1.46	2.36	2.36	5535
Mountain View Park	1.46	2.09	2.09	6050
Deer Valley Airport	1.42	2.36	2.36	5550
Apache FRS	1.42	1.97	1.97	6670

Circle City	1.38	2.20	2.20	5475
Florence Junction	1.38	2.36	2.36	6730
Salt & 24th St.	1.38	1.81	1.81	6020
New River Dam	1.38	2.36	2.36	5610
I-17 and 169	1.34	2.20	2.20	5790
Skunk Creek & I-17	1.30	2.05	2.05	5565
Sedona Airport	1.30	1.97	1.97	150
Grapevine	1.30	2.36	2.36	6420
Fitch Park	1.30	1.97	1.97	6040
Chrysler P.G.	1.30	2.13	2.13	5460
Arizona Hunt Club	1.30	1.93	1.93	5775
Roeser @ 2nd. St.	1.30	1.50	1.50	6010
Signal Butte FRS	1.26	1.85	1.85	6625
Rittenhouse FRS	1.26	1.97	1.97	6700
IBW @ Indian Bend	1.26	2.05	2.05	6110
Durango Complex	1.26	1.77	1.77	6200
Powerline FRS	1.22	1.89	1.89	6680
Vineyard FRS	1.22	1.81	1.81	6685
Wittmann	1.22	1.97	1.97	5455
Asher Hills	1.18	2.13	2.13	5900
ParadiseValley Park	1.18	1.97	1.97	6150
White Tanks 3	1.18	2.17	2.17	5415
Papago Park	1.18	1.73	1.73	6240
Greenway & 32nd Ave	1.18	2.01	2.01	6340
Phoenix Municipal	1.18	1.69	1.69	6210
Cave Creek & Cactus	1.18	1.97	1.97	6330
Box Canyon	1.18	2.24	2.24	5305
IBW @ McKellips Rd.	1.14	1.73	1.73	6100
Perry Park	1.10	1.73	1.73	6230
Dreamy Draw	1.10	1.73	1.73	6300
Buckeye FRS #1	1.06	1.69	1.69	5200
A.C.D.C. & 43rd Ave	1.06	2.01	2.01	6320
Dewey	1.06	1.73	1.73	5805
Lost Dog Wash	1.06	1.97	1.97	6160
Buckeye FRS #3	1.06	1.38	1.38	6810
Thomas @ 48th St.	1.06	1.69	1.69	6250
Dysart @ Bell Rd.	1.06	1.97	1.97	5510
White Tanks 4	1.06	1.50	1.50	6820
Kleinman Park	1.02	1.65	1.65	6030
New River @ Bell	0.98	1.65	1.65	5595
Sweetwater	0.98	1.61	1.61	6140
Thompson Peak	0.98	1.97	1.97	5945
Prescott Valley	0.98	1.30	1.30	5820
Thunderbird Academy	0.94	1.54	1.54	6130
Buckeye FRS #2	0.94	1.30	1.30	5205
Estrella Park	0.94	1.46	1.46	6840
South Mountain Park	0.94	1.46	1.46	6510
Estrella Fan	0.94	1.38	1.38	6890
Holly Acres	0.91	1.54	1.54	6860
McMicken Floodway	0.91	1.65	1.65	5435
NewRiver @ Glendale	0.91	1.18	1.18	5505

Missouri @ 16th St.	0.91	1.54	1.54	6280
Alvord Park	0.87	1.30	1.30	6000
Maryvale Muni Golf	0.87	1.54	1.54	6260
City of Glendale	0.83	1.65	1.65	6270
Sunset FRS	0.83	1.65	1.65	5230
Waterman Wash	0.83	1.26	1.26	6880
A.C.D.C. & 67th Ave	0.83	1.50	1.50	5520
Guadalupe FRS	0.79	1.26	1.26	6500
EMF @ Broadway	0.79	1.30	1.30	6565
P.V. Country Club	0.79	1.34	1.34	6290
Queen Creek Rd.	0.79	1.34	1.34	6610
Mesa Tower	0.79	1.34	1.34	6540
Thomas & 16th St.	0.75	1.18	1.18	6220
Agua Fria @ Buckeye	0.75	1.46	1.46	5400
Gila Bend Mountains	0.67	1.06	1.06	5050
Patton Rd.	0.63	1.22	1.22	5450
Sunnycove FRS	0.63	1.26	1.26	5245
Upper Waterman	0.59	0.94	0.94	6900
Mt. Oatman	0.59	0.91	0.91	5000
Centennial Railroad	0.59	1.06	1.06	5100
McMicken Dam	0.59	1.42	1.42	5445
Saddleback FRS	0.59	1.18	1.18	5110
Carrage Lane Park	0.59	1.06	1.06	6520
Sols Wash	0.55	1.34	1.34	5275
EMF @ Arizona Ave.	0.51	1.02	1.02	6595
Cave Buttes Dam	0.47	1.26	1.26	6400
South Mountain West	0.47	0.79	0.79	6550
Bender Wash	0.47	0.83	0.83	6960
EMF @ Queen Creek	0.43	0.87	0.87	6580
Vekol Wash	0.43	0.91	0.91	6980
Sauceda Wash	0.39	0.67	0.67	6920
Magma FRS	0.39	1.14	1.14	6715
Gladden	0.39	0.83	0.83	5170
Sand Tanks Wash	0.28	0.67	0.67	6940
Pima Wash	0.28	0.79	0.79	6530
Centennial Levee	0.28	0.67	0.67	5120
O'Brian	0.24	1.30	1.30	5320
Vulture Mine	0.04	0.63	0.63	5260

FIGURE 7



Monthly Total Rainfall in the Phoenix Metro Area

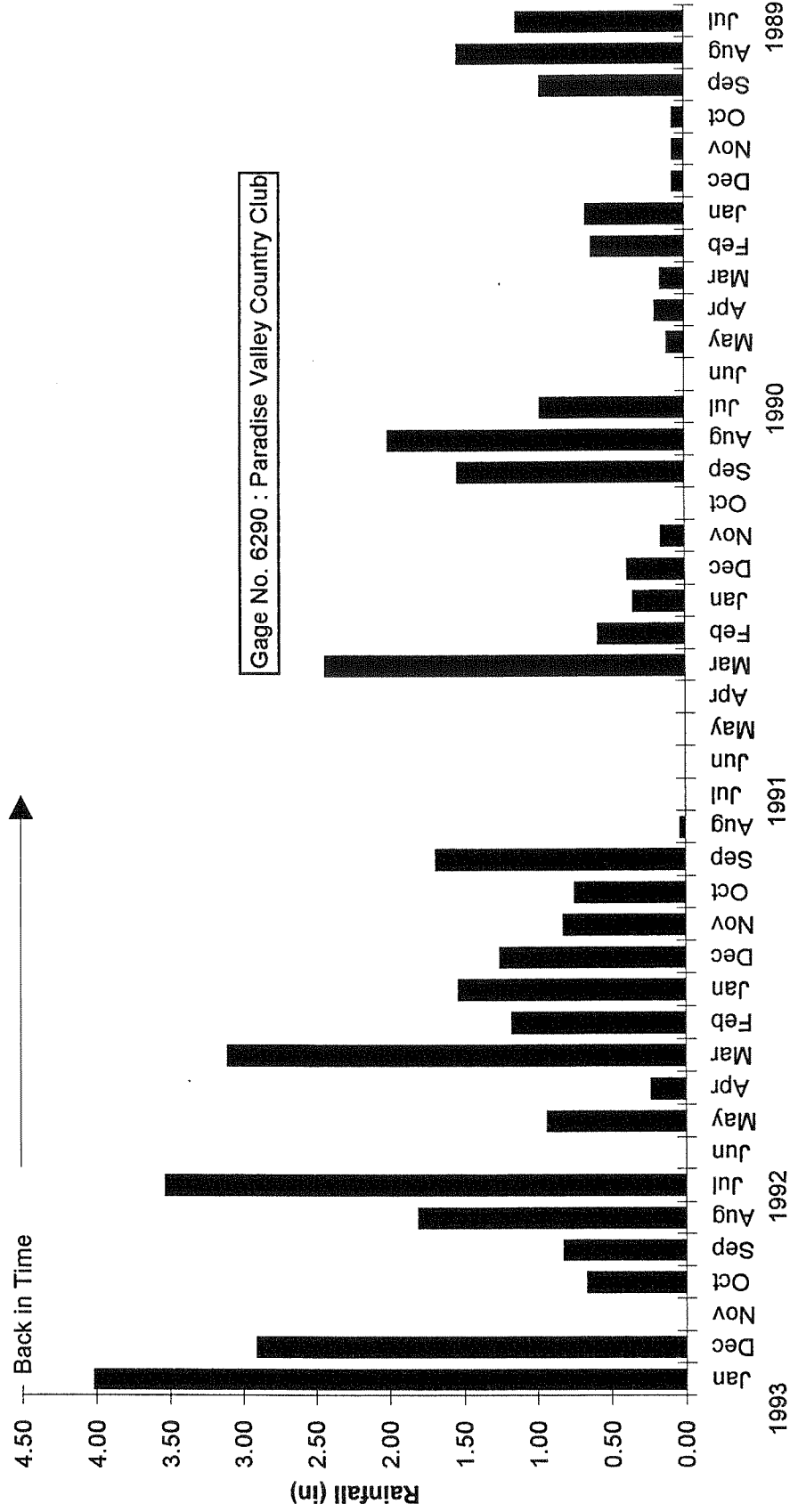


FIGURE 8

RUNOFF

General information on the flooding caused by the December and January rainfalls is provided by reprinting a few paragraphs from a post-storm "Water Fact Sheet" compiled by the USGS (USGS, 1993):

The first flooding occurred on small drainage basins. Floods such as those observed at Tanque Verde Creek in Tucson, Oak Creek near Cornville, Big Sandy River near Wickiup, Eagle Creek near Morenci, (New River, Hassayampa River, Queen Creek) and White River near Fort Apache all have less than a 5-percent (2-year return period) chance of occurring in any given year. As these small streams contributed flow to the larger streams, floods began to occur on the Verde, Salt, Gila, and Agua Fria Rivers and Rillito Creek. The accumulated waters produced floods on these streams that have only a 1- to 2-percent (100- to 50-year return period) chance of occurring in any given year. Although these peak flows are high, the most unusual aspect of these floods was the volume of water produced. For example, in the Gila River just above San Carlos Reservoir, the highest flood ever recorded at that site occurred in 1983 during a storm that affected the southern part of Arizona. At the peak of the flood, about 150,000 cubic feet of water passed that station. In January 1993, the highest of the three peaks that occurred in the flood is estimated to be 109,000 cubic feet per second. When the volumes of water in the two floods are compared, however, the flood of 1993 is estimated to be 76 percent larger than the flood in 1983. In 1983, the flood volume was 503,000 acre-feet, but in January 1993, the prolonged period of rainfall (combined with high initial soil moisture) caused a much longer duration of flooding and the flood volume was 884,900 acre-feet - more than enough water to fill the San Carlos Reservoir downstream whose available storage capacity for flood control at the time was 239,500 acre-feet. Other streams also contributed water to the

reservoir, resulting in a spillway discharge from the reservoir of 32,500 cubic feet per second. Of the (major rivers in Arizona), only the Salt River near Roosevelt and Big Sandy near Wickiup indicate less flood volume in the 1993 flood than for a flood with a 1-percent chance (100-year return period) of occurring at those sites. Because of the high elevation of many tributary drainages to the Salt River, part of the precipitation fell as snow, which has yet to melt. This effect explains the low volume of flood runoff in the Salt River compared with (other rivers in the State). The National Weather Service reports that because of these storms, the snowpack is at 154 percent of normal in the Salt-Verde watershed, and runoff from this snowpack is projected at 342 percent of normal.

The ALERT system recorded runoff at nearly all of it's 50 water level gages. Table 5 presents recorded maximum discharges on FCD stream gages for the month of January, and a reason is given if a maximum was not recorded. Figures 9 through 12 are selected hydrographs at ALERT streamgage locations. Table 6 lists flow impoundment data for all gaged FCD structures, including maximum percent full, maximum stage, peak storage, peak outflow, and the date/time of occurrence. Only two District dams exceeded 15% of storage capacity: Cave Buttes at 38% and New River at 34%. Both are record impoundments for the structures. Stage hydrographs for Cave Buttes and New River Dams are presented as Figures 13 and 14. Figures 15 and 16 show graphically the relationships between rainfall and runoff on the Cave Creek and New River watersheds. Finally, two inflow hydrographs from Salt River Project are provided as Figures 17 and 18, showing inflows to Lake Roosevelt and the Verde River near the Salt confluence. The maximum recorded discharge on the Salt

River at Granite Reef Dam was 125,000 cfs on January 8th (SRP, 1993). Appendix 2 summarizes flood damages sustained as a result of the January 8-10th and 15-18th storms. At present, efforts are underway by the District and the USGS to make indirect streamflow measurements on major creeks and rivers based on high-water marks placed immediately after the runoff events. These measurements will be available in future reports.

Flood Control District of Maricopa County

January 1993 Storms

Recorded Maximum Discharges at FCD Stream Gages

Gage Name	ID #	Gage Height (ft)	Peak Discharge (cfs)	Date / Time
ACDC @ 43rd Ave.				
	Poor Rating			
ACDC @ 67th Ave.	5523	3.6	480	01/08;07:30
Agua Fria @ Buckeye Rd.	5403	1.8	2600	01/11;01:17
Carefree Ranch	6434	0.1	3	1/08;17:56
Cave Creek @ Cactus	6333	11.5	1370	1/10;23:34
Cave Creek @ Cave Creek *	6413	6.9	5800	1/08;01:19
Centennial Wash @ SPRR	5103	2.2	270	1/11;14:30
EMF @ Arizona Ave.				
	Poor rating due to backwater effects			
EMF @ Broadway Rd.	6568	3.0	1580	1/11;04:19
EMF @ Queen Creek Rd.	6583	3.1	1700	1/11;09:01
Estrella Fan				
	Instrument not yet installed			
Gila R. @ Estrella Parkway	6853	19.1	137,300	1/08;19:45
Gila R. @ St. Rt. 85				
	Gage removed prior to storms			
Grapevine Wash	6423	0.7	7	1/08;03:09
Hassayampa R. @ Box Canyon				
	Gage damaged by floods - Est. peak of 29,000 cfs on 1/08/93			
Hassayampa R. @ Wagner Rd.	5353	5.0	13,800	1/08;09:14
IBW @ Indian Bend Rd.	6113	4.3	3900	1/11;02:25
IBW @ McKellips	6099	4.9	3100	1/11;04:02
IBW @ Sweetwater Ave.	6139	3.0	370	1/18;13:42
McMicken Floodway				
	Poor Rating			
New River @ Bell Rd.				
	Poor Rating - Gage Vandalized			
New River @ Glendale Ave.	5508	2.6	6980	1/11;13:46
Pima Wash @ 48th St.				
	No flow recorded due to instrument failure			
Salt R. @ 24th St. *	6023	13.9	88,800	1/08;12:56
Sauceda Wash	6923	1.2	3	1/08;03:45
Skunk Cr. @ I-17	5568	4.4	4980	1/11;01:59
Vekol Wash				
	Poor record due to channel construction- probably no flow			

* Peak recorded prior to gage being destroyed by floodwaters

Gila River at Estrella Parkway

January, 1993

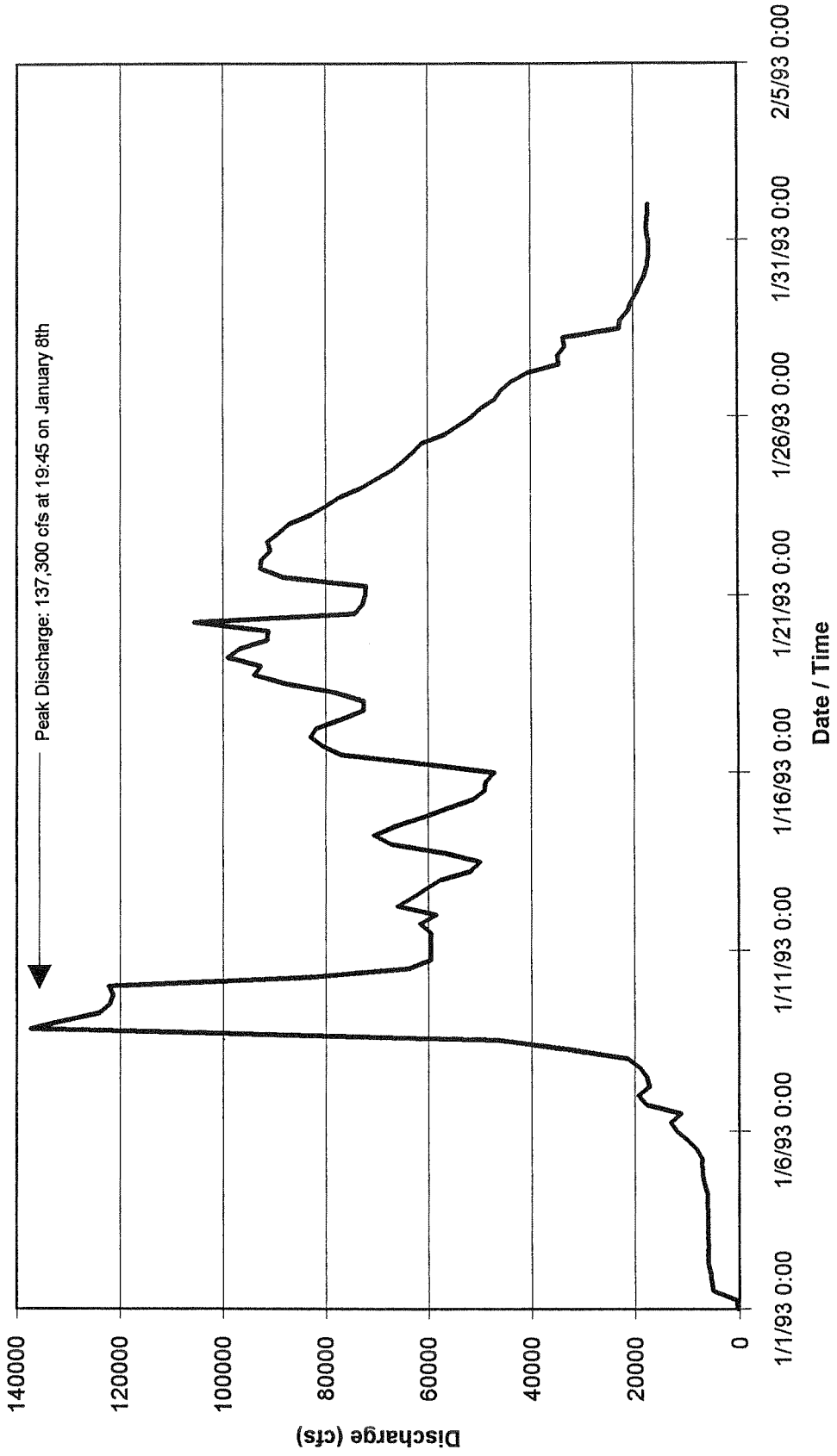
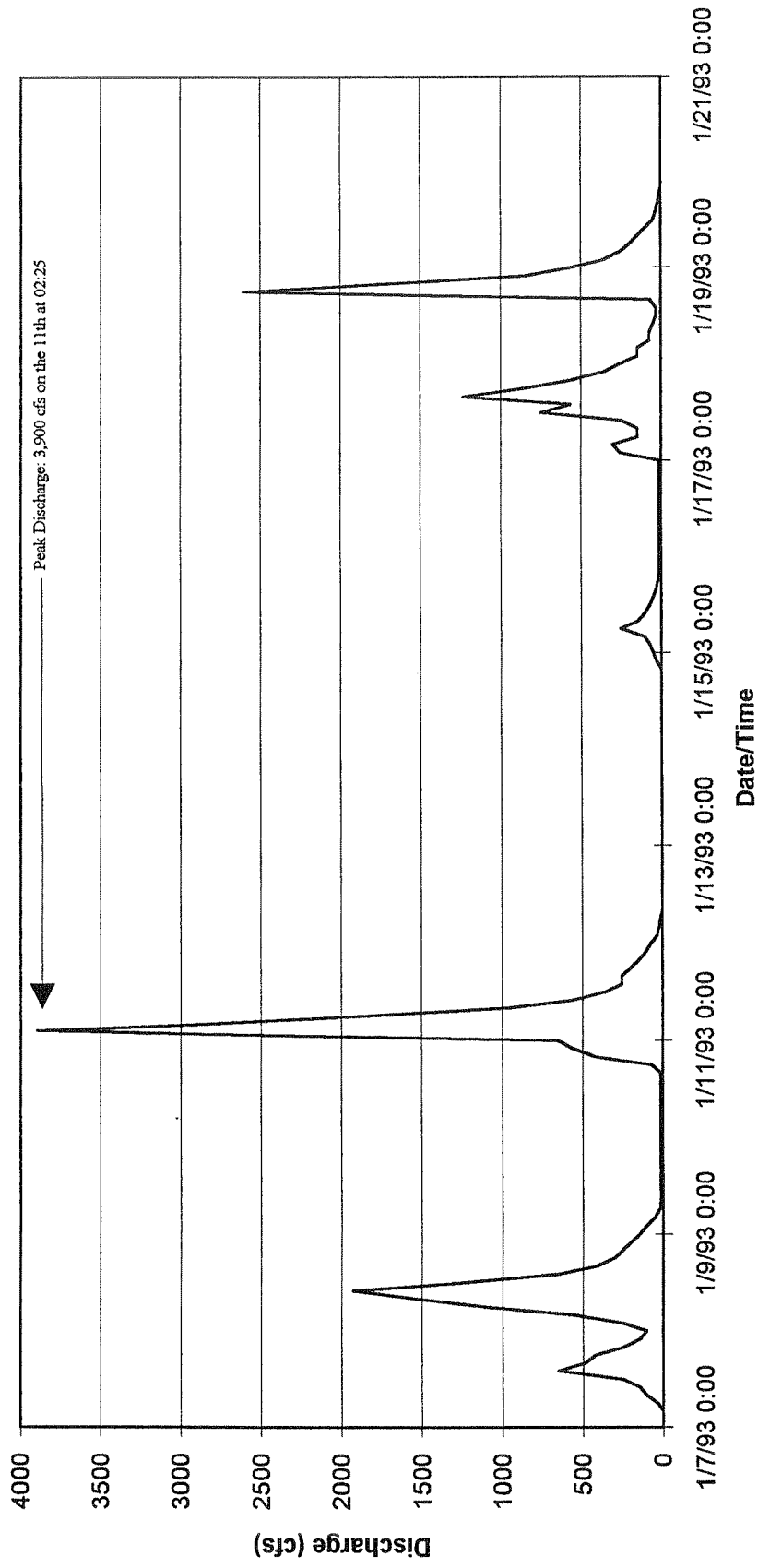


FIGURE 9

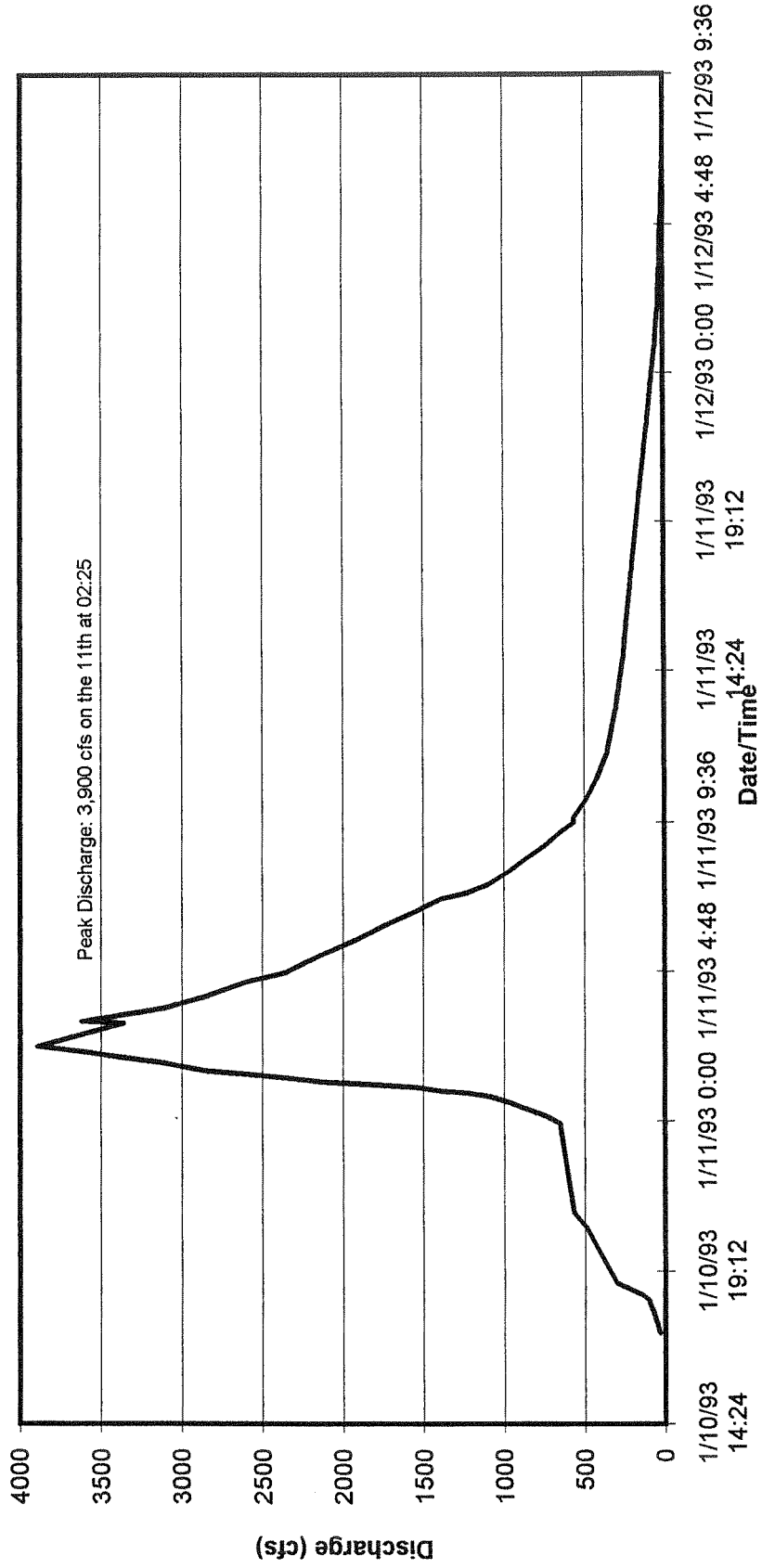
Indian Bend Wash at Indian Bend Rd.

January, 1993



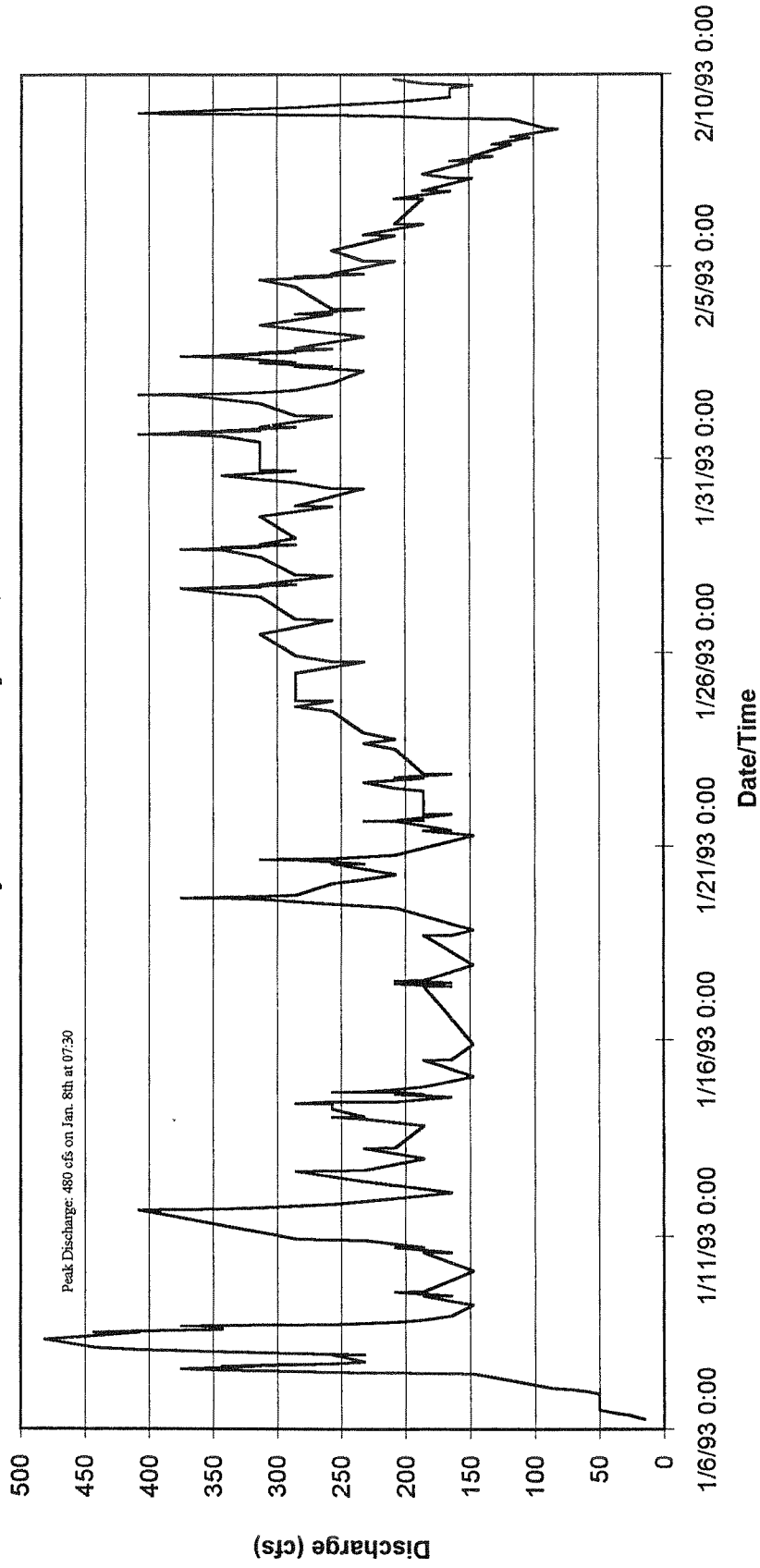
Indian Bend Wash at Indian Bend Rd.

Storm of January 10-11, 1993



ACDC @ 67th Avenue

January 6th - February 10th, 1993



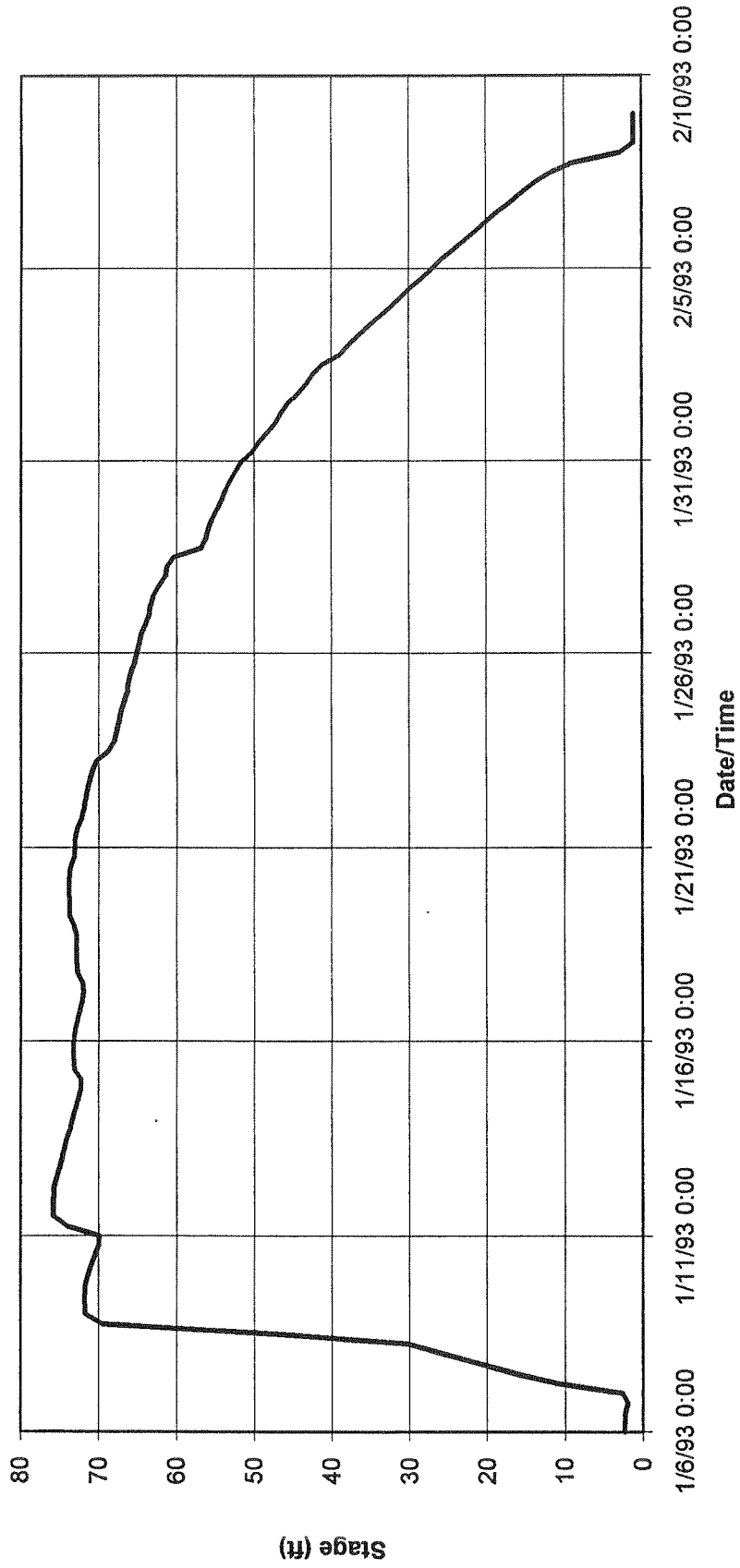
Flood Control District of Maricopa County
January 1993 Storms

Floodwater Storage Impoundments at FCD Structures

Structure Name	ID #	Maximum Percent Full	Peak Storage (ac-ft)	Peak Stage (ft)	Peak Outflow (cfs)	Date / Time
Adobe Dam	5532	6.0	1039.0	13.00	1162.0	1/08 - 17:35
Apache Jct. FRS	6672	0.0	0.0	2.10	0.0	1/11 - 07:52
Buckeye FRS #1	5202	0.0	0.0	0.00	0.0	na
Buckeye FRS #2	5207	0.0	0.0	1.60	0.0	1/08 - 06:20
Buckeye FRS #3	6812	0.0	0.0	4.14	0.0	1/08 - 06:15
Cave Buttes Dam	6397	38.0	17494.0	75.78	407.0	1/11 - 09:25
Dreamy Draw Dam	6297	0.0	0.0	5.33	63.0	1/18 - 13:17
Guadalupe FRS	6502	5.0	15.0	4.80	0.0	1/11 - 05:53
Harquahala FRS	no gage	xx	xx	xx	xx	xx
McMicken Dam	5447	1.0	315.0	3.60	158.0	1/11 - 07:34
New River Dam	5607	34.0	14986.0	44.40	2300.0	1/08 - 16:13
Powerline FRS	6682	0.0	10.8	3.86	no rating	1/11 - 11:09
Rittenhouse FRS	6702	9.0	359.0	11.00	112.0	1/11 - 11:32
Saddleback FRS	5112	0.0	0.0	0.00	0.0	na
Signal Butte FRS	6627	12.0	166.0	13.30	0.0	1/11 - 14:24
Spookhill FRS	6062	0.0	0.0	6.70	50.0	1/11 - 07:29
Sunnycove FRS	5247	3.0	7.0	8.80	gate closed	1/19 - 05:19
Sunset FRS	5232	5.0	5.0	4.20	gate closed	1/18 - 22:19
Vineyard FRS	6687	13.0	573.0	4.80	102.0	1/11 - 12:09
White Tanks #3	5417	0.0	125.0	2.60	187.0	1/11 - 02:34
White Tanks #4	6822	0.0	744.0	0.50	57.0	1/10 - 23:40

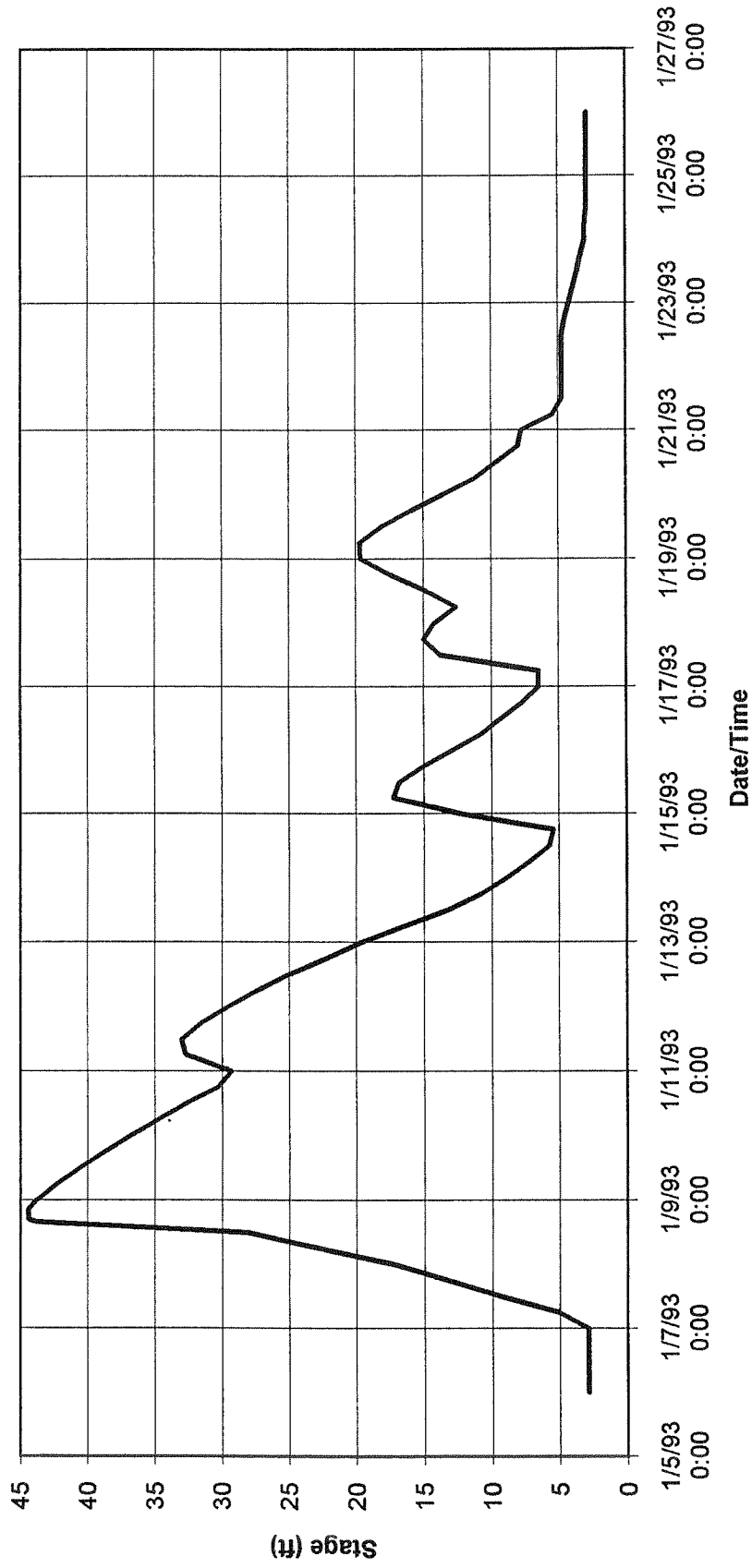
Cave Buttes Dam Stage

Peak Stage: 75.8 ft on 1/11/93 at 09:15, 375 cfs outflow, 17,500 ac-ft, 38.3% full



New River Dam Stage

Peak Stage: 44.4 ft on 1/08/93 at 16:13, 2,300 cfs outflow, 15,000 ac-ft, 34.2% full



CAVE CREEK WATERSHED - JANUARY 6-12, 1993

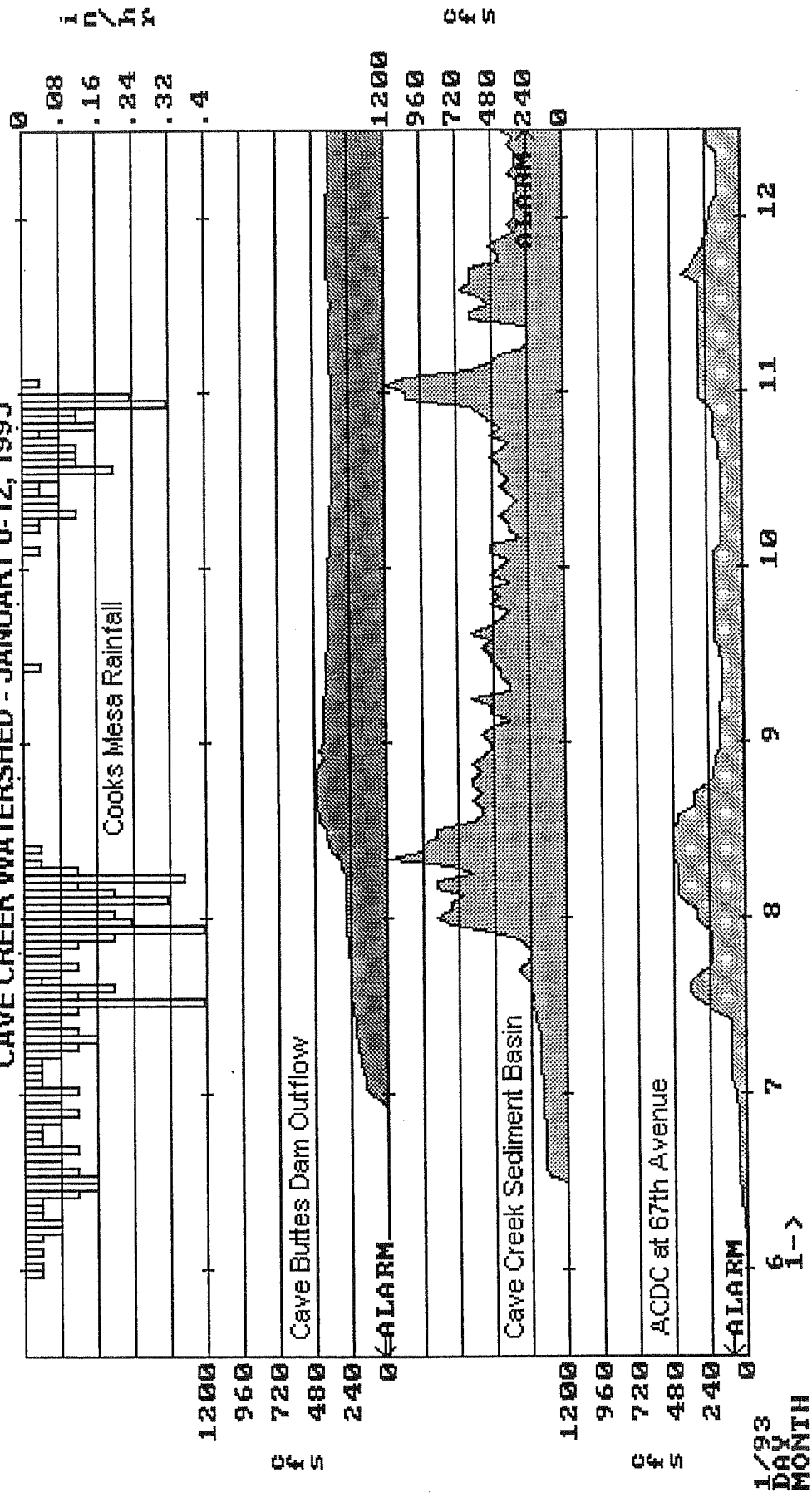


FIGURE 15

NEW RIVER WATERSHED - JANUARY 14, 1993

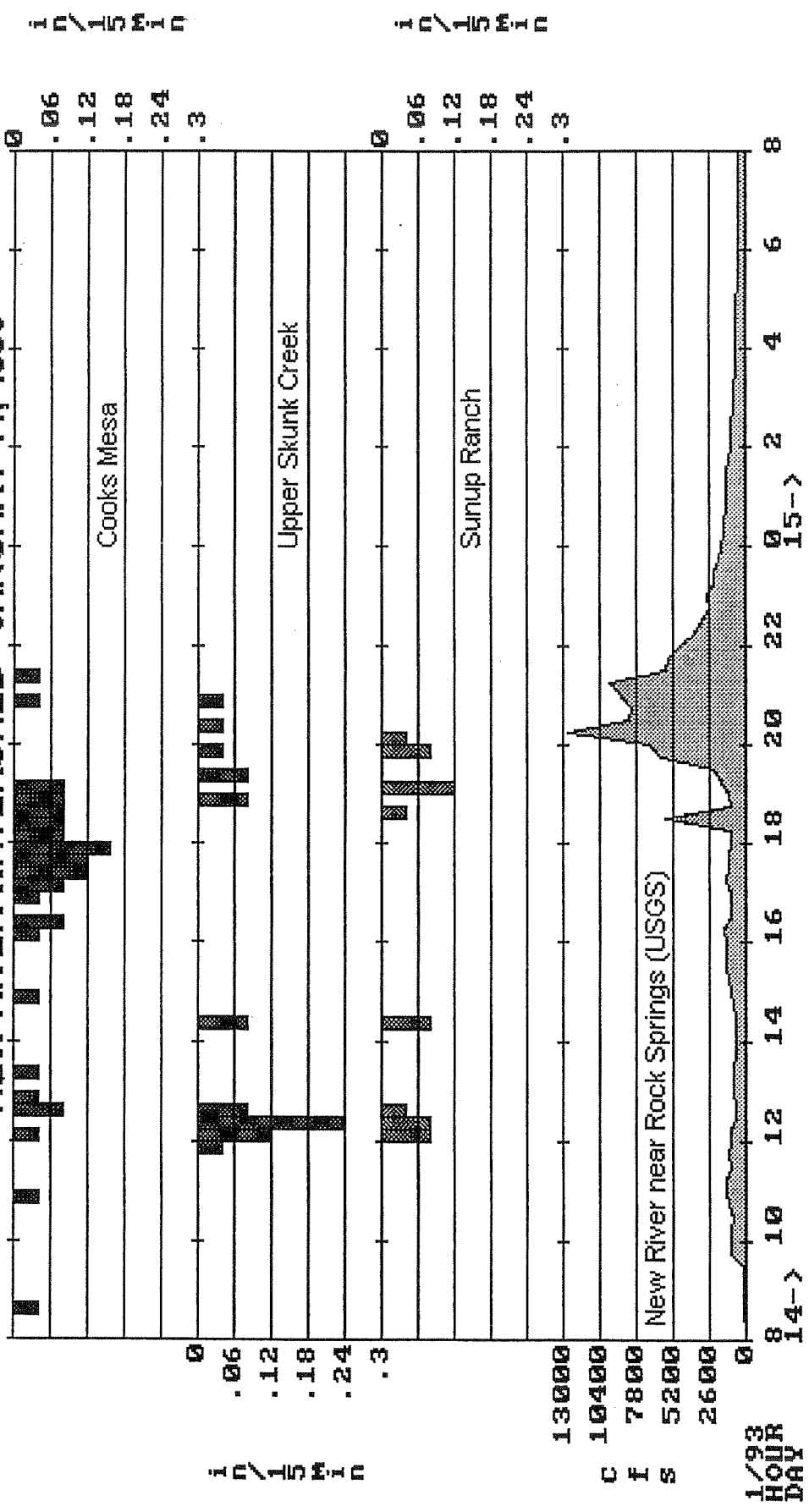
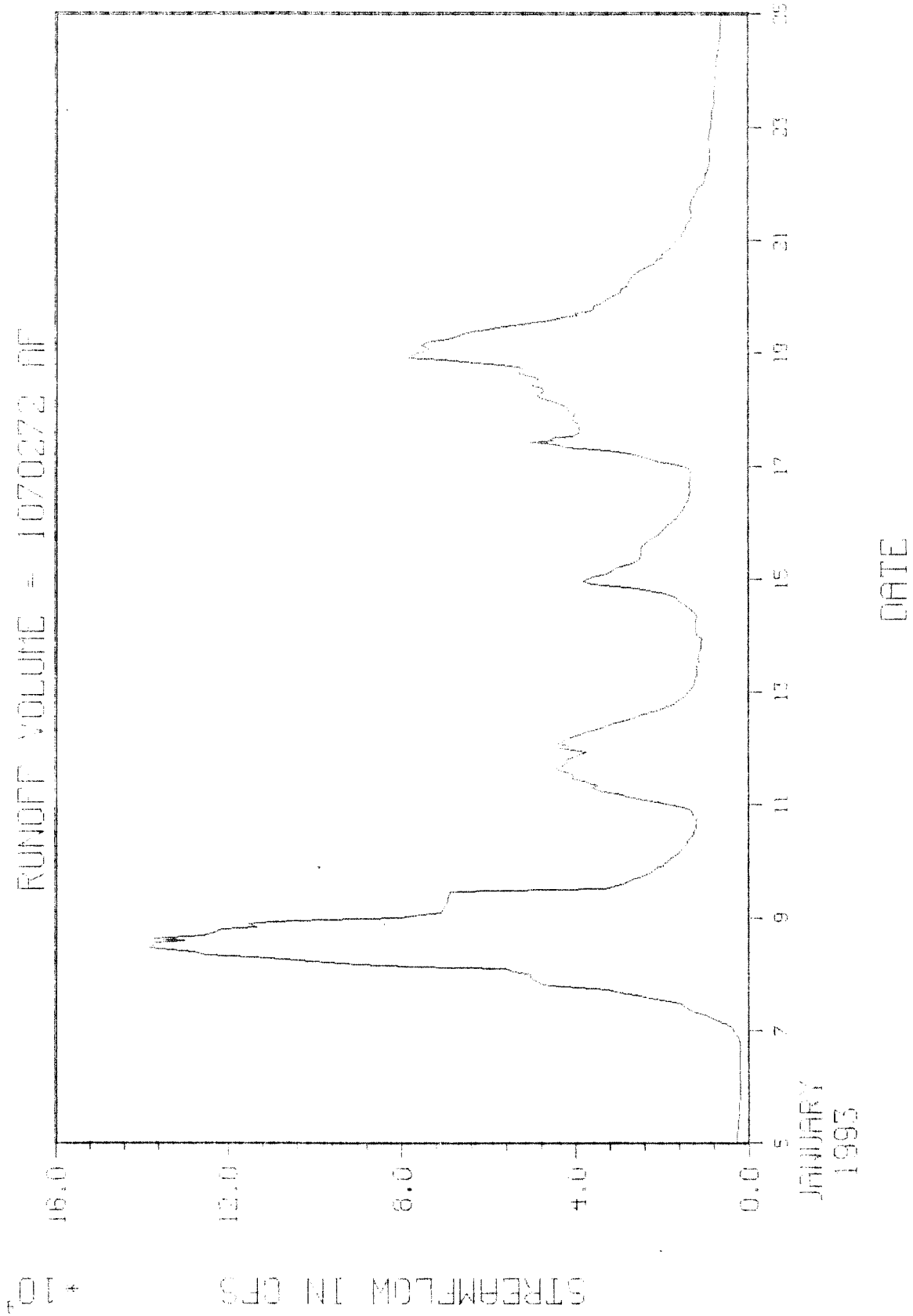


FIGURE 16

BALT + TONTO - P65

RUNOFF VOLUME = 1070272 AF

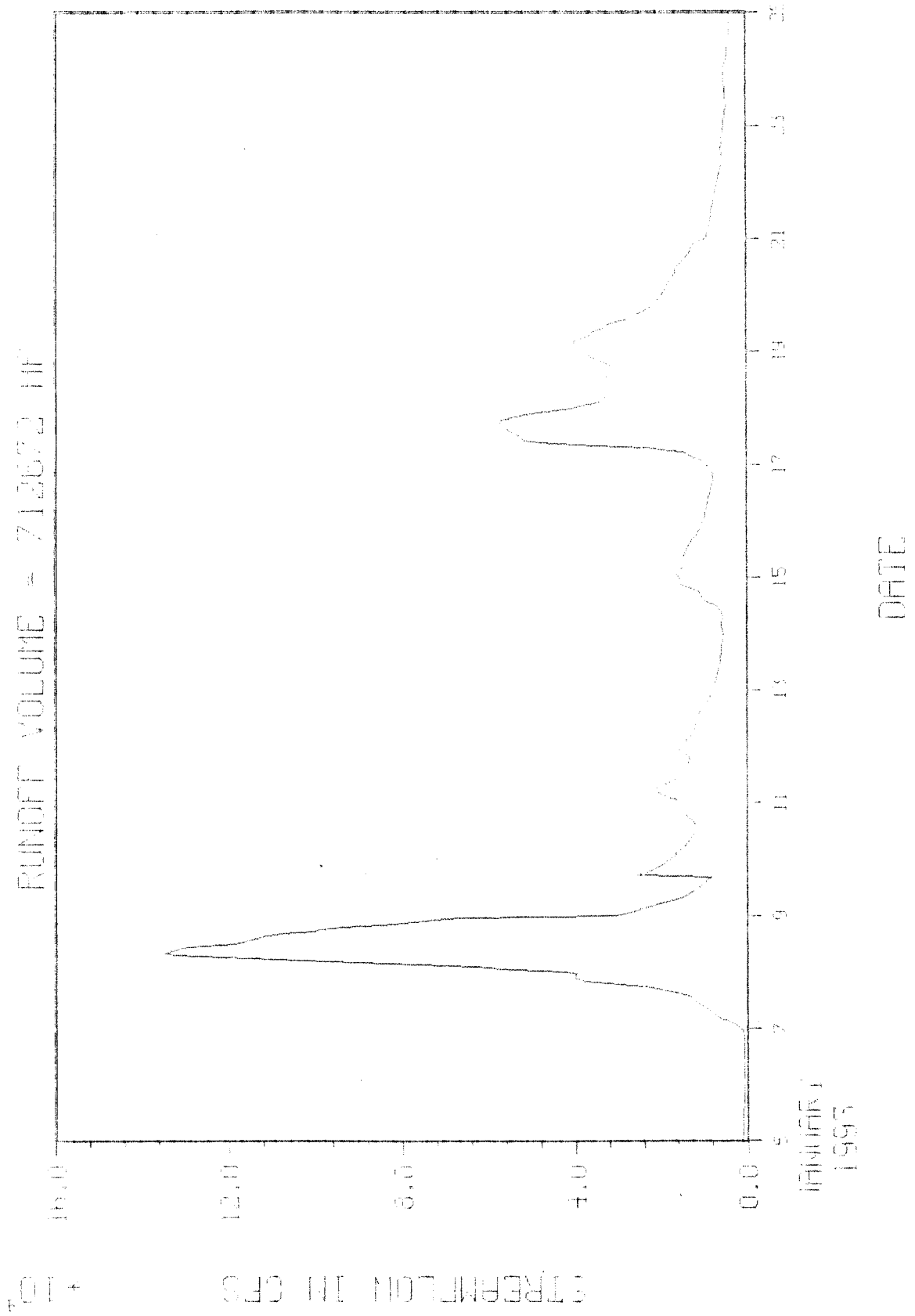


CREATED: 06FEB93 13:06

FIGURE 17

VERDE TANGLE - F65

RUNOFF VOLUME = 712672 HF



CREATED: 08FEB93:13:07

FIGURE 18

ALERT SYSTEM PERFORMANCE and EMERGENCY OPERATIONS

The overall performance of the ALERT system during the series of storm events in late December and January was excellent. The Datacommand software installed in October 1992 simplified and compiled ALERT information into very useful decision-making products, as evidenced by the real-time copies of Corps Dam data presented in Figures 19-21. Although several precipitation and water level gages became inoperative at various times during the storms, increasingly thorough gage coverage throughout the County made the effects of these temporary losses minimal, and field crews were able to quickly repair defective gages. Only two gages, Salt River at 24th St. and Cave Cr. at Cave Creek were damaged beyond repair. The Holly Acres precipitation gage had to be removed on January 9th because it faced inundation by Gila River floodwaters. Numerous ALERT alarms, the majority set off by water-level gages, were received and reacted to by District hydrologists either at the terminal or at home via the DECtalk dialout system. Table 7 lists gaged FCD structures and the relation of their peak stage in January to FCD Construction and Operations Division (C&O) and Department of Emergency Services (DEM) notification criteria. Figure 22 presents the "FCD Flood Emergency Procedures Flowchart", a plan which outlines the preferred chain-of-command and information path for the District during an emergency. The plan was followed during the January events by District staff and appeared to work well for its intended in-house purposes. However, the inclusion of MCDOT and other TADA activities within this plan caused some confusion and

duplication of effort. An update to this plan would benefit by more clearly defining the Hydrology Divisions role as a supplier of information to other County departments and outside agencies.

By the 18th of January it became apparent that river forecast information for locations below the confluence of the Salt and Gila rivers would be of great value not only to the FCD but to other departments and outside agencies. Hydrology Division staff regularly collected data from SRP, USBR, USGS, NWS, in-field observers, and the ALERT system, and along with some estimated travel times along the Gila River (Table 8), used a spreadsheet program to lag and combine the flows at the point of interest. These forecasts were then faxed to SRP, USBR, MCDOT, ADOT, the Corps of Engineers, and several County Emergency Management agencies. Figures 23-25 represent three of thirteen forecasts made during January. The forecasts produced from known flow data were reasonably accurate, but the ones produced from quantitative precipitation forecasts (i.e. Figure 21) were limited by the accuracy of the input information.

Jan 12 93 8:25

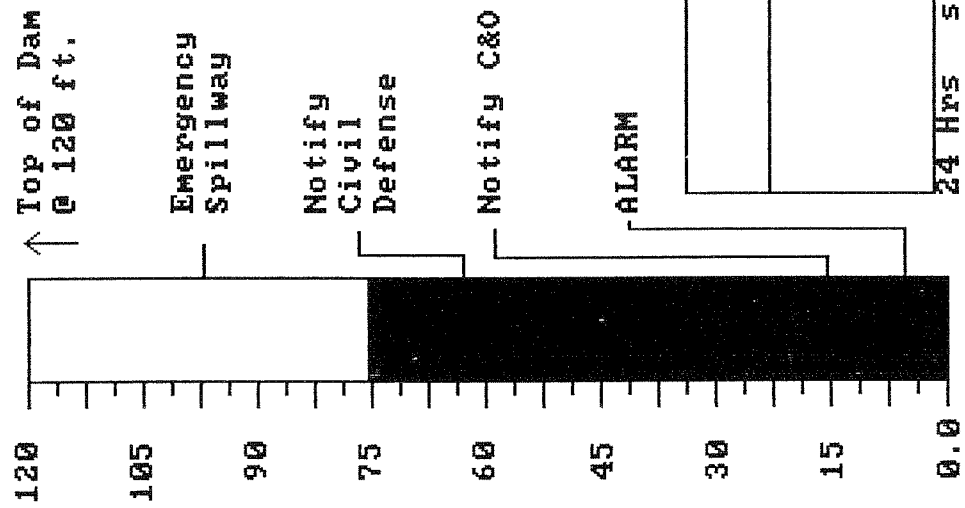
CAVE BUTTES DAM POOL
 S E N S O R 6 3 9 9

STRUCTURE DATA
 TOP OF DAM.....1679.0
 SPILLWAY ELEV.....1657.1
 MAX. DEPTH.....120.0 ft
 SPILLWAY CAP...45,650 af

STRUCTURE DIMENSIONS
 LENGTH.....2,275 ft
 TOP CREST.....20 ft
 DRAW DOWN... 48 days

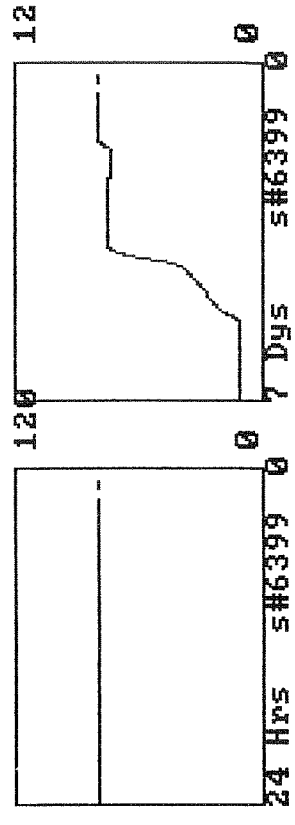
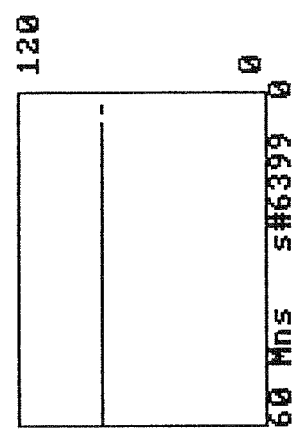
CURRENT CONDITIONS:
 Stage (ft) -----> 75.5
 Discharge (cfs) -> 307.
 Storage (ac-ft) -> 17199

POOL STAGE (ft)



PROBLEM AREAS
 Unknown at this time

BASIN RAINFALL				
I. D.	60m	3hr	6hr	Ytd
6400	0.00	0.00	0.00	5.51
6410	0.00	0.00	0.00	0.43
6420	0.00	0.00	0.00	9.17
6430	0.00	0.00	0.00	10.20
6440	0.00	0.00	0.00	8.54
6450	0.00	0.00	0.00	13.78



Sensor Offset = 1.99 feet

Note: Storage begins at elev. 15.0

FIGURE 19

Jan 15 93 6:50

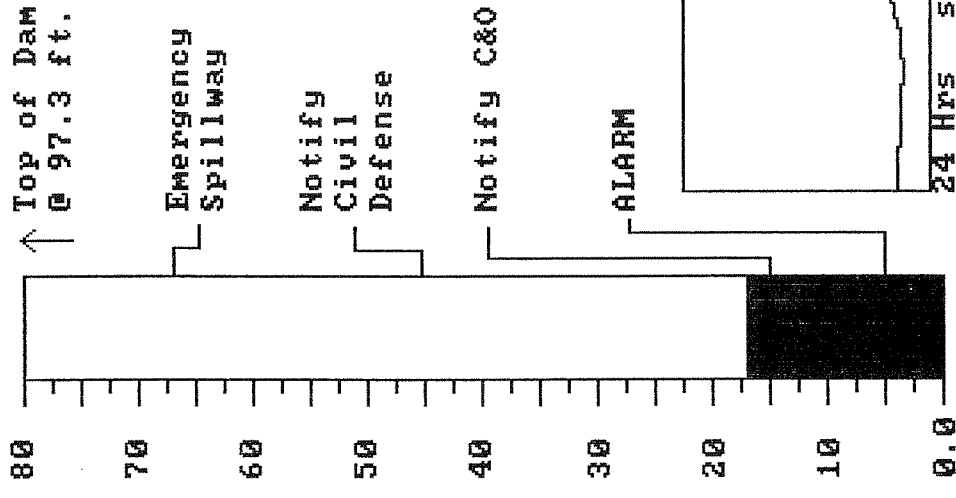
NEW RIVER DAM POOL
 S E N S O R 5 6 0 9

STRUCTURE DATA
 TOP OF DAM.....1486.7
 SPILLWAY ELEV.....1456.4
 MAX. DEPTH.....97.3 ft
 SPILLWAY CAP...43,760 af

STRUCTURE DIMENSIONS
 LENGTH.....2,320 ft
 TOP CREST.....20 ft
 DRAW DOWN...13.4 days

CURRENT CONDITIONS:
 Stage (ft) -----> 17.2
 Discharge (cfs) -> 1077
 Storage (ac-ft) -> 1813.

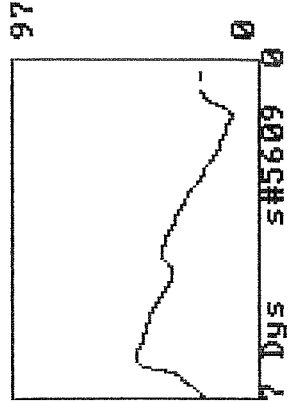
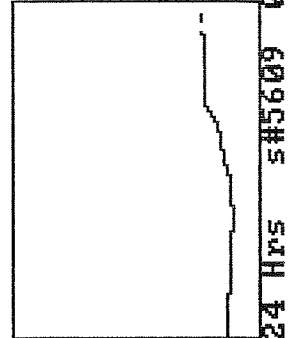
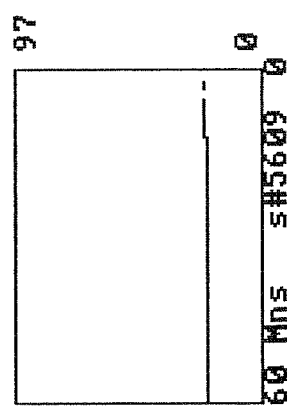
POOL STAGE (ft)



PROBLEM AREAS
 Unknown at this time

BASIN RAINFALL

I. D.	1hr	6hr	24hr	WYTD
5610	0.04	0.12	0.35	6.97
5625	0.00	0.00	0.67	10.75
5580	0.00	0.00	0.83	11.26
5640	0.00	0.00	1.73	18.78



Sensor Offset = 2.88 feet

Note: Storage begins 0.64 feet

Jan 12 93 7:54

POOL STAGE (ft)

60.0
52.5
45.0
37.5
30.0
22.5
15.0
7.5
0.0

↑ Top of Dam @ 65.6 ft.

ADOBE DAM POOL

S E N S O R 5 5 3 4

STRUCTURE DATA

TOP OF DAM.....1403.4
 SPILLWAY ELEV.....1377.7
 MAX. DEPTH.....65.6 ft
 SPILLWAY CAP...18,000 af

STRUCTURE DIMENSIONS

LENGTH.....11,245 ft
 TOP CREST.....20 ft
 DRAW DOWN...5.1 days

CURRENT CONDITIONS:

Stage (ft) -----> 8.9
 Discharge (cfs) -> 318.
 Storage (ac-ft) -> 334.9

PROBLEM AREAS

Unknown at this time

BASIN RAINFALL

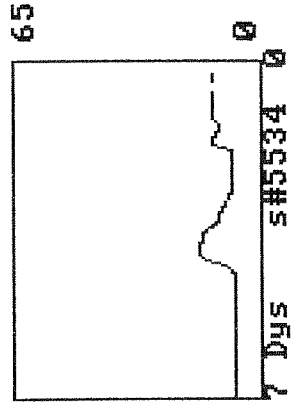
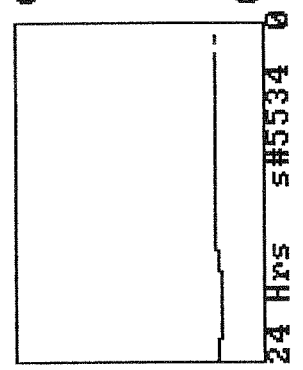
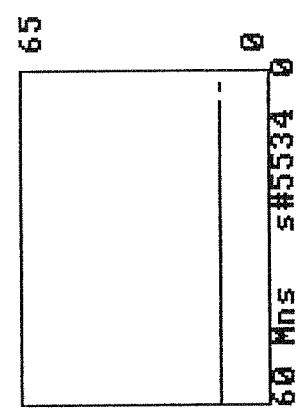
I.D.	60m	3hr	6hr	YTD
5535	0.00	0.00	0.00	7.13
5565	0.00	0.00	0.00	7.05
5580	0.00	0.00	0.00	10.31
5640	0.00	0.00	0.00	16.50

Emergency Spillway

Notify Civil Defense

Notify C&O

ALARM

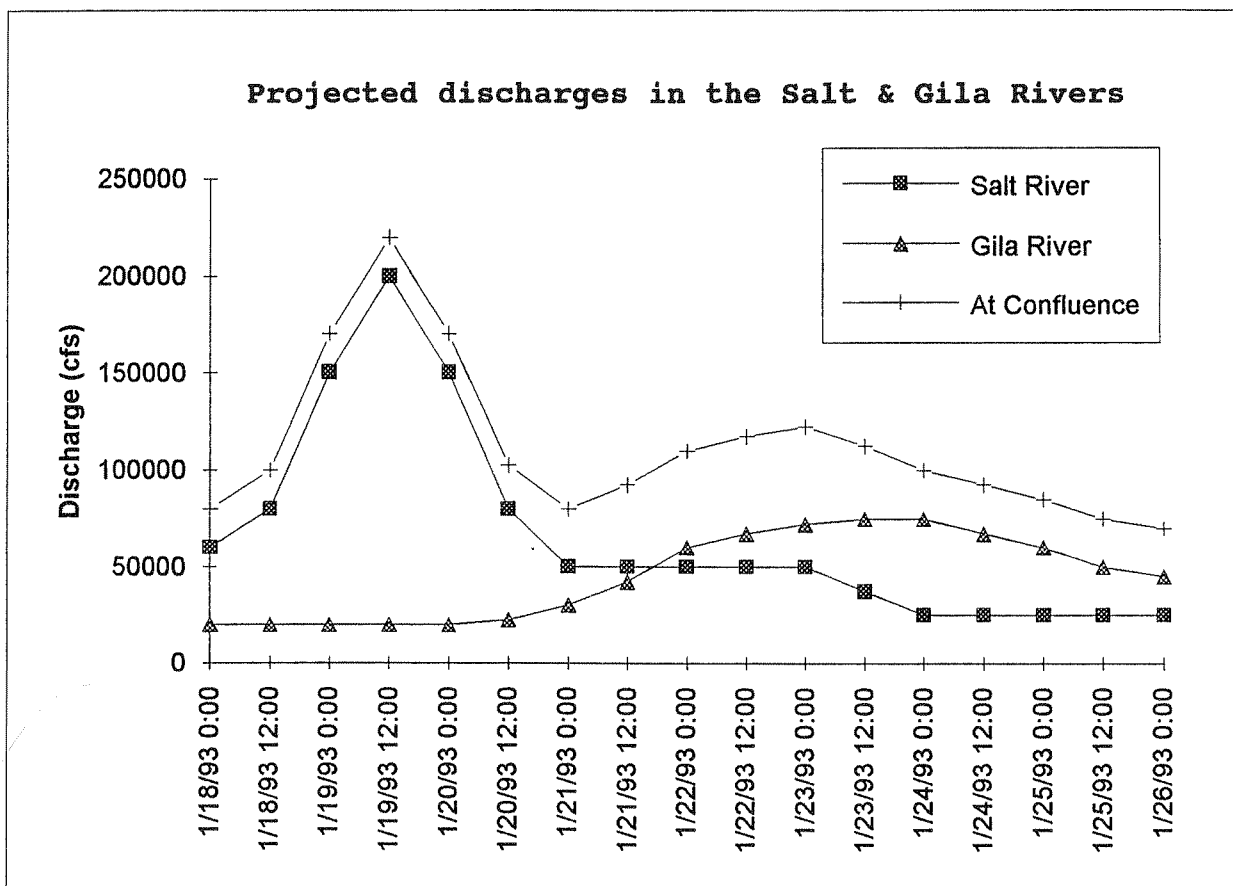


Sensor Offset = 3.20 feet

Note: Storage begins 7.24 feet

FIGURE 21

Flows in the Salt and Gila Rivers			
time	Salt River	Gila River	At Confluence
1/18/93 0:00	60000	20000	80000
1/18/93 12:00	80000	20000	100000
1/19/93 0:00	150000	20000	170000
1/19/93 12:00	200000	20000	220000
1/20/93 0:00	150000	20000	170000
1/20/93 12:00	80000	22500	102500
1/21/93 0:00	50000	30000	80000
1/21/93 12:00	50000	42500	92500
1/22/93 0:00	50000	60000	110000
1/22/93 12:00	50000	67500	117500
1/23/93 0:00	50000	72500	122500
1/23/93 12:00	37500	75000	112500
1/24/93 0:00	25000	75000	100000
1/24/93 12:00	25000	67500	92500
1/25/93 0:00	25000	60000	85000
1/25/93 12:00	25000	50000	75000
1/26/93 0:00	25000	45000	70000



Projected Discharges in the Salt and Gila Rivers

Updated 1/20/93 Noon

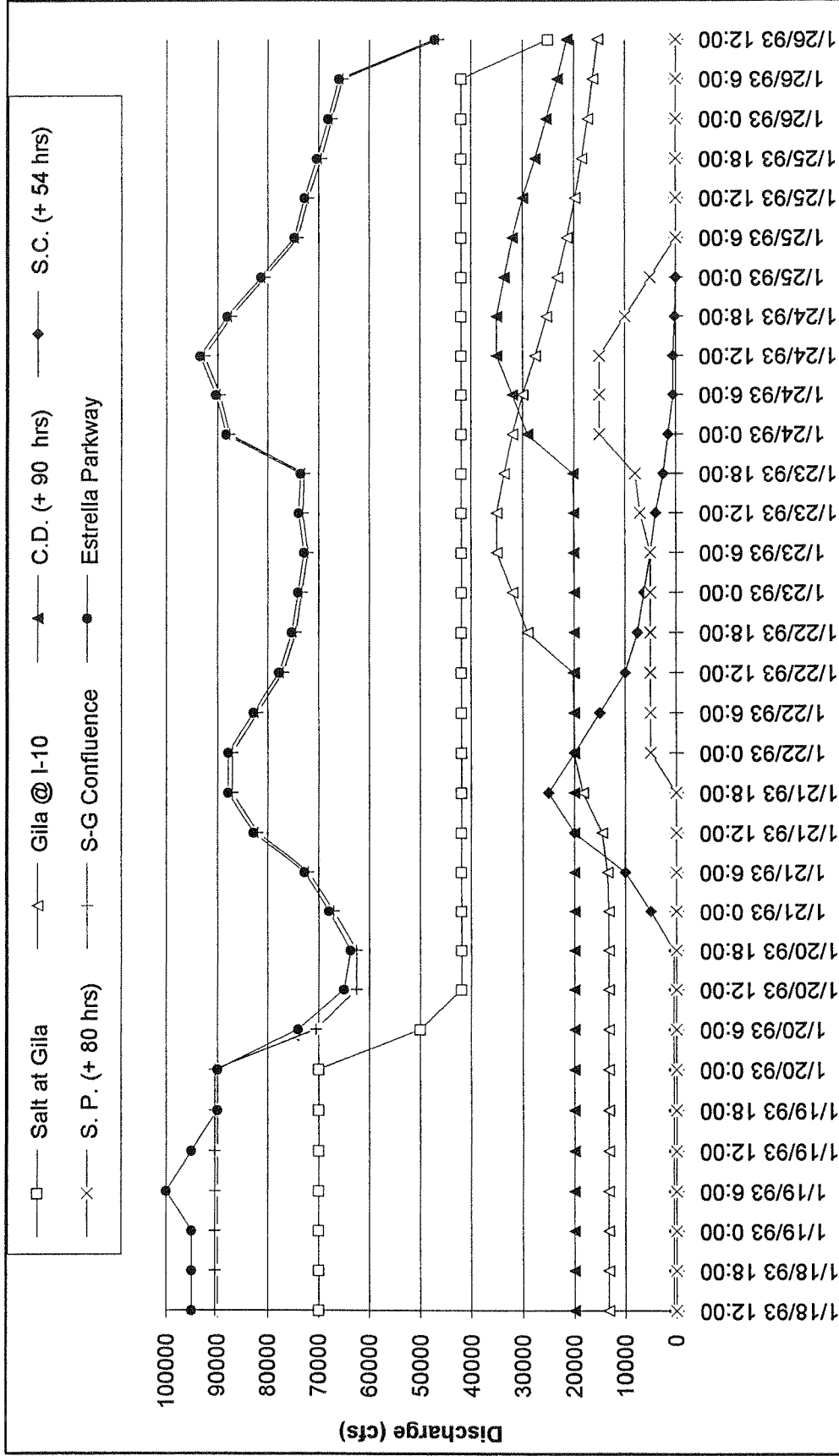


FIGURE 24

DRAFT

TRAVEL TIMES FROM COOLIDGE DAM FOR VARIOUS
FLOOD LEVELS

Location	Distance From Coolidge Dam (Miles)	Travel Time From Coolidge Dam (Hours)					
		Discharge (cfs)					
		5.5K	10K	30K	50K	60K	100K
Coolidge Dam	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hayden	20.0	20.0	16.7	14.3	10.0	8.0	6.7
Kerney.	30.0	30.0	25.0	21.4	15.0	12.0	10.7
Kelvin	35.0	32.8	29.2	25.0	17.5	14.0	12.7
Ashurst-Hayden	50.0	57.8	44.2	37.5	27.5	21.5	20.2
Florence	58.0	71.1	52.2	44.2	32.8	25.5	24.2
Sacaton Hwy.	78.0	104.4	68.8	60.8	48.2	38.8	36.7
I-10 Hwy	88.0	121.1	85.5	70.8	55.9	45.5	42.9
Maricopa Rd.	93.0	129.4	93.8	75.8	59.7	48.8	46.0
St. Johns	103.0	146.1	110.5	85.8	67.4	56.5	52.7
Confluence (Salt)	123.0	179.4	143.8	105.8	82.8	71.9	66.0

DRAFT

SUMMARY

This report presented meteorological, rainfall, runoff, statistical, and operational data for the storm events of December 1992 and January 1993. The majority of the data presented were collected by the FCD ALERT system, with contributions from SRP, the USBR, the NWS, and the USGS. The combination of a northward-displaced subtropical jetstream, with its abundant moisture supply and associated disturbances, and a southward-displaced polar jet, with its storm track, led to the abnormally wet period from just after Christmas to mid-January. Significant rainfall events occurred on December 27-28, January 6-8, January 10, January 14, and January 16-18. Ten FCD telemetered raingages reported greater than ten inches of precipitation for these storms. In terms of peak discharge on the Salt and Gila rivers below their respective controls, this flood was certainly the biggest since 1980, but does not rank as a "record flood". However, in terms of the volume of floodwaters released, is probably the largest flood experienced by central and southwestern Arizona since 1890 when a peak flow of 300,000 cfs was estimated for the Salt River at Phoenix. The system performance of both ALERT hardware and software was exemplary, allowing the operators to provide timely and accurate information to in-house, TADA, and outside agency decision makers. A portion of this credit is due to the newly installed software, but the majority goes to the field crews whose regular maintenance programs, expert installations, and timely repairs of gages between events made possible the steady flow of real-time information.

APPENDIX A

**ALERT Precipitation Gage Daily Rainfall Totals for December 23, 1992
through January 22, 1993.**

Maricopa County ALERT System
 Group Name Date Time
 Upper Centennial 03/10/93 06:42:29

DeviceID	TigerWsh	Gladden	CentlWsh	Smith Pk
StatType	dif	dif	dif	dif
DataType	precip	precip	precip	precip
Units	in	in	in	in
1 day at 24:00:00				
01/22/93	0.00	0.00	0.00	0.00
01/21/93	0.00	0.00	0.00	0.00
01/20/93	0.00	0.00	0.00	0.00
01/19/93	0.00	0.00	0.00	0.00
01/18/93	0.28	0.04	0.47	0.24
01/17/93	0.24	0.12	0.71	0.51
01/16/93	0.75	0.47	0.59	1.22
01/15/93	0.12	0.16	0.12	0.24
01/14/93	0.16	0.20	0.20	0.35
01/13/93	0.12	0.00	0.04	0.08
01/12/93	0.28	0.12	0.24	0.04
01/11/93	0.00	0.00	0.00	0.00
01/10/93	1.65	0.71	0.94	0.94
01/09/93	0.04	0.00	0.00	0.00
01/08/93	0.67	0.20	0.83	1.18
01/07/93	1.18	0.28	0.83	1.85
01/06/93	0.75	0.35	0.43	0.59
01/05/93	0.00	0.00	0.00	0.00
01/04/93	0.00	0.00	0.00	0.00
01/03/93	0.00	0.00	0.04	0.00
01/02/93	0.04	0.00	0.00	0.04
01/01/93	0.00	0.00	0.00	0.00
12/31/92	0.00	0.00	0.00	0.00
12/30/92	0.00	0.00	0.00	0.04
12/29/92	0.00	0.00	0.08	0.04
12/28/92	0.83	0.51	0.63	0.79
12/27/92	0.31	0.31	0.12	0.43
12/26/92	0.00	0.00	0.00	0.00
12/25/92	0.00	0.00	0.00	0.00
12/24/92	0.00	0.00	0.00	0.00
12/23/92	0.00	0.00	0.00	0.00
TOTALS:	7.40	3.46	6.26	8.58

Maricopa County ALERT System
 Group Name Date Time
 Lower Hassayampa 03/10/93 06:42:49

DeviceID	BuckFRS1	BuckFRS2	Jackrabt	Morrstwn
StatType	dif	dif	dif	dif
DataType	precip	precip	precip	precip
Units	in	in	in	in
1 day at 24:00:00				
01/22/93	0.00	0.00	0.00	0.00
01/21/93	0.00	0.00	0.00	0.00
01/20/93	0.00	0.00	0.00	0.00
01/19/93	0.00	0.00	0.00	0.00
01/18/93	0.00	0.04	0.16	0.47
01/17/93	0.12	0.51	0.04	0.16
01/16/93	0.28	0.24	0.59	0.47
01/15/93	0.08	0.08	0.00	0.12
01/14/93	0.04	0.00	0.20	0.31
01/13/93	0.04	0.00	0.04	0.04
01/12/93	0.08	0.12	0.20	0.12
01/11/93	0.20	0.35	0.12	0.04
01/10/93	1.10	0.63	1.30	1.38
01/09/93	0.00	0.04	0.00	0.00
01/08/93	0.71	0.47	1.02	0.63
01/07/93	0.51	0.47	0.79	1.18
01/06/93	0.43	0.35	0.47	0.71
01/05/93	0.00	0.00	0.04	0.00
01/04/93	0.00	0.00	0.00	0.00
01/03/93	0.04	0.00	0.00	0.00
01/02/93	0.00	0.00	0.00	0.00
01/01/93	0.00	0.00	0.00	0.00
12/31/92	0.00	0.00	0.00	0.00
12/30/92	0.00	0.00	0.00	0.00
12/29/92	0.04	0.00	0.00	0.12
12/28/92	0.55	0.71	0.79	0.91
12/27/92	0.28	0.16	0.39	0.28
12/26/92	0.00	0.00	0.00	0.00
12/25/92	0.00	0.00	0.00	0.00
12/24/92	0.00	0.00	0.00	0.00
12/23/92	0.00	0.00	0.00	0.00
TOTALS:	4.49	4.17	6.14	6.93

Maricopa County ALERT System
 Group Name Date Time
 Middle Hassayampa 03/10/93 06:46:11

DeviceID	Sunset	Sunnycov	Vulture	SolsWash	Yarnell	BoxCanyn
StatType	dif	dif	dif	dif	dif	dif
DataType	precip	precip	precip	precip	precip	precip
Units	in	in	in	in	in	in
1 day at 24:00:00						
01/22/93	0.00	0.00	0.00	0.00	0.00	0.00
01/21/93	0.00	0.00	0.00	0.00	0.00	0.00
01/20/93	0.00	0.00	0.00	0.00	0.00	0.00
01/19/93	0.39	0.00	0.00	0.00	0.35	0.04
01/18/93	0.08	0.12	0.39	0.43	1.30	0.39
01/17/93	0.28	0.39	0.55	0.35	0.71	0.47
01/16/93	0.00	0.51	0.47	0.71	1.22	0.51
01/15/93	0.00	0.08	0.12	0.16	0.12	0.08
01/14/93	0.16	0.31	0.28	0.67	1.18	0.47
01/13/93	0.00	0.00	0.04	0.00	0.08	0.04
01/12/93	0.24	0.28	0.20	0.12	0.04	0.28
01/11/93	0.00	0.00	0.98	0.00	0.00	0.04
01/10/93	0.91	0.94	0.00	0.91	1.10	0.79
01/09/93	0.00	0.00	0.00	0.00	0.00	0.00
01/08/93	0.31	0.35	0.00	0.16	0.75	0.39
01/07/93	0.59	0.39	0.08	0.47	2.87	0.91
01/06/93	0.63	0.51	0.16	0.63	1.85	0.83
01/05/93	0.00	0.00	0.00	0.00	0.00	0.00
01/04/93	0.00	0.00	0.31	0.00	0.00	0.00
01/03/93	0.08	0.04	0.00	0.04	0.08	0.12
01/02/93	0.00	0.00	0.04	0.04	0.04	0.00
01/01/93	0.00	0.00	0.04	0.00	0.00	0.00
12/31/92	0.00	0.00	0.08	0.00	0.00	0.00
12/30/92	0.16	0.00	0.08	0.00	0.04	0.00
12/29/92	0.24	0.08	0.08	0.00	0.39	0.08
12/28/92	0.63	1.18	0.47	0.75	0.16	1.14
12/27/92	0.00	0.24	0.20	0.47	0.00	0.39
12/26/92	0.00	0.00	0.00	0.00	0.00	0.00
12/25/92	0.00	0.00	0.00	0.00	0.00	0.00
12/24/92	0.00	0.00	0.00	0.00	0.00	0.00
12/23/92	0.00	0.00	0.00	0.00	0.00	0.00
TOTALS:	4.69	5.43	4.57	5.91	12.28	6.97

Maricopa County ALERT System
 Group Name Date Time
 Upper Hassayampa 03/10/93 06:46:29

DeviceID	O'Brian	Minehaha	TowersMt	HassyBrg	Wilhoit	Mt.Union
StatType	dif	dif	dif	dif	dif	dif
DataType	precip	precip	precip	precip	precip	precip
Units	in	in	in	in	in	in
1 day at 24:00:00						
01/22/93	0.00	0.00	0.00	0.00	0.00	0.63
01/21/93	0.00	0.00	0.00	0.00	0.00	0.43
01/20/93	0.00	0.00	0.20	0.00	0.00	0.16
01/19/93	0.43	0.20	0.31	0.08	0.47	0.00
01/18/93	0.35	0.67	0.31	1.06	0.87	0.87
01/17/93	1.34	0.75	0.71	0.55	0.55	1.61
01/16/93	0.35	0.91	0.67	0.79	0.79	2.48
01/15/93	0.08	0.12	0.43	0.16	0.08	0.04
01/14/93	0.83	1.18	0.20	0.59	0.51	0.12
01/13/93	0.04	0.39	0.08	0.16	0.04	0.28
01/12/93	0.28	0.00	0.00	0.12	0.00	0.12
01/11/93	0.04	0.00	0.04	0.04	0.00	0.00
01/10/93	0.79	1.06	0.00	0.94	0.79	0.31
01/09/93	0.04	0.00	0.04	0.00	0.00	0.00
01/08/93	1.10	0.71	1.57	0.79	0.79	2.36
01/07/93	0.91	1.50	1.65	0.98	0.94	3.27
01/06/93	0.87	1.18	0.98	0.98	0.87	2.24
01/05/93	0.00	0.00	0.00	0.00	0.00	0.08
01/04/93	0.00	0.00	0.00	0.00	0.00	0.16
01/03/93	0.00	0.08	0.04	0.00	0.12	0.12
01/02/93	0.04	0.04	0.00	0.00	0.04	0.00
01/01/93	0.00	0.00	0.00	0.00	0.00	0.00
12/31/92	0.00	0.00	0.00	0.00	0.00	0.00
12/30/92	0.00	0.00	0.04	0.00	0.00	0.04
12/29/92	0.08	0.08	0.08	0.24	0.20	0.43
12/28/92	0.91	1.46	1.85	1.85	0.79	2.09
12/27/92	0.43	0.67	0.67	0.55	0.35	0.55
12/26/92	0.00	0.00	0.00	0.00	0.00	0.00
12/25/92	0.00	0.00	0.00	0.00	0.00	0.00
12/24/92	0.00	0.00	0.00	0.00	0.00	0.00
12/23/92	0.00	0.00	0.00	0.00	0.00	0.08
TOTALS:	8.90	10.98	9.88	9.88	8.19	18.46

Maricopa County ALERT System
 Group Name Date Time
 AF1: McMicken 03/10/93 06:55:16

DeviceID	AFBuckey	WtTanks3	WTankSEP	McMickFl	McMkn Dm	PattonRd
StatType	dif	dif	dif	dif	dif	dif
DataType	precip	precip	precip	precip	precip	precip
Units	in	in	in	in	in	in
1 day at 24:00:00						
01/22/93	0.00	0.00	0.00	0.00	0.00	0.00
01/21/93	0.00	0.00	0.00	0.00	0.00	0.00
01/20/93	0.00	0.00	0.00	0.00	0.00	0.00
01/19/93	0.00	0.00	0.04	0.04	0.00	0.00
01/18/93	0.59	0.20	0.51	0.31	0.39	0.59
01/17/93	0.35	0.71	0.83	0.24	0.24	0.04
01/16/93	0.39	0.43	0.55	0.39	0.47	0.55
01/15/93	0.04	0.08	0.16	0.08	0.12	0.20
01/14/93	0.20	0.28	0.20	0.20	0.24	0.04
01/13/93	0.08	0.12	0.24	0.04	0.04	0.16
01/12/93	0.16	0.08	0.16	0.04	0.04	0.00
01/11/93	0.39	0.00	0.00	0.00	0.00	0.75
01/10/93	1.38	1.85	1.46	1.34	1.26	0.16
01/09/93	0.00	0.00	0.00	0.00	0.00	0.20
01/08/93	0.35	0.79	2.56	0.55	0.20	0.51
01/07/93	0.55	0.63	1.97	0.47	0.55	0.63
01/06/93	0.47	0.67	0.94	0.55	0.63	0.35
01/05/93	0.00	0.00	0.00	0.00	0.00	0.00
01/04/93	0.00	0.00	0.00	0.00	0.00	0.00
01/03/93	0.08	0.08	0.08	0.08	0.04	0.04
01/02/93	0.00	0.00	0.00	0.00	0.00	0.00
01/01/93	0.00	0.00	0.00	0.00	0.00	0.00
12/31/92	0.00	0.00	0.00	0.00	0.00	0.00
12/30/92	0.00	0.00	0.04	0.00	0.00	0.00
12/29/92	0.08	0.08	0.12	0.12	0.12	0.16
12/28/92	0.91	0.91	1.06	0.87	0.94	0.83
12/27/92	0.24	0.20	0.28	0.24	0.28	0.28
12/26/92	0.00	0.00	0.00	0.00	0.00	0.00
12/25/92	0.00	0.00	0.00	0.00	0.00	0.00
12/24/92	0.00	0.00	0.00	0.00	0.00	0.00
12/23/92	0.00	0.00	0.00	0.00	0.00	0.00
TOTALS:	6.26	7.09	11.18	5.55	5.55	5.47

Maricopa County ALERT System
 Group Name Date Time
 AF2: Circle City 03/10/93 06:55:20

DeviceID	Wittman	Chrys	PG	Crcl	Cty	CastleHS	NR@Glndl	Dys@Bell	ACDC67th
StatType	dif	dif	dif	dif	dif	dif	dif	dif	dif
DataType	precip	precip	precip	precip	precip	precip	precip	precip	precip
Units	in	in	in	in	in	in	in	in	in
1 day at 24:00:00									
01/22/93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01/21/93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01/20/93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01/19/93	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00
01/18/93	0.63	0.67	0.51	1.06	0.39	0.51	0.51	0.63	0.63
01/17/93	0.16	0.20	0.39	0.20	0.12	0.47	0.47	0.59	0.59
01/16/93	0.47	0.51	0.39	0.47	0.16	0.43	0.43	0.20	0.20
01/15/93	0.12	0.12	0.08	0.08	0.08	0.12	0.12	0.12	0.12
01/14/93	0.08	0.20	0.28	0.24	0.12	0.16	0.16	0.08	0.08
01/13/93	0.12	0.08	0.04	0.00	0.04	0.08	0.08	0.08	0.08
01/12/93	0.12	0.12	0.08	0.20	0.12	0.04	0.04	0.12	0.12
01/11/93	0.04	0.00	0.04	0.00	0.12	0.04	0.04	0.08	0.08
01/10/93	1.34	1.54	1.42	1.10	0.87	1.50	1.50	1.06	1.06
01/09/93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01/08/93	0.55	0.55	0.55	0.63	0.71	0.47	0.47	0.28	0.28
01/07/93	0.79	0.87	0.98	1.61	0.55	0.71	0.71	0.71	0.71
01/06/93	0.59	0.67	0.63	1.14	0.16	0.63	0.63	0.43	0.43
01/05/93	0.04	0.00	0.04	0.00	0.00	0.04	0.04	0.00	0.00
01/04/93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01/03/93	0.00	0.04	0.00	0.04	0.08	0.08	0.08	0.08	0.08
01/02/93	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00
01/01/93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/31/92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/30/92	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00
12/29/92	0.00	0.20	0.08	0.08	0.04	0.12	0.12	0.04	0.04
12/28/92	0.00	1.06	1.10	1.10	0.87	0.91	0.91	0.63	0.63
12/27/92	0.00	0.35	0.31	0.35	0.12	0.24	0.24	0.20	0.20
12/26/92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/25/92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/24/92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/23/92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTALS:	5.04	7.17	6.93	8.35	4.61	6.54	6.54	5.31	5.31

Maricopa County ALERT System
 Group Name Date Time
 AF3: Adobe/New River 03/10/93 06:56:52

DeviceID	AdobeDam	DrValApt	SkunkI17	U.SknkCr	NR@Bell	N.RivDam	SunupRch
StatType	dif	dif	dif	dif	dif	dif	dif
DataType	precip	precip	precip	precip	precip	precip	precip
Units	in	in	in	in	in	in	in
1 day at 24:00:00							
01/22/93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01/21/93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01/20/93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01/19/93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01/18/93	0.51	0.28	0.55	0.75	0.31	0.63	0.39
01/17/93	0.75	0.79	0.31	0.31	0.63	0.16	0.47
01/16/93	0.28	0.35	0.35	0.31	0.28	0.35	0.43
01/15/93	0.04	0.08	0.12	0.04	0.08	0.12	0.04
01/14/93	0.24	0.47	1.02	0.87	0.08	0.24	0.67
01/13/93	0.12	0.08	0.08	0.04	0.08	0.00	0.08
01/12/93	0.12	0.12	0.08	0.04	0.08	0.04	0.08
01/11/93	0.08	0.12	0.12	0.00	0.08	0.00	0.08
01/10/93	1.46	1.18	1.65	1.26	1.10	0.39	1.02
01/09/93	0.00	0.00	0.00	0.00	0.00	0.00	0.04
01/08/93	0.51	0.47	0.71	1.30	0.35	0.75	1.18
01/07/93	1.14	1.18	0.83	1.54	0.79	0.79	1.97
01/06/93	0.59	0.55	0.47	1.14	0.51	0.67	1.02
01/05/93	0.04	0.00	0.04	0.00	0.04	0.00	0.00
01/04/93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01/03/93	0.08	0.16	0.12	0.24	0.04	0.16	0.12
01/02/93	0.00	0.00	0.00	0.04	0.00	0.00	0.00
01/01/93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/31/92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/30/92	0.00	0.00	0.00	0.00	0.04	0.00	0.00
12/29/92	0.08	0.20	0.08	0.04	0.04	0.12	0.08
12/28/92	0.87	0.83	0.63	1.34	0.55	0.98	1.14
12/27/92	0.20	0.20	0.24	0.28	0.20	0.20	0.24
12/26/92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/25/92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/24/92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/23/92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTALS:	7.09	7.05	7.40	9.53	5.28	5.59	9.06

Maricopa County ALERT System
 Group Name Date Time
 AF4: Lake Pleasant 03/10/93 06:58:39

DeviceID	CooksMsa	Lk.Plsnt	Garfias	Columbia	HorseBsn	CrwnKing	SunsetPt
StatType	dif	dif	dif	dif	dif	dif	dif
DataType	precip	precip	precip	precip	precip	precip	precip
Units	in	in	in	in	in	in	in
1 day at 24:00:00							
01/22/93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01/21/93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01/20/93	0.00	0.00	0.00	0.00	0.08	0.08	0.00
01/19/93	0.04	0.00	0.00	0.04	0.16	0.39	0.20
01/18/93	1.42	0.31	0.83	1.57	1.54	0.47	1.02
01/17/93	0.98	0.31	0.39	0.47	0.79	0.59	0.79
01/16/93	0.83	0.43	0.63	0.55	1.06	0.59	0.75
01/15/93	0.12	0.04	0.12	0.08	0.12	0.16	0.08
01/14/93	2.01	0.67	0.94	1.73	0.87	1.06	1.30
01/13/93	0.16	0.12	0.08	0.08	0.28	0.31	0.20
01/12/93	0.12	0.04	0.24	0.16	0.08	0.00	0.28
01/11/93	0.04	0.00	0.00	0.00	0.04	0.08	0.00
01/10/93	2.17	1.30	1.77	1.93	1.69	0.79	1.77
01/09/93	0.04	0.00	0.00	0.00	0.04	0.04	0.00
01/08/93	1.54	0.94	1.26	1.46	1.81	1.46	1.57
01/07/93	3.07	1.34	2.60	2.40	2.32	1.85	1.14
01/06/93	1.69	0.79	1.81	1.61	1.81	1.10	1.30
01/05/93	0.04	0.00	0.00	0.00	0.00	0.00	0.00
01/04/93	0.00	0.00	0.00	0.00	0.16	0.04	0.00
01/03/93	0.35	0.08	0.08	0.04	0.12	0.00	0.12
01/02/93	0.16	0.00	0.04	0.04	0.00	0.04	0.00
01/01/93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/31/92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/30/92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/29/92	0.28	0.08	0.16	0.28	0.31	0.04	0.43
12/28/92	2.20	0.98	1.54	1.65	2.44	1.93	1.42
12/27/92	0.39	0.24	0.47	0.47	0.20	0.67	0.51
12/26/92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/25/92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/24/92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/23/92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTALS:	17.64	7.68	12.95	14.57	15.91	11.69	12.87

Maricopa County ALERT System

Group Name Date Time

AF5: Upper Agua Fria 03/10/93 06:58:44

DeviceID	HorshRch	HornrMtn	AzHuntCl	I-17@169	Dewey	PrsctVal
StatType	dif	dif	dif	dif	dif	dif
DataType	precip	precip	precip	precip	precip	precip
Units	in	in	in	in	in	in
1 day at 24:00:00						
01/22/93	0.00	0.00	0.00	0.00	0.00	0.00
01/21/93	0.00	0.00	0.00	0.00	0.00	0.00
01/20/93	0.00	0.00	0.00	0.00	0.00	0.00
01/19/93	0.67	0.12	0.08	0.12	0.04	0.12
01/18/93	0.83	0.98	0.67	0.87	0.67	0.43
01/17/93	0.98	0.79	0.39	0.79	0.59	0.47
01/16/93	0.39	0.47	0.51	0.83	0.71	0.55
01/15/93	0.08	0.00	0.04	0.04	0.08	0.04
01/14/93	0.79	0.47	0.43	0.43	0.39	0.28
01/13/93	0.12	0.24	0.24	0.43	0.20	0.04
01/12/93	0.24	0.12	0.24	0.00	0.00	0.00
01/11/93	0.00	0.00	0.00	0.04	0.04	0.00
01/10/93	0.79	0.59	1.10	0.79	0.98	0.47
01/09/93	0.04	0.00	0.04	0.00	0.12	0.08
01/08/93	1.14	1.02	0.63	0.67	0.63	0.31
01/07/93	1.18	0.79	0.71	0.87	0.47	0.71
01/06/93	0.75	0.43	0.55	0.59	0.55	0.20
01/05/93	0.00	0.00	0.00	0.00	0.00	0.00
01/04/93	0.00	0.00	0.00	0.00	0.00	0.00
01/03/93	0.12	0.08	0.04	0.12	0.12	0.04
01/02/93	0.04	0.00	0.00	0.00	0.00	0.04
01/01/93	0.00	0.00	0.00	0.00	0.00	0.00
12/31/92	0.00	0.00	0.00	0.00	0.00	0.00
12/30/92	0.00	0.00	0.00	0.00	0.00	0.00
12/29/92	0.31	0.20	0.04	0.28	0.08	0.00
12/28/92	0.94	0.83	1.18	0.87	0.91	0.55
12/27/92	0.39	0.39	0.47	0.43	0.43	0.28
12/26/92	0.00	0.00	0.00	0.00	0.00	0.00
12/25/92	0.00	0.00	0.00	0.00	0.00	0.00
12/24/92	0.00	0.00	0.00	0.00	0.00	0.00
12/23/92	0.00	0.00	0.00	0.00	0.00	0.00
TOTALS:	9.80	7.52	7.36	8.15	7.01	4.61

Maricopa County ALERT System

Group Name Date Time
 Verde River 03/10/93 06:59:12

DeviceID	AshrHils	McDwlMtn	FrsfldMt	ThomsnPk	Mt.Ord
StatType	dif	dif	dif	dif	dif
DataType	precip	precip	precip	precip	precip
Units	in	in	in	in	in
1 day at 24:00:00					
01/22/93	0.00	0.00	0.00	0.00	0.00
01/21/93	0.00	0.00	0.00	0.00	0.00
01/20/93	0.00	0.00	0.00	0.00	0.08
01/19/93	0.00	0.08	0.00	0.00	0.39
01/18/93	0.71	0.51	0.55	0.43	0.75
01/17/93	0.63	0.71	0.94	1.02	0.87
01/16/93	0.31	0.43	0.51	0.35	0.55
01/15/93	0.04	0.04	0.08	0.31	0.43
01/14/93	0.47	0.59	0.55	0.51	0.55
01/13/93	0.04	0.12	0.12	0.12	0.16
01/12/93	0.12	0.08	0.16	0.12	0.00
01/11/93	0.24	0.24	0.12	0.24	0.75
01/10/93	1.85	2.20	1.65	1.10	0.31
01/09/93	0.00	0.00	0.00	0.00	0.04
01/08/93	0.71	0.87	0.91	0.35	1.77
01/07/93	0.63	1.14	1.61	0.87	2.91
01/06/93	0.71	1.18	1.02	0.59	1.30
01/05/93	0.00	0.04	0.00	0.04	0.00
01/04/93	0.00	0.00	0.00	0.00	0.00
01/03/93	0.08	0.12	0.16	0.12	0.24
01/02/93	0.00	0.00	0.00	0.00	0.00
01/01/93	0.00	0.00	0.00	0.00	0.00
12/31/92	0.00	0.00	0.00	0.00	0.00
12/30/92	0.00	0.00	0.00	0.00	0.00
12/29/92	0.00	0.08	0.08	0.04	0.31
12/28/92	0.98	1.10	1.18	0.79	1.77
12/27/92	0.12	0.20	0.16	0.16	0.12
12/26/92	0.00	0.00	0.00	0.00	0.00
12/25/92	0.00	0.00	0.00	0.00	0.00
12/24/92	0.00	0.00	0.00	0.00	0.00
12/23/92	0.00	0.00	0.00	0.00	0.00
TOTALS:	7.64	9.72	9.80	7.17	13.31

Maricopa County ALERT System
 Group Name Date Time
 CCS1: Salt R. South 03/10/93 06:59:28

DeviceID	AlvordPk	Roeser	Kleinman	Fitch	Mtn.View	Spookhil
StatType	dif	dif	dif	dif	dif	dif
DataType	precip	precip	precip	precip	precip	precip
Units	in	in	in	in	in	in
1 day at 24:00:00						
01/22/93	0.00	0.00	0.00	0.00	0.00	0.00
01/21/93	0.00	0.00	0.00	0.00	0.00	0.00
01/20/93	0.00	0.00	0.00	0.00	0.00	0.00
01/19/93	0.00	0.00	0.04	0.00	0.00	0.00
01/18/93	0.43	0.28	0.12	0.16	0.31	0.47
01/17/93	0.12	0.20	0.08	0.31	0.08	0.12
01/16/93	0.31	0.24	0.24	0.24	0.16	0.28
01/15/93	0.43	0.12	0.35	0.43	0.31	0.28
01/14/93	0.00	0.00	0.12	0.08	0.12	0.08
01/13/93	0.08	0.04	0.04	0.08	0.08	0.12
01/12/93	0.20	0.20	0.20	0.16	0.16	0.12
01/11/93	0.75	0.83	0.71	0.55	0.79	0.98
01/10/93	0.83	0.83	0.71	0.59	0.63	0.75
01/09/93	0.00	0.00	0.00	0.00	0.00	0.00
01/08/93	0.51	0.98	0.67	0.91	1.02	1.22
01/07/93	0.39	0.35	0.47	0.51	0.51	0.67
01/06/93	0.24	0.28	0.35	0.39	0.39	0.55
01/05/93	0.04	0.00	0.00	0.00	0.04	0.00
01/04/93	0.00	0.00	0.00	0.00	0.00	0.00
01/03/93	0.12	0.12	0.16	0.16	0.12	0.12
01/02/93	0.00	0.00	0.00	0.00	0.00	0.00
01/01/93	0.00	0.00	0.00	0.00	0.00	0.00
12/31/92	0.00	0.00	0.00	0.00	0.00	0.00
12/30/92	0.00	0.04	0.00	0.00	0.00	0.00
12/29/92	0.04	0.00	0.00	0.04	0.00	0.00
12/28/92	0.67	0.67	0.63	0.63	0.71	0.83
12/27/92	0.16	0.16	0.16	0.12	0.12	0.12
12/26/92	0.00	0.00	0.00	0.00	0.00	0.00
12/25/92	0.00	0.00	0.00	0.00	0.00	0.00
12/24/92	0.00	0.00	0.00	0.00	0.00	0.00
12/23/92	0.00	0.00	0.00	0.00	0.00	0.00
TOTALS:	5.31	5.31	5.04	5.35	5.55	6.69

Maricopa County ALERT System
 Group Name Date Time
 CCS2: Indian Bend 03/10/93 06:59:44

DeviceID	IBWMcKel	IBW@IBRd	IBWInter	Thunderb	Sweetwtr	ParValPk	LostDog
StatType	dif	dif	dif	dif	dif	dif	dif
DataType	precip	precip	precip	precip	precip	precip	precip
Units	in	in	in	in	in	in	in
1 day at 24:00:00							
01/22/93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01/21/93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01/20/93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01/19/93	0.00	0.00	0.00	0.00	0.00	0.00	0.04
01/18/93	0.20	0.35	0.16	0.55	0.79	0.63	0.20
01/17/93	0.67	0.04	0.08	0.59	0.98	0.63	0.28
01/16/93	0.16	0.24	0.24	0.24	0.31	0.35	0.24
01/15/93	0.35	0.16	0.00	0.08	0.08	0.08	0.24
01/14/93	0.16	0.16	0.00	0.16	0.28	0.47	0.20
01/13/93	0.04	0.04	0.00	0.08	0.08	0.12	0.08
01/12/93	0.16	0.20	0.00	0.12	0.12	0.12	0.16
01/11/93	0.55	0.59	0.16	0.20	0.20	0.16	0.43
01/10/93	0.43	1.10	0.63	0.94	0.94	0.71	1.14
01/09/93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01/08/93	0.71	0.91	1.10	0.43	0.51	0.51	0.59
01/07/93	0.55	0.55	0.59	0.63	0.59	0.87	0.67
01/06/93	0.43	0.51	0.59	0.39	0.35	0.51	0.55
01/05/93	0.00	0.04	0.04	0.00	0.04	0.00	0.00
01/04/93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01/03/93	0.04	0.08	0.08	0.08	0.08	0.12	0.16
01/02/93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01/01/93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/31/92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/30/92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/29/92	0.00	0.00	0.00	0.00	0.00	0.00	0.04
12/28/92	0.51	0.71	0.71	0.51	0.63	0.71	0.75
12/27/92	0.12	0.16	0.16	0.08	0.16	0.16	0.12
12/26/92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/25/92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/24/92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/23/92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTALS:	5.08	5.83	4.53	5.08	6.14	6.14	5.87

Maricopa County ALERT System
 Group Name Date Time
 CCS3: Phx Metro 1 03/10/93 07:00:07

DeviceID	Durango	Phx Muni	Thom16th	PerryPrk	Papago
StatType	dif	dif	dif	dif	dif
DataType	precip	precip	precip	precip	precip
Units	in	in	in	in	in
1 day at 24:00:00					
01/22/93	0.00	0.00	0.00	0.00	0.00
01/21/93	0.00	0.00	0.00	0.00	0.00
01/20/93	0.00	0.00	0.00	0.00	0.00
01/19/93	0.00	0.00	0.00	0.00	0.83
01/18/93	1.10	0.55	0.71	0.59	0.00
01/17/93	0.16	0.16	0.08	0.08	0.04
01/16/93	0.28	0.28	0.31	0.28	0.00
01/15/93	0.12	0.24	0.47	0.43	0.04
01/14/93	0.00	0.16	0.31	0.28	0.04
01/13/93	0.08	0.04	0.08	0.08	0.04
01/12/93	0.16	0.16	0.16	0.20	0.04
01/11/93	1.34	1.14	0.79	0.98	0.24
01/10/93	0.91	0.91	0.55	1.18	0.51
01/09/93	0.00	0.00	0.00	0.00	0.00
01/08/93	0.87	0.79	0.63	0.75	0.91
01/07/93	0.51	0.51	0.16	0.47	0.47
01/06/93	0.24	0.28	0.24	0.35	0.31
01/05/93	0.04	0.00	0.04	0.04	0.00
01/04/93	0.00	0.00	0.00	0.00	0.00
01/03/93	0.12	0.12	0.12	0.12	0.08
01/02/93	0.00	0.00	0.00	0.00	0.00
01/01/93	0.00	0.00	0.00	0.00	0.00
12/31/92	0.00	0.00	0.00	0.00	0.00
12/30/92	0.00	0.00	0.00	0.00	0.00
12/29/92	0.04	0.00	0.00	0.00	0.00
12/28/92	0.63	0.67	0.24	0.67	0.55
12/27/92	0.16	0.12	0.16	0.16	0.16
12/26/92	0.00	0.00	0.00	0.00	0.00
12/25/92	0.00	0.00	0.00	0.00	0.00
12/24/92	0.00	0.00	0.00	0.00	0.00
12/23/92	0.00	0.00	0.00	0.00	0.00
TOTALS:	6.73	6.10	5.04	6.65	4.25

Maricopa County ALERT System
 Group Name Date Time
 CCS4: Phx Metro 2 03/10/93 07:10:26

DeviceID	Thom48th	MariMuni	Glendale	Miss16th	ParValCC
StatType	dif	dif	dif	dif	dif
DataType	precip	precip	precip	precip	precip
Units	in	in	in	in	in
1 day at 24:00:00					
01/22/93	0.00	0.00	0.00	0.00	0.00
01/21/93	0.00	0.00	0.00	0.00	0.00
01/20/93	0.00	0.00	0.00	0.00	0.00
01/19/93	0.04	0.00	0.00	0.00	0.00
01/18/93	0.28	0.43	0.20	0.87	0.51
01/17/93	0.08	0.31	0.71	0.31	0.08
01/16/93	0.24	0.43	0.39	0.31	0.24
01/15/93	0.47	0.79	0.31	0.39	0.24
01/14/93	0.20	0.24	0.20	0.20	0.12
01/13/93	0.04	0.08	0.08	0.08	0.08
01/12/93	0.20	0.16	0.20	0.16	0.16
01/11/93	0.87	0.35	0.20	0.43	0.39
01/10/93	0.83	1.26	1.02	1.22	0.87
01/09/93	0.00	0.00	0.00	0.00	0.00
01/08/93	0.75	0.47	0.20	0.51	0.51
01/07/93	0.47	0.55	0.55	0.55	0.43
01/06/93	0.35	0.39	0.43	0.35	0.31
01/05/93	0.04	0.04	0.04	0.00	0.00
01/04/93	0.00	0.00	0.00	0.00	0.00
01/03/93	0.08	0.08	0.12	0.12	0.08
01/02/93	0.00	0.00	0.00	0.00	0.00
01/01/93	0.00	0.00	0.00	0.00	0.00
12/31/92	0.00	0.00	0.00	0.00	0.00
12/30/92	0.00	0.00	0.00	0.00	0.00
12/29/92	0.04	0.04	0.12	0.04	0.04
12/28/92	0.59	0.83	0.91	0.67	0.55
12/27/92	0.16	0.16	0.20	0.16	0.12
12/26/92	0.00	0.00	0.00	0.00	0.00
12/25/92	0.00	0.00	0.00	0.00	0.00
12/24/92	0.00	0.00	0.00	0.00	0.00
12/23/92	0.00	0.00	0.00	0.00	0.00
TOTALS:	5.71	6.61	5.87	6.38	4.72

Maricopa County ALERT System

Group Name Date Time
 CCS5: ACDC 03/10/93 07:10:50

DeviceID	Drm.Draw	ACDC67th	ACDC43rd	CCcactus	Grnwy@32
StatType	dif	dif	dif	dif	dif
DataType	precip	precip	precip	precip	precip
Units	in	in	in	in	in
1 day at 24:00:00					
01/22/93	0.00	0.00	0.00	0.00	0.00
01/21/93	0.00	0.00	0.00	0.00	0.00
01/20/93	0.00	0.00	0.00	0.00	0.00
01/19/93	0.00	0.00	0.00	0.00	0.00
01/18/93	0.94	0.63	0.35	0.35	0.28
01/17/93	0.28	0.59	0.55	0.59	0.51
01/16/93	0.35	0.20	0.35	0.35	0.35
01/15/93	0.24	0.12	0.08	0.08	0.04
01/14/93	0.16	0.08	0.16	0.08	0.16
01/13/93	0.08	0.08	0.08	0.12	0.12
01/12/93	0.16	0.12	0.16	0.16	0.12
01/11/93	0.28	0.08	0.20	0.20	0.16
01/10/93	1.06	1.06	0.98	0.98	1.10
01/09/93	0.00	0.00	0.00	0.00	0.00
01/08/93	0.59	0.28	0.47	0.51	0.39
01/07/93	0.67	0.71	0.87	0.87	0.94
01/06/93	0.35	0.43	0.51	0.43	0.59
01/05/93	0.00	0.00	0.04	0.00	0.04
01/04/93	0.00	0.00	0.00	0.00	0.00
01/03/93	0.12	0.08	0.16	0.16	0.08
01/02/93	0.00	0.00	0.00	0.00	0.00
01/01/93	0.00	0.00	0.00	0.00	0.00
12/31/92	0.00	0.00	0.00	0.00	0.00
12/30/92	0.00	0.00	0.00	0.04	0.00
12/29/92	0.04	0.04	0.12	0.08	0.12
12/28/92	0.63	0.63	0.83	0.79	0.75
12/27/92	0.16	0.20	0.20	0.16	0.20
12/26/92	0.00	0.00	0.00	0.00	0.00
12/25/92	0.00	0.00	0.00	0.00	0.00
12/24/92	0.00	0.00	0.00	0.00	0.00
12/23/92	0.00	0.00	0.00	0.00	0.00
TOTALS:	6.10	5.31	6.10	5.94	5.94

Maricopa County ALERT System

Group Name Date Time
 GQC3: E. Valley Structures 03/10/93 07:33:08

DeviceID	Apache F	Vineyard	Rittnhse	Magma	Florence	KingsRch
StatType	dif	dif	dif	dif	dif	dif
DataType	precip	precip	precip	precip	precip	precip
Units	in	in	in	in	in	in
1 day at 24:00:00						
01/22/93	0.00	0.00	0.00	0.00	0.00	0.00
01/21/93	0.00	0.00	0.00	0.00	0.00	0.00
01/20/93	0.00	0.00	0.00	0.00	0.00	0.00
01/19/93	0.04	0.04	0.04	0.00	0.00	0.00
01/18/93	0.94	0.59	0.98	0.00	0.55	1.57
01/17/93	0.43	0.08	0.04	0.08	0.08	0.08
01/16/93	0.16	0.20	0.16	0.04	0.20	0.16
01/15/93	0.12	0.20	0.16	0.04	0.20	0.28
01/14/93	0.20	0.39	0.16	0.04	0.12	0.51
01/13/93	0.04	0.12	0.12	0.08	0.16	0.08
01/12/93	0.12	0.16	0.20	0.08	0.16	0.16
01/11/93	0.87	0.67	0.47	0.20	0.63	0.75
01/10/93	0.71	0.79	0.63	0.12	1.10	0.87
01/09/93	0.00	0.04	0.00	0.08	0.00	0.00
01/08/93	0.94	0.55	0.39	0.24	0.43	0.94
01/07/93	0.63	0.71	0.98	0.35	1.06	1.22
01/06/93	0.35	0.35	0.39	0.39	0.59	0.59
01/05/93	0.00	0.00	0.00	0.00	0.00	0.00
01/04/93	0.00	0.00	0.00	0.00	0.00	0.00
01/03/93	0.08	0.20	0.20	0.31	0.28	0.24
01/02/93	0.00	0.00	0.00	0.00	0.00	0.00
01/01/93	0.00	0.00	0.00	0.00	0.00	0.00
12/31/92	0.00	0.00	0.00	0.00	0.00	0.00
12/30/92	0.00	0.00	0.00	0.00	0.00	0.00
12/29/92	0.04	0.04	0.00	0.04	0.12	0.04
12/28/92	0.91	0.98	0.79	1.06	1.26	1.34
12/27/92	0.04	0.08	0.04	0.08	0.08	0.04
12/26/92	0.00	0.00	0.00	0.00	0.00	0.00
12/25/92	0.00	0.00	0.00	0.00	0.00	0.00
12/24/92	0.00	0.00	0.00	0.00	0.00	0.00
12/23/92	0.00	0.00	0.00	0.00	0.00	0.00
TOTALS:	6.61	6.18	5.75	3.23	7.01	8.86

Maricopa County ALERT System
 Group Name Date Time
 Lower Waterman Wash 03/10/93 07:35:33

DeviceID	Gila@85	BuckFRS3	WTanks4	EstrlaPk
StatType	dif	dif	dif	dif
DataType	precip	precip	precip	precip
Units	in	in	in	in
1 day at 24:00:00				
01/22/93	_____	0.00	0.00	0.00
01/21/93	_____	0.00	0.00	0.00
01/20/93	_____	0.00	0.00	0.00
01/19/93	_____	0.00	0.00	0.00
01/18/93	_____	0.16	0.24	0.63
01/17/93	_____	0.51	0.28	0.24
01/16/93	_____	0.12	0.31	0.35
01/15/93	_____	0.04	0.04	0.04
01/14/93	_____	0.28	0.35	0.08
01/13/93	_____	0.00	0.04	0.04
01/12/93	_____	0.16	0.12	0.20
01/11/93	_____	0.04	0.04	1.02
01/10/93	_____	1.10	1.54	1.14
01/09/93	_____	0.00	0.00	0.00
01/08/93	_____	0.55	0.55	0.51
01/07/93	_____	0.63	0.63	0.51
01/06/93	_____	0.16	0.28	0.31
01/05/93	_____	0.00	0.04	0.00
01/04/93	_____	0.00	0.00	0.00
01/03/93	_____	0.00	0.00	0.12
01/02/93	_____	0.00	0.00	0.00
01/01/93	_____	0.00	0.00	0.00
12/31/92	_____	0.00	0.00	0.00
12/30/92	_____	0.00	0.00	0.00
12/29/92	_____	0.00	0.04	0.04
12/28/92	_____	0.71	0.83	0.63
12/27/92	_____	0.12	0.12	0.16
12/26/92	_____	0.00	0.00	0.00
12/25/92	_____	0.00	0.00	0.00
12/24/92	_____	0.00	0.00	0.00
12/23/92	_____	0.00	0.00	0.00
TOTALS:	_____	4.57	5.43	6.02

Maricopa County ALERT System
 Group Name Date Time
 Upper Waterman Wash 03/10/93 07:35:51

DeviceID	HollyAcr	Waterman	Estr.Fan	UpWatrmn
StatType	dif	dif	dif	dif
DataType	precip	precip	precip	precip
Units	in	in	in	in
1 day at 24:00:00				
01/22/93	_____	0.00	0.00	0.00
01/21/93	_____	0.00	0.00	0.00
01/20/93	_____	0.00	0.00	0.00
01/19/93	_____	0.00	0.00	0.00
01/18/93	_____	0.94	0.79	0.39
01/17/93	_____	0.12	0.16	0.00
01/16/93	_____	0.31	0.39	0.12
01/15/93	_____	0.04	0.04	0.04
01/14/93	_____	0.04	0.00	0.00
01/13/93	_____	0.00	0.00	0.04
01/12/93	_____	0.20	0.55	0.24
01/11/93	_____	0.08	0.00	0.00
01/10/93	_____	0.43	0.43	0.47
01/09/93	_____	0.00	0.00	0.00
01/08/93	0.55	0.28	0.47	0.28
01/07/93	0.47	0.59	0.51	0.39
01/06/93	0.39	0.28	0.24	0.24
01/05/93	0.04	0.00	0.00	0.00
01/04/93	0.00	0.00	0.00	0.00
01/03/93	0.12	0.12	0.16	0.08
01/02/93	0.00	0.00	0.00	0.00
01/01/93	0.00	0.00	0.00	0.00
12/31/92	0.00	0.00	0.00	0.00
12/30/92	0.00	0.00	0.00	0.00
12/29/92	0.08	0.04	0.04	0.00
12/28/92	0.75	0.71	0.55	0.79
12/27/92	0.20	0.16	0.20	0.16
12/26/92	0.00	0.00	0.00	0.00
12/25/92	0.00	0.00	0.00	0.00
12/24/92	0.00	0.00	0.00	0.00
12/23/92	0.00	0.00	0.00	0.00
TOTALS:	2.60	4.33	4.53	3.23

Maricopa County ALERT System
 Group Name Date Time
 Saucedá Wash 03/10/93 07:50:58

DeviceID	Sauceda	SandTank	BendrWsh	Vekol
StatType	dif	dif	dif	dif
DataType	precip	precip	precip	precip
Units	in	in	in	in
1 day at 24:00:00				
01/22/93	0.00	0.00	0.00	0.00
01/21/93	0.00	0.00	0.00	0.00
01/20/93	0.00	0.00	0.00	0.00
01/19/93	0.00	0.00	0.00	0.00
01/18/93	0.12	0.00	0.16	0.12
01/17/93	0.00	0.00	0.00	0.00
01/16/93	0.04	0.00	0.12	0.00
01/15/93	0.00	0.00	0.00	0.00
01/14/93	0.00	0.00	0.00	0.00
01/13/93	0.00	0.08	0.00	0.20
01/12/93	0.24	0.12	0.04	0.16
01/11/93	0.00	0.04	0.04	0.00
01/10/93	0.39	0.47	0.35	0.83
01/09/93	0.00	0.00	0.04	0.00
01/08/93	0.12	0.20	0.24	0.12
01/07/93	0.35	0.39	0.39	0.35
01/06/93	0.12	0.16	0.28	0.28
01/05/93	0.00	0.00	0.00	0.04
01/04/93	0.00	0.00	0.00	0.00
01/03/93	0.08	0.12	0.04	0.12
01/02/93	0.00	0.00	0.00	0.00
01/01/93	0.00	0.00	0.00	0.00
12/31/92	0.04	0.00	0.00	0.00
12/30/92	0.00	0.00	0.00	0.00
12/29/92	0.00	0.04	0.04	0.00
12/28/92	0.08	0.47	0.55	0.51
12/27/92	0.16	0.20	0.20	0.12
12/26/92	0.00	0.00	0.00	0.00
12/25/92	0.00	0.00	0.00	0.00
12/24/92	0.00	0.00	0.00	0.00
12/23/92	0.00	0.00	0.00	0.00
TOTALS:	1.73	2.28	2.48	2.83

APPENDIX B

**Report on Flood Damage and Assessment for Board of
Supervisors Meeting (by MC Dept. of Emergency Management)**

TO: Ted Williams, Assistant County Manager, Environmental Quality and Community Services Agency

FROM: Robert H. Bishop, Director, Department of Emergency Management

SUBJECT: REPORT ON FLOOD DAMAGE AND ASSESSMENT FOR BOARD OF SUPERVISORS MEETING

DATE: February 1, 1993

This report is a summary of the flood damage events that affected Maricopa County as a result of the weekend storms of January 8-10 and the following MLK weekend of 15-18 January. These events followed unusually heavy rains which began with a series of intense tropical storms generated in the Pacific Ocean. The initial storm beginning on January 5th, the first in a series of three, produced up to 3 inches of rain in the Verde and Salt River watersheds. The excessive rain, coupled with saturated soil, rising freezing levels and melting snow, caused stream levels to exceed bank-full capacities. Flood watches, warnings and advisories were issued throughout the period by the National Weather Service, disseminated by the Department of Emergency Management and broadcast throughout the County by the media.

On January 8th, the Department of Emergency Management was advised by the Salt River Project (SRP) that water releases from Granite Reef Dam would be increased to 80-85,000 cubic feet per second (CFS) due to the heavy overnight rains. Later that day, SRP increased their release prediction to an estimated 150,000 CFS based on increased flows into the Verde River combined with heavy storm runoff of streets, roads, streams, and canals below the dams. In the final analysis the actual peak release from the Granite Reef Dam was 124,000 CFS.

In the meantime, the path of the storm also drenched the eastern part of the State causing increased flows into the Gila River above Coolidge Dam. Due to the arrival time of the runoff into San Carlos Lake and ultimately through the dam, the effects of the combined flow of the Gila River as it enters the Salt River near 115th Avenue, were not felt until several days later.

On January 8th, the Chairman of the Board of Supervisors signed a County Emergency Declaration, subsequently forwarded to the State. The State Declaration was signed by the Governor on the same day (effective January 5th) and was then forwarded to the Federal

Government. A Presidential Federal Disaster Declaration was requested and signed by the President on January 19th.

The Department of Emergency Management activated the Emergency Operations Center (EOC) on a 24-hour basis starting on January 7th in response to the continued rain, water releases and potential flooding in the County. The EOC staff, represented by Emergency Management, Environmental Quality, Flood Control District, Department of Transportation, Sheriff's Office and the Central Arizona Chapter of the American Red Cross, answered thousands of inquiries from the public in response to the events taking place. The EOC staff was instrumental in the support of City and Town response operations by providing up-to-date, accurate and continuous support in a coordinated response to the emergency.

Two deaths were reported in the County as a result of the storms. One individual fell from a horse in the Agua Fria and drowned and the other individual was believed to have walked into the water as a suicide attempt. Numerous successful rescues were made by municipal and Rural/Metro fire units and law enforcement agencies as people tried to cross flooded streams, usually as a result of ignoring road closure signs.

Several major facilities and areas were affected by the flooding. Of greatest concern, considering the potential loss of life, was the Holly Acres community in the West Valley. Located at the convergence of the Gila and Salt Rivers, the levee surrounding the community of Holly Acres is rated by the Flood Control District at 105,000 CFS. The levee was not breached in part due to the outstanding efforts of Transportation and Development Agency personnel who strengthened the structure prior to the highest flows; however, the free board level above the water was within 18 inches of the top. The community of over 200 families was evacuated as a precaution early on January 8th, but was allowed to return late on January 9th with appropriate cautions. The MCSO dispatched its Command Center to the location to monitor the evacuation and return. The Central Arizona Chapter of the American Red Cross (ARC) opened a shelter at the Littleton Elementary School in Cashion, but due to lack of participants it was later closed.

Of equal concern is an area east of the Holly Acres community that received flood damage. This area is located between Southern Avenue and the Salt River and extends from 105th Avenue to the Agua Fria River.

Other areas evacuated included 6 families from the 51 unit Hawaiian Mobile Home Park located west of Country Club Road in Mesa. The ARC opened a shelter at the Westwood High School in support of emergency operations.

Several families in the New River area became stranded as a result of roads and bridges washing out on New River and Coyote Pass

roads. Some families stayed at the New River Community Center until they were able to return home. Through the outstanding efforts of the volunteers of the Arizona Search and Rescue organization, all of the 16 stranded families received support.

Fifteen families in a trailer park 5 miles south of Wickenburg were forced to relocate due to flooding of the Hassayampa River. Extensive damage was done to the trailer park with several trailers being washed away. A large amount of personal property was lost and is being reported to the Disaster Application Center. The ARC opened a shelter at the Seventh Day Adventist Church in Wickenburg and the Wickenburg Inn opened 5 rooms for family disaster relief.

Arlington School and six farm houses located in the Arlington area received flood damage as the waters spread throughout the unchanneled areas of the west County. Water marks in these homes and the school were about 24 inches high. Although damage was not extensive, considerable cleanup effort was needed to reopen the school. Four homes, two mobile homes and three farms were damaged in the area of 227th Avenue and Beloat with water marks about 24 inches high.

A number of farms and dairies located in the western reaches of the County were adversely affected by the flooding. Farms along Beloat Road west of Tuthill Road, feedlots along Beloat Road and a dairy near 195th Avenue and Highway 85 as well as several dairies at Beloat and Airport Roads received damage including the reports of the loss of livestock. Dead cattle and other animals have been found in the river.

The El Paso Natural Gas Company pipeline received damage during the event. An initial precautionary measure to prevent damage to the pipeline failed when two separate explosions ruptured the pipe. No injuries were reported and restoration work is being done.

A major breach in the Tri-City Landfill on the Salt River Pima-Maricopa Indian Reservation may be one of the more serious challenges to the environment and to health as a result of the flooding. Landfill contents entered the Salt River and spread throughout the river bottom area. Agreements are being drawn up to mitigate against this recurring problem including sealing the old landfill and moving the location. Issues surrounding the landfill erosion problem include questions about who has regulatory and enforcement responsibilities for activities taking place at the landfill site and questions regarding release of hazardous substances into the river and groundwater. In regards to the debris scattered throughout the Salt and Gila River system from Granite Reef to Painted Rock, unresolved issues concern authority to order an all-out river cleanup. A series of meetings are under way to discuss the issue.

Phoenix reported the Verde Water Treatment Plant received

considerable damage from high water and would probably have to be shut down for several months. Fortunately a scheduled maintenance was planned for this spring shutting down the facility. Scheduled maintenance and damage repair can now be completed simultaneously. The Del Rio Landfill at 16th Street and the Salt River was nearly breached, but was successfully shored up. A storm drain outfall had been exposed by erosion which could have caused flooding into the landfill. Extensive dike protection was done and no damage was reported.

The San Lucy Village Sewage Disposal Pond located north of Gila Bend was breached causing raw sewage to enter the Painted Rock Dam backwater.

Business establishments receiving damage include many of the sand and gravel operations located near the river bed. Tanner Companies estimated their losses at \$1.4 million and a temporary loss of 75 employee jobs.

Preliminary cost estimates for the City of Phoenix, including mitigation efforts, is estimated at \$4.2 million. Half of the total is for funds to replace the embankment lost at Sky Harbor International Airport along the north bank of the Salt River below the southern runway and to improve the riverbank with reinforced barriers to prevent future erosion.

As a general concern, bridges, their CFS rating and conditions, received added emphasis. The dramatic media video of the New Mill Avenue Bridge construction forms falling into the Salt River caused increased alarm by the public of the general safety of the bridges crossing the river. During the entire event only the grade crossings and the Gilbert Bridge, the 35th Ave Bridge and temporarily the 51st Ave Bridge were closed. Bridges over the Gila River on Highway 85 and Old US 80 to Gila Bend were subject to closure on several occasions either from flooding or during the relocation and explosions of the El Paso Natural Gas pipeline. The I-10 Bridge over the Gila was closed for several hours during the precautionary removal of tanks floating down the Gila River. Water flows below the I-10 Bridge came extremely close to closing the structure.

Gillespie Dam failed when a 100 foot section from the center of the structure was washed away. Extensive repair will be required to restore the dam to its original condition.

Painted Rock Dam continues to provide challenges to the County as of this writing. The dam has nearly filled to its full capacity of 2.5 million acre feet with a corresponding release of up to 12,500 CFS. Recently, the release rate was decreased to 10,000 CFS by the Corps of Engineers due in part to the concern for flooding and bridges located in Yuma County. The road crossing over Painted Rock Dam was closed by the Corps of Engineers because of the high

water, restricting residents to the use of the Agua Caliente Bridge. The Agua Caliente Bridge, three miles northeast of Yuma County line, is officially rated at 10,000 CFS; however some authorities feel its capacity could be as high as 20,000 CFS. No concern is expressed for the bridge to fail, but approach washouts may make the crossing unusable. If this bridge becomes unusable approximately 40-50 families may be stranded north of the River. MCDOT officials have been monitoring the Agua Caliente Bridge and drawing up contingency plans to open a higher road to the Painted Rock Dam road crossing if required. Close coordination with the Corps is being done to reopen the road crossing at the dam if it becomes necessary.

Roads and streets closed by the flooding throughout the County were extensive. At one point the Department of Transportation reported 71 locations closed due to flooding. The Department of Emergency Management assumed the responsibility of reporting to the media and to the general public the status of road conditions throughout the area. Several hundred calls were received daily requesting road and bridge conditions throughout the event.

Thunderstorms, hail and tornados associated with the severe weather patterns were reported on January 17. Tornados were sighted in New River, Chandler, Apache Junction, Gilbert and Scottsdale with only Scottsdale reporting damage. Eighteen homes were damaged, 4 with major and 14 with minor damage as the tornado touched down during the noon hour.

Coolidge Dam was required to release water as San Carlos Lake began to fill as a result of storm runoff in the eastern part of the State. By design, the dam does not have large capacity water release mechanisms and therefore must rely on the use of an uncontrolled spillway to lower water levels. At its highest release rate it approached 32,850 CFS, never having released more than 5,000 CFS in the past. Ultimately the outflow flooded several downstream towns on the Gila River before joining the Salt River at 115th Avenue. Water releases from Granite Reef were stabilized at lower release levels to compensate for the increased flows from Coolidge Dam.

In response to the weather forecasts on January 17th and with the threat of heavy rains and the potential of 200,000 CFS water runoff into the Salt and Gila Rivers, the EOC was reactivated after a two day suspension of 24-hour operations. Low lying areas were notified of the potential danger and were pre-warned of the possibility of again being evacuated. Again, the EOC staff performed successfully in their response to this potential disaster.

In the final analysis, the actual flooding danger was not realized due to the pattern of the storm entering the State. The cold front moving from the north pushed the warm tropical flow further south of the Verde watershed, increasing the snow pack to the north and

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6

February 2, 1993

increasing the rainfall in the Tucson area. The worst case scenario of rain on snow pack did not occur and the potential for flooding was decreased dramatically. The Department of Emergency Management stood down the Emergency Operations Center on January 23rd.

Any questions regarding this report, please contact Dennis Cvancara, Department of Emergency Management, 273-1411.

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