Hydrologic Analysis

for

McMicken Dam

Prepared by

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1. Introduction

The purpose of this report is to document the hydrologic analysis for McMicken Dam. The 72-hour Probable Maximum Precipitation (PMP) general storm, 6-hour PMP local storm, and 6-hour 100-year storm are used in this hydrologic analysis. More specifically, the hydrologic analysis is conducted to (1) investigate the effect of the new stage/storage relationship for the McMicken Dam for the 72-hour PMP general storm; (2) investigate the effect of the increased drainage area on the maximum outflow from the Dam for the 72-hour PMP general storm; and (3) compare the 6-hour PMP local storm and 6-hour, 100-year storm for two drainage sub-basins. The HEC-1 models are developed by modifying a previous HEC-1 model (Rumann and Sutko, 1987). HAESTAD 900-Ordinates HEC-1 (version 3.2c, 1985) is used to run the models. The results are listed in Tables 1-2. The detailed results can be found in the HEC-1 output files in the attached computer diskette.

2. Previous Hydrologic Analysis

McMicken Dam is an earthen flood control structure designed and built by the U.S. Army Corps of Engineers in 1955, and currently operated and maintained by the Flood Control District of Maricopa County (Rumann and Sutko, 1987). An aerial photo for the Dam and outlet structure can be seen on Figure 1. The contributing watershed of 247 square miles is bounded by the White Tank Mountains on the south, and the Wickenburg Mountains on the north, and the Hieroglyphic Mountains on the east. The main contributing washes are Trilby Wash, Iona Wash, and Me Wash.

Two major PMP hydrologic analyses were conducted in the past to evaluate how

McMicken Dam responds to PMP storm events. The first PMP analysis was conducted by Sergent, Hauskins & Beckwith, Consulting Geotechnical Engineers (SH&B, 1983). In the analysis, the watershed was divided into eight sub-basins. The second PMP analysis was conducted by Rumann and Sutko (1987). In the second analysis, the watershed was divided into 44 sub-basins.

3. Current Hydrologic Analysis

Since the previous hydrologic analysis was conducted, the capacity for McMicken Dam has been revised based on more detailed topographic mapping, resulting in a new stage/storage rating curve for the Dam. The old and new stage/storage rating curves are shown on Figure 2. The stage/discharge rating curve (Rumann and Sutko, 1987) is shown on Figure 3. In addition to the change in stage/storage rating curve, McMicken Dam Inlet Channel has recently been proposed as a 5-year Capital Improvement Program (CIP) project to convey the runoff between the current McMicken Dam and White Tanks #3 into McMicken Dam (Tram, 1995). This Inlet Channel, if built, will add 2 additional sub-basins (8.7 square miles) to the existing 44 sub-basins, giving 46 contributing sub-basins to the Dam. Therefore, it is necessary to re-evaluate how the Dam would respond to PMP storm events.

The current hydrologic analysis has two parts. The first part is to re-evaluate how the Dam responds to a 72-hour PMP general storm for the following four cases: (1) 44 contributing sub-basins with the old stage/storage rating curve, (2) 44 contributing sub-basins with new stage/storage rating curve, (3) 46 contributing sub-basins with old stage/storage rating curve, and (4) 46 contributing sub-basins with new stage/storage rating curve. The first case is the same as

the work by Rumann and Sutko (1987). The HEC-1 models for the 72-hour PMP general storm analysis are developed by modifying the HEC-1 model by Rumann and Sutko (1987). The procedures by Hansen et al. (1977) for 72-hour PMP general storm are used to find the total rainfall depth and temporal distribution for the 72-hour PMP general storm. The procedures can be found in Appendix 7.2.1.

The second part of the current hydrologic analysis is to conduct the 6-hour local PMP storm analysis and the 6-hour 100-year storm analysis for the 2 additional sub-basins in order to compute design discharges for the Inlet Channel design. The procedures by Hansen et al. (1977) for the 6-hour PMP local storm are used to find the total rainfall depth and temporal distribution for the 6-hour PMP local storm. The procedures can be found in Appendix 7.2.2. The 6-hour 100-year storm analysis is based on Sabol et al. (1992). MCUHP2 computer program is used to compute the unit hydrograph and rainfall temporal distribution for the 6-hour 100-year storm analysis.

4. Results

HAESTAD 900-Ordinates HEC-1 (version 3.2c, 1985) is used to run the HEC-1 models. The model by Rumann and Sutko (1987) is reproduced and modified to reflect the new stage/storage relationship and 2 added drainage sub-basins. The results selected from the HEC-1 output files are listed in Tables 1-2. The HEC-1 input files are listed in Appendix 7.1. The HEC-1 input and output files are included in the diskette attached with the report. As can be seen in Table 1, the Dam is not overtopped in all cases.

Comparisons can be made for the maximum outflows from the Dam for the 72-hour PMP

general storm. As can be seen in Table 1, the maximum outflow for the "44 Basins with New Rating Curve" is smaller than that for the "44 Basins with Old Rating Curve (85897 cfs versus 90105 cfs), which is expected because the new stage/storage relationship corresponds to the increased dam volume. This is the case between "46 Basins with New Rating Curve" and "46 Basins with Old Rating Curve" (92618 cfs versus 96097 cfs).

It can also be observed from Table 1 that the "46 Basins with Old Rating Curve" gives larger maximum outflow than the "44 Basins with Old Rating Curve does (96097 cfs versus 90105 cfs), which is expected because larger contributing areas generate larger flows. This is the case between "46 Basins with New Rating Curve" and "44 Basins with New Rating Curve" (92618 cfs versus 85897 cfs).

Table 2 lists the results for the hydrologic analysis for the 2 additional sub-basins for the 6-hour PMP local storm and 6-hour, 100-year storm. As can be seen from Table 2, the peak discharge of the 2 basins for the 6-hour PMP local storm is, as expected, significantly larger than that for the 6-hour, 100-year storm (30479 cfs versus 6093 cfs).

5. Summary

PMP analysis has been conducted to evaluate how McMicken Dam responds to a 72-hour PMP general storm. It was found that (1) the maximum outflow from the Dam for the new stage/storage relationship is smaller than that for the old stage/storage relationship; (2) the two added drainage basins increased the maximum outflow from the Dam.

Both 6-hour PMP local storm analysis and 6-hour 100-year storm analysis have been conducted to compute the 6-hour PMP peak discharge and the 6-hour 100-year peak discharge

for 2 sub-basins which are due to a proposed McMicken Dam Inlet Channel. It was found that the peak discharge of the 2 basins for the 6-hour PMP local storm is significantly larger than that for the 6-hour, 100-year storm.

6. References

Hansen, E.M., Schwarz, F.K., and Riedel J.T., 1977, "Hydrometeorological Report No. 49, Probable Maximum Precipitation Estimates, Colorado River and Great Basin Drainage." Hydrometeorological Branch, Office of Hydrology, National Weather Service.

Rumann, J.M. and Sutko, T.E., 1987, "Report on a Hydrologic Analysis of the McMicken Dam Watershed." Flood Control District of Maricopa County. A202.702

Sabol, G.V., Rumann, J.M., Khalili D., Waters, S.D. and Lehman, T., 1995, "Drainage Design Manual for Maricopa County, Arizona Volume I Hydrology." Flood Control District of Maricopa County.

SHB Consulting Geotechnical Engineers, 1983, "Surface Water Hydrology Report, McMicken Dam Restoration Study, Maricopa County, Arizona." A 202.603

Tram, J. J., 1995 (10/24), "Internal Memorandum: Proposed Project."

Table 1. Hydrologic Analysis for McMicken Dam with a 72-hour PMP General Storm under Four Different Cases (using HAESTAD 900-Ordinates HEC-1, Version 3.2c, 1985).

	44 Basins with Old Rating Curve (Rumann and Sutko, 1987)	44 Basins with New Rating Curve	46 Basins with Old Rating Curve	46 Basins with New Rating Curve
HEC-1 Filename	PMP1.DAT PMP1.OUT	PMP2.DAT PMP2.OUT	PMP3.DAT PMP3.OUT	PMP4.DAT PMP4.OUT
Drainage Area (sq. mi.)	247	247	255.7	255.7
Maximum Reservoir W.S. Elev for PMP (ft)	1360.~~43~~ 83 (0)	1360.~~17~~ 61 (-0.26)	1360.71 (0.28)	1360.47 (0.03)
Maximum Depth Over Dam for PMP (ft)	0	0	0	0
Maximum Storage for PMP (ac-ft)	33719 34973 (0)	36991 38251 (+3272)	34601 (+882)	37871 (+4152)
Maximum Total Outflow for PMP (cfs)	90105 98623 (0)	85897 95522 (-4208)	96097 (+5992)	92618 (+2513)
Duration of Over Top for PMP (hrs)	0	0	0	0
Time of Maximum Outflow for PMP (hrs)	19.~~58~~ 42 (0)	19.~~92~~ 58 (0.34)	19.5 (0.08)	19.67 (+0.09)

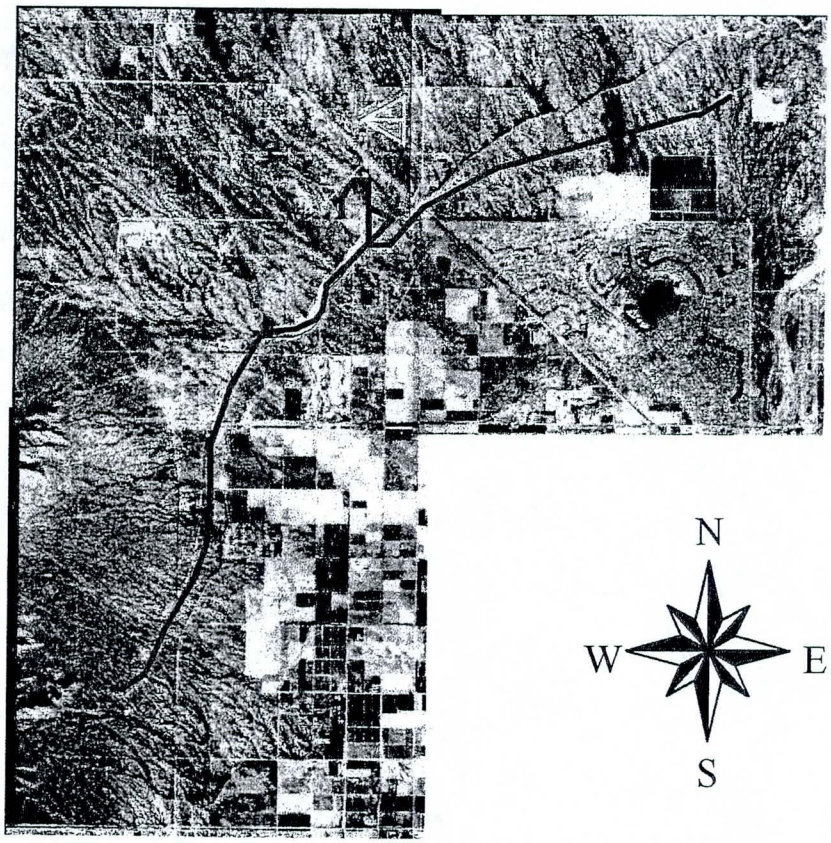
Table 1. Continued

	44 Basins with Old Rating Curve (Rumann and Sutko, 1987)	44 Basins with New Rating Curve	46 Basins with Old Rating Curve	46 Basins with New Rating Curve
Time of Failure for PMP (hrs)	0	0	0	0
Initial Elevation (ft)	1335 (0)	1327 (-8)	1335 (0)	1327 (-8)
Initial Storage (ac-ft)	0	0	0	0
Initial Outflow (cfs)	0	0	0	0
Elevation at Spillway Crest (ft)	1354	1354	1354	1354
Storage at Spillway Crest (ac-ft)	16667 (0)	20100 (+3433)	16667 (0)	20100 (+3433)
Outflow at Spillway Crest (cfs)	4600	4600	4600	4600
Minimum Elevation at Top of Dam (ft)	1361	1361	1361	1361
Storage at Top of Dam (ac-ft)	35500 (0)	39387 (3887)	35500 (0)	39387 (+3887)
Outflow at Top of Dam (cfs)	102200	102200	102200	102200

Table 2. Hydrologic Analysis for the 2 Additional Sub-basins (using HAESTAD 900-Ordinates HEC-1, Version 3.2c, 1985).

	6-hr PMP local storm	**6-hr 100-yr storm**
HEC-1 Filename	PMP52.DAT PMP52.OUT	PMP62.DAT PMP62.OUT
Drainage Area (sq. mi.)	8.7	8.7
Peak Discharges (cfs)	30479	6093
Time-of-Peak (hrs)	3.17	4.83
Volume (ac-ft)	9879	1826

Figure 1. Aerial Photo for McMicken Dam



4.8 0 4.8 9.6 Miles

Figure 2. Stage/Storage Rating Curves (old and new) for McMicken Dam

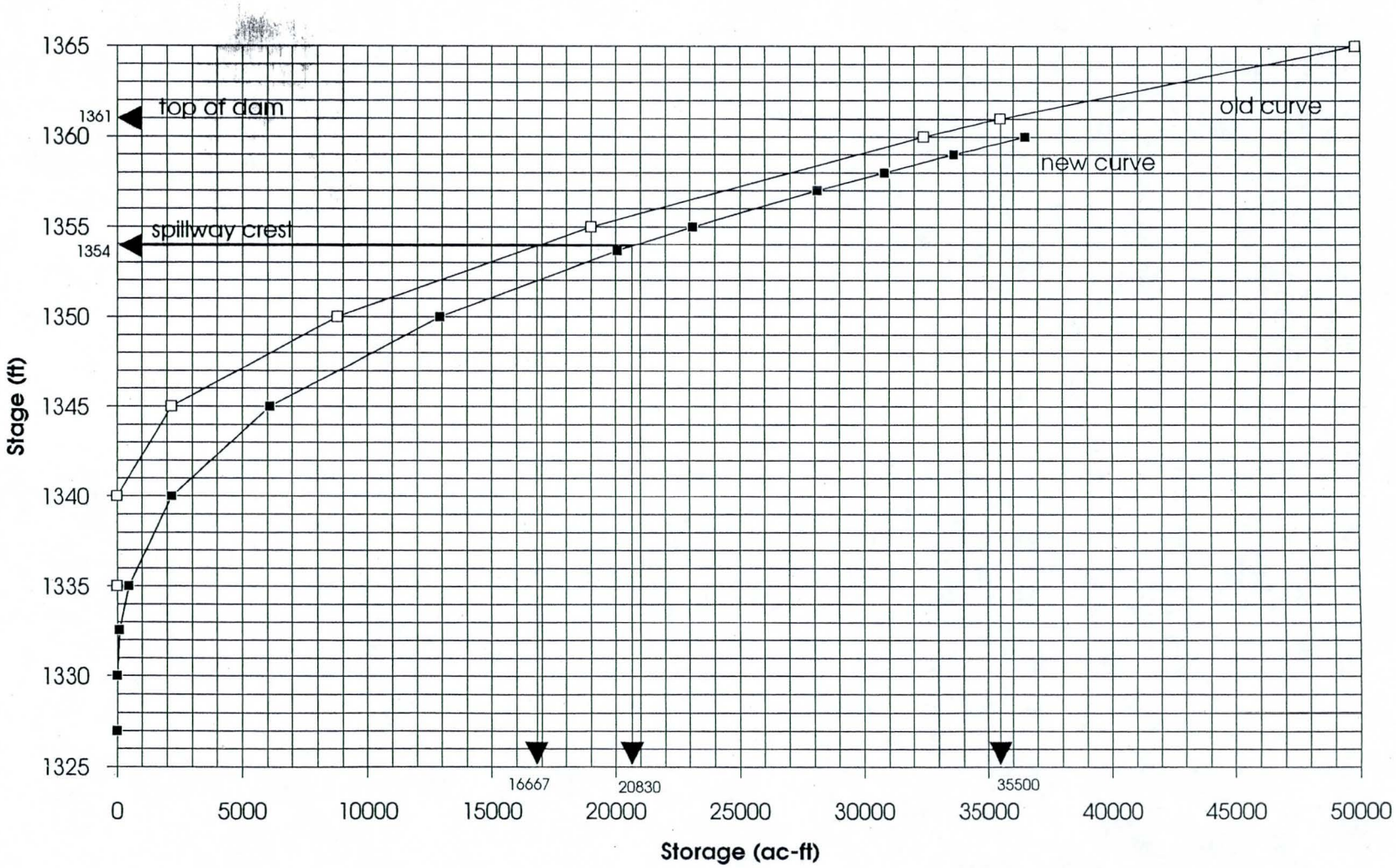
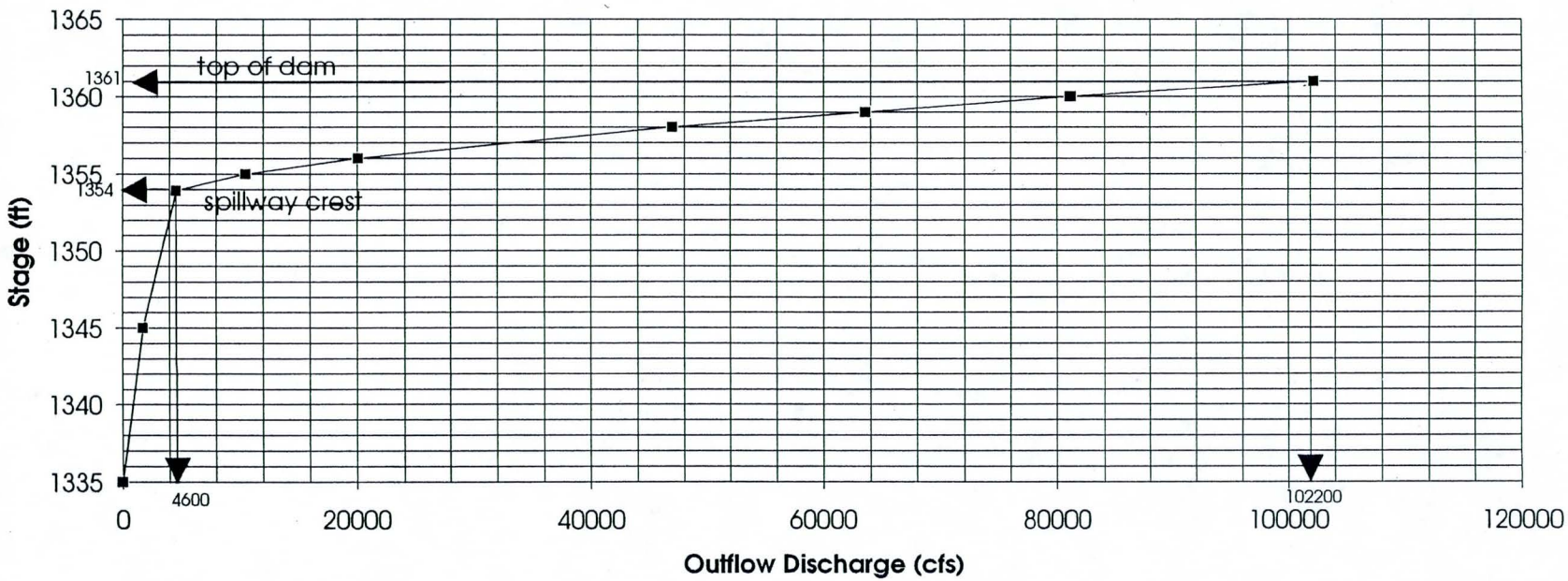


Figure 3. Stage/Discharge Rating Curve for Combined Principle-Emergency Spillway for McMicken Dam



7. Appendices

7.1 HEC-1 Input Files

7.1.1 PMP1.DAT -- 72-hour PMP general storm for 44 contributing sub-basins with old stage/storage rating curve

```
ID filename: pmp1.dat
ID McMicken Dam Watershed
ID Probable Maximum Flood
ID FCMCD Jan 87 J. Rumann
ID Sub Basins 1-44
*DIAGRAM
IT      5        0        0      900
IO      5
KK      1
BA   9.60
IN    360
PB  15.70
PI    1.1      2.3      7.2      1.3      .65      .65      .65      .65      .30      .30
PI    .30      .30
LU   0.95     0.15
UI      0      241      489      761     1196     1767     2405     3022     3742     3889
UI   4131     4350     4350     4350     3744     3157     2953     2702     2265     2142
UI   2032     1842     1467     1402     1343     1086     1005      967      932      920
UI    900      869      580      562      545      529      514      319      295      274
UI    267      260      254      171      150      146      143      140      137      134
UI    131      129      126       67       66       65       64       62       61       60
UI     59       58       57       19        0
KK ROUTE1 TO 4
RM      1      0.7      0.2
KK      4
BA   3.42
PB  15.70
LU    .95      .15
UK    300     0.09     0.15      100
RK   7500     0.05     0.05      0.5     TRAP       25        3
RK  19500     0.05    0.035             TRAP       50        3       NO
KK CCOMBINE1 & 4
HC      2
KK      6
BA   5.79
PB   15.7
LU    .95      .15
UK    300     0.03     0.15      100
RK  10000     0.02     0.04      1.0     TRAP       25        3
RK  19500     0.02    0.035             TRAP       75        3      YES
KK  DAM2
KM TRILBY WASH @ S.R. 74
RS      1     STOR       -1
SA      0      0.9
SE   2050     2061
SQ      0    17600
ST   2061     3500        3      1.5
KK   ROUTEDAM2 TO 13
RM      1      1.1      0.2
KK     13
BA   6.05
PB   15.7
LU    .95      .15
UK    300     0.03     0.15      100
RK  21000     0.02    0.040      1.0     TRAP       25        3
RK  27000     0.02    0.035             TRAP       50        3       NO
KK COMBINEDAM 2 @ 13
HC      2
KK     DAM9
KM   TRILBY WASH @ GRAND AVE.
RS      1     STOR       -1
SA      0       50
SE   1850     1857
SQ      0    30300
ST   1857     9000        3      1.5
```

```
KK   ROUTEDAM9 TO 25
RM     1      2.6      0.2
KK    25
BA  9.36
PB  15.7
LU   .95      .15
UK   300     0.01     0.15      100
RK 20000    0.009    0.040      3.0     TRAP      50        3
RK 40750    0.008    0.035              TRAP     150        3       NO
KK COMBINEDAM9 TO 25
HC     2
KK   DAM22
KM   TRILBY WASH @ C.A.P., STA. 609+0
RS     1     STOR       -1
SQ     0     6903
SE  1540   1548.5
SV     0     3436
ST  1554     2000        3      1.5
KK   ROUTEDAM22 TO 31
RM     1      2.7      0.2
KK     3
BA  4.43
PB  15.7
LU   .95      .15
UK   300     0.05     0.15      100
RK  6200     0.05    0.040      1.0     TRAP      50        3
RK 26500     0.04    0.035              TRAP      75        3       NO
KK     5
BA  2.98
PB  15.7
LU   .95      .15
UK   300     0.03     0.15      100
RK  4500     0.03    0.040      1.0     TRAP      50        3
RK 13000     0.01    0.035              TRAP     100        3      YES
KK  DAM1
KM   IONA WASH @ S.R. 74
RS     1     STOR       -1
SA     0      1.1
SE  2040     2048
SQ     0     7300
ST  2048     6000        3      1.5
KK  ROUTEDAM1 TO 12
RM     1      0.9      0.2
KK    12
BA  4.42
PB  15.7
LU   .95      .15
UK   300     0.02     0.15      100
RK  9300    0.015    0.040      1.0     TRAP      50        3
RK 13500    0.010    0.035              TRAP     100        3       NO
KK CCOMBINEDAM1 TO 12
HC     2
KK DAM8
KM IONA WASH @ GRAND AVE.
RS     1     STOR       -1
SA     0     50.0
SE  1920     1930
SQ     0    10500
ST  1930    70003      1.5
KK   ROUTEDAM8 TO 24
RM     1      3.3      0.2
KK    24
BA 17.92
PB  15.7
LU   .95      .15
UK   300    0.010     0.15      100
RK 16000    0.008    0.040      5.0     TRAP      75        3
RK 60250    0.007    0.035              TRAP     150        3       NO
KK COMBINEDAM8 TO 24
HC     2
KK DAM21
KM   IONA WASH @ C.A.P., STA. 572+5
RS     1     STOR       -1
SQ     0       72      505     1135     1914     2817
SE1545.2     1546     1548     1550     1552     1554
SV     0        7       31       69      288      518
ST  1553     2000        3      1.5
KK   ROUTEDAM 21 TO 31
```

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RM      1      2.8      0.2
KK     31
BA   9.34
PB   15.7
LU    .95      .15
UK    300    0.007     0.15      100
RK 10000    0.006    0.040      2.0     TRAP      100        3
RK 39750    0.005    0.035              TRAP      175        3       NO
KK COMBINEDAMS 21 & 22 TO 31
HC      3
KK ROUTEDAMS 21 & 22/31 TO 32
RM      1      0.2      0.2
KK      7
BA   7.05
PB   15.7
LU    .95      .15
UK    300     0.03     0.15      100
RK 12400     0.02    0.040      1.0     TRAP       25        3
RK 24750     0.03    0.035              TRAP       50        3       NO
KK  DAM3
KM  S.R. 74
RS      1     STOR       -1
SA      0      1.1
SE   2000     2008
SQ      0    10300
ST   2008     6000        3      1.5
KK   ROUTEDAM3 TO 14
RM      1      2.1      0.2
KK     14
BA   7.21
PB   15.7
LU    .95      .15
UK    300    0.020     0.15      100
RK 19000    0.015    0.040      2.0     TRAP       50        3
RK 32250    0.012    0.035              TRAP      100        3       NO
KK COMBINEDAM3 TO 14
HC      2
KK DAM10
KM GRAND AVE.
RS      1     STOR       -1
SA      0       50
SE   1670     1675
SQ      0     8740
ST   1681     4000        3      1.5
KK   ROUTEDAM10 TO 26
RM      1      1.2      0.2
KK     26
BA   8.42
PB   15.7
LU    .95      .15
UK    300    0.010     0.15      100
RK 20000    0.008    0.040      2.0     TRAP       75        3
RK 27750    0.008    0.035              TRAP      150        3       NO
KK COMBINEDAM 10 TO 26
HC      2
KK DAM23
KM   C.A.P., STA. 688+0
RS      1     STOR       -1
SQ      0      116      440      881     1414     2025     2705     3447
SE1544.3     1545     1546     1547     1548     1549     1550     1551
SV      0        3       10       19       31      139      292      498
ST1550.2     2000        3      1.5
* THE FOLLOWING CARDS WERE FROM SPF HEC-1 INPUT FILE IN THE 1987
* REPORT BECAUSE ONE PAGE IS MISSING IN THE PMP HEC-1 INPUT FILE
* IN THE 1987 REPORT.
KK ROUTEDAM23 TO 32
RM      1      2.7      0.2
KK     32
BA   8.42
PB   15.7
LU   0.95     0.15
UK    300    0.007     0.15      100
RK 10000    0.006    0.040      3.0     TRAP      100        3
RK 38250    0.006    0.035              TRAP      175        3       NO
KK COMBINEDAMS 21,22,23 TO 32
HC      3
KK      ROUTEDAMS 21,22,23/31,32 TO 33
RM      1      0.6      0.2
```

```
KK      8
BA   3.38
PB   15.7
LU   0.95     0.15
UK    300     0.04     0.15      100
RK   6500     0.04    0.040      1.0     TRAP      25        3
RK  24500     0.03    0.035              TRAP      50        3       NO
KK   DAM4
KM    S.R. 74
RS      1     STOR       -1
SA      0     50.0
SE   1990     2000
SQ      0     1525
ST   2001     1500        3      1.5
KK   ROUTEDAM4 TO 15
RM      1      2.6      0.2
KK      9
BA   5.44
PB   15.7
LU   0.95     0.15
UK    300     0.05     0.15      100
RK  12000     0.05     0.04      1.0     TRAP      25        3
RK  27500     0.04    0.035              TRAP      75        3       NO
KK DAM5
KM S.R.74
RS      1     STOR       -1
SA      0      5.0
SE   1980     1988
SQ      0    12000
ST   1988     2500        3      1.5
KK TO 15
RM      1      2.6      0.2
KK     15
BA   6.65
PB   15.7
* THE ABOVE (UP TO *) CARDS ARE FROM SPF HEC-1 INPUT FILE
LU    .95      .15
UK    300     0.02     0.15      100
RK  11400     0.02     0.04      2.0     TRAP      50        3
RK  38000    0.011    0.035              TRAP     100        3       NO
KK COMBINEDAMS 4, 5 TO 15
HC      3
KK DAM11
KM GRAND AVE.
RS      1     STOR       -1
SA      0     50.0
SE   1560     1567
SQ      0     5000
ST   1568     5000        3      1.5
KK    ROUTEDAM 11 TO 27
RM      1     0.07      0.2
KK     27
BA   1.04
PB   15.7
LU    .95      .15
UK    300    0.009     0.15      100
RK  13500    0.008     0.04              TRAP      25        3       NO
KK COMBINEDAM11 TO 27
HC      2
KK DAM24
KM    C.A.P. STA. 804+5
RS      1     STOR       -1
SQ      0       54      233      608     1007     1469     1985     2550     3161     3814
SQ   4506     5236
SE1543.5     1544     1545     1546     1547     1548     1549     1550     1551     1552
SE   1553     1554
SV      0        0        0        0        1        3        9       18       44      114
SV    204      413
ST1552.8     2000        3      1.5
KK    ROUTEDAM24 TO 33
RM      1      2.4      0.2
KK     18
BA   0.87
PB   15.7
LU    .95      .15
UK    300     0.01     0.15      100
RK  17500    0.009     0.04              TRAP      50        3       NO
KK DAM14
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```
KM GRAND AVE.
RS      1     STOR       -1
SA      0     0.30
SE   1520     1527
SQ      0     1500
ST   1527     1500        3      1.5
KK   ROUTEDAM14 TO 33
RM      1      2.4      0.2
KK     33
BA   7.48
PB   15.7
LU    .95      .15
UK    300    0.005     0.15      100
RK  13000    0.005     0.04      2.0     TRAP      75        3
RK  34750    0.006    0.035              TRAP     100        3       NO
KK COMBINEDAMS 21, 22, 23/31, 32 TO DAMS 14, 24/33
HC      4
KK   ROUTEALL TO 34
RM      1      0.3      0.2
KK      2
BA  17.02
PB   15.7
LU    .95     0.15
UK    300     0.09     0.15      100
RK   6800    0.071    0.040      2.0     TRAP      50        3
RK  48000    0.043    0.035              TRAP     100        3       NO
KK     11
BA   1.40
PB   15.7
LU    .95      .15
UK    300    0.030     0.15      100
RK   9000    0.022     0.04      0.5     TRAP      50        3
RK  11750    0.022    0.035              TRAP     100        3      YES
KK   DAM7
KM   ME WASH @ S.R. 74
RS      1     STOR       -1
SA      0       50
SE   1980     1988
SQ      0    15000
ST   1988     2500        3      1.5
KK   ROUTEDAM7 TO 17
RM      1      2.4      0.2
KK     10
BA   1.43
PB   15.7
LU    .95      .15
UK    300     0.03     0.15      100
RK   8500     0.28     0.04      0.5     TRAP      25        3
RK  17500    0.023    0.035              TRAP      50        3       NO
KK   DAM6
KM   S.R. 74
RS      1     STOR       -1
SA      0     0.20
SE   1980     1988
SQ      0     1325
ST   1988     1000        3      1.5
KK   ROUTEDAM6 TO 17
RM      1      2.4      0.2
KK     17
BA   6.70
PB   15.7
LU    .95      .15
UK    300    0.015     0.15      100
RK  18000    0.014     0.04      2.0     TRAP      50        3
RK  34250    0.013    0.035              TRAP     100        3       NO
KK COMBINEDAM56 & 7 TO 17
HC      3
KK DAM13
KM ME WASH @ C.A.P.
RS      1     STOR       -1
SQ      0       51      778     3740     5531     6875     7646     7773
SE   1540     1542     1548  1549.03  1551.26  1552.82  1553.68  1553.82
SV      0        0        0       44      357      747     1024     1072
ST   1557     2000        3      1.5
KK   ROUTEDAM13 TO 21
RM      1      0.6      0.2
KK     16
BA   3.46
```

```
PB  15.7
LU   .95      .15
UK   300    0.015     0.15      100
RK  8500    0.014     0.04      1.0     TRAP       25        3
RK 35750    0.011    0.035              TRAP       75        3       NO
KK DAM12
KM C.A.P.
RS     1     STOR       -1
SQ     0       51      778     3740     5531     6875     7646     7773
SE  1540     1542     1548 1549.03 1551.26 1552.82 1553.68 1553.82
SV     0        0        0       44      357      747     1024     1072
ST  1557      200        3      1.5
KK   ROUTEDAM12 TO 21
RM     1      0.6      0.2
KK    21
BA  1.04
PB  15.7
LU   .95      .15
UK   300    0.009     0.15      100
RK  8500    0.008     0.04              TRAP       25        3       NO
KK COMBINEDAMS 12, 13 TO 21
HC     3
KK   DAM17
KM GRAND AVE.
RS     1     STOR       -1
SA     0       50
SE  1480     1487
SQ     0    12000
ST  1488     3000        3      1.5
KK   ROUTEDAM 17 TO 34
RM     1      1.3      0.2
KK    19
BA  2.57
PB  15.7
LU   .95      .15
UK   300    0.013     0.15      100
RK 10000    0.012     0.04      1.0     TRAP       25        3
RK 19000    0.012    0.035              TRAP       50        3       NO
KK DAM15
KM C.A.P.
RS     1     STOR       -1
SQ     0       51      778     3740     5531     6875     7646     7773
SE  1540     1542     1548 1549.03 1551.26 1552.82 1553.68 1553.82
SV     0        0        0       44      357      747     1024     1072
ST  1557     2000        3      1.5
KK   ROUTEDAM15 TO 22
RM     0        1      0.2
KK    22
BA  2.31
PB  15.7
LU   .95      .15
UK   300    0.009     0.15      100
RK 14750    0.008     0.04              TRAP       50        3       NO
KK COMBINEDAM15 TO 22
HC     2
KK DAM18
KM GRAND AVE.
RS     1     STOR       -1
SA     0    0.600
SE  1420     1427
SQ     0    10000
ST  1427     3500        3      1.5
KK ROUTEDAM18 TO 34
RM     1      0.8      0.2
KK COMBINEDAM 17 TO DAM 18
HC     2
KK    20
BA  1.08
PB  15.7
LU   .95      .15
UK   300     0.01     0.15      100
RK  6500     0.01     0.04      0.5     TRAP       25        3
RK 12250    0.011    0.035              TRAP       50        3       NO
KK DAM16
KM C.A.P.
RS     1     STOR       -1
SQ     0       51      778     3740     5531     6875     7646     7773
SE  1540     1542     1548 1549.03 1551.26 1552.82 1553.68 1553.82
```

```
SV      0       0       0      44     357     747    1024    1072
ST   1557    2000       3     1.5
KK   ROUTEDAM16 TO 23
RM      1     1.6     0.2
KK     23
BA   3.71
PB   15.7
LU    .95     .15
UK    300   0.008    0.15     100
RK  12000   0.008    0.04     1.0    TRAP      50       3
RK  23500   0.007   0.035            TRAP      75       3      NO
KK COM8INEDAM16 TO 23
HC      2
KK DAM19
KM GRAND AVE.
RS      1    STOR      -1
SA      0   0.650
SE   1375    1382
SQ      0   10000
ST   1382    4000       3     1.5
KK   ROUTEDAM19 TO 34
RM      1     0.2     0.2
KK COMBINEDAMS 17, 18 TO DAM 19
HC      2
KK     34
BA   3.23
PB   15.7
LU    .95     .15
UK    300   0.008    0.15     100
RK  12000   0.008    0.04     1.0    TRAP      75       3
RK  24000   0.007   0.035            TRAP     100       3      NO
KK     44
BA    8.7
IN     60
PB   15.7
LU    .95     .15
UI      0     144     292     398     593     826    1097    1476    1794    2129
UI   2582    2587    2710    3037    3037    3037    3037    3037    2621    2242
UI   2127    2024    1883    1597    1529    1466    1409    1345    1040    1003
UI    969     938     802     715     694     674     655     637     620     604
UI    588     523     399     389     380     372     364     351     196     192
UI    188     184     184     181     177     174     110     104     102     100
UI     99      97      96      94      92      91      89      88      87      47
UI     46      45      45      44      44      43      42      42      41      41
UI     40      38       0       0
KK ROUTE44
KM ROUTE 44 TO 43
RK  12500   0.001    0.03            TRAP     100       3
KK     42
BA   5.46
PB   15.7
UI      0     144     292     466     723    1096    1469    1846    2256    2225
UI   2550    2550    2550    2549    1928    1795    1679    1431    1288    1218
UI   1189     875     834     797     684     595     572     550     530     511
UI    494     396     330     319     310     313     164     160     156     152
UI    148     157      87      85      83      81      80      78      76      75
UI     73      81      39      38      38      37      36      36      35      34
UI     34      16       0       0
KK   ROUTE42
KM   ROUTE 42 TO 43
RK  21000   0.013   0.035            TRAP     100       3
KK     43
BA   5.11
PB   15.7
LU    .95     .15
UK    300    0.02    0.15     100
RK   6500    0.02    0.04       1    TRAP      20       3
RK  25500   0.017   0.035            TRAP      50       3
KK COM8INE
HC      3
KK   ROUTE
KM ROUTE COMBINED HYDROGRAPHS
KM     42 43 44 TO 41
RK   5000   0.001    0.03            TRAP     100       3
KK     41
BA   3.05
PB   15.7
LU    .95     .15
```

```
UK   300    0.02    0.15     100
RK  6200    0.09    0.04       1    TRAP      20       3
RK 24750    0.09   0.035            TRAP      50       3
KK COMBINE
HC     2
KK   ROUTE41 TO 38
RK  7000   0.001    0.03            TRAP     100       3
KK    38
BA  7.18
PB  15.7
LU   .95     .15
UK   300    0.02    0.15     100
RK  8500    0.09    0.04       2    TRAP      20       3
RK 33750    0.06   0.035            TRAP      50       3
KK COMBINE
HC     2
KK    39
BA  2.77
PB  15.7
UI     0     137     308     595    1015    1468    1786    1776    1915    1829
UI  1393    1266     997     917     787     629     574     449     424     401
UI   380     318     246     235     201     121     116     112     105      65
UI    62      60      58      57      55      47      29      28      27      27
UI    26      24       0       0
KK   ROUTE39 TO 35
RK 24000    0.01   0.035            TRAP      50       3
KK    35
BA  2.57
PB  15.7
LU   .95     .15
UK   300    0.02    0.15     100
RK  6000    0.02    0.04       1    TRAP      20       3
RK 24000    0.01   0.035            TRAP      50       3
KK    28
BA 17.59
PB  15.7
LU   .95     .15
UK   300   0.007    0.15     100
RK 19000   0.007    0.04       6    TRAP      25       3
RK 44500   0.006   0.035            TRAP      50       3      NO
KK   DAM20
KM   C.A.P., STA. 466+0
RS     1    STOR      -1
SV     0       9      33      97     436     912
SE  1536    1538    1540    1542    1544    1546
SQ     0     432    1222    2245    3457    4830
ST  1546    2000       3     1.5
KK   ROUTE28 TO 29
RK 14000   0.005    0.03            TRAP      75       3
KK    29
BA 10.32
PB  15.7
LU   .95     .15
UK   300    0.04    0.15     100
RK 16000    0.06    0.04       3    TRAP      25       3
RK 44000    0.04   0.035            TRAP      75       3      NO
KK COMBINE28 TO 29
HC     2
KK COMBINE28, 29, 39 & 35
HC     3
KK   ROUTE
RK  6500   0.004   0.035            TRAP     100       3
KK    40
BA  2.15
PB  15.7
UI     0     168     397     786    1319    1870    2068    2259    2259    1805
UI  1532    1254    1095     949     743     665     526     494     466     462
UI   298     283     270     161     139     133     129      76      74      71
UI    69      66      74      35      33      33      32      31      30       4
UI     0
KK   ROUTE40 TO 36
RK 18000    0.01   0.035            TRAP      50       3
KK    36
BA  4.37
PB  15.7
LU   .95     .15
UK   300    0.02    0.15     100
RK  6600    0.02    0.04       2    TRAP      20       3
```

```
RK 26500    0.01   0.035            TRAP      50       3
KK    30
BA  1.50
PB  15.7
LU   .95     .15
UK   300   0.007    0.15     100
RK 19000   0.005   0.035            TRAP      25       3
KK COMBINE30, 35, 36, 39 & 40
HC     4
KK   ROUTETO 37
RK  5000    0.01   0.035            TRAP     100       3
KK    37
BA  2.94
PB  15.7
LU   .95     .15
UK   300    0.02    0.15     100
RK  6700    0.09    0.04       1    TRAP      50       3
RK 26750    0.07   0.035            TRAP     100       3
KK COMBINE
HC     2
KK ROUTE
RK 14500   0.005   0.035            TRAP     100       3
KK COMBINE
HC     2
KK ROUTE MCM.SUB. TO 34
RK  3000   0.001    0.03            TRAP     100       3
KK COMBINE ALL TO 34
HC     4
KO     1       2
KK MCMICKEN DAM
RS     1    ELEV    1335
SV     0       0    2200    8800   19000   32400   35500   49800
SE  1335    1340    1345    1350    1355    1360    1361    1365
SQ   0.0  1750.0  4600.0  10500.  20100.  47000.  63600.  81150.102200.0
SE1335.0  1345.0  1353.9  1355.0  1356.0  1358.0  1359.0  1360.0  1361.0
ST  1361   49500    3.05     1.5
ZZ
```

7.1.2 PMP2.DAT -- 72-hour PMP general storm for 44 contributing sub-basins with new stage/storage rating curve

```
ID filename: pmp2.dat
ID McMicken Dam Watershed
ID Probable Maximum Flood
ID FCMCD Jan 87 J. Rumann
ID Sub Basins 1-44
ID TWO MORE SUB-BASINS WERE ADDED BY BING ZHAO
ID (01/09/1996). THEY ARE SUB-BASINS 45 AND 46.
*DIAGRAM
IT      5        0        0      900
IO      5
KK      1
BA   9.60
IN    360
PB  15.70
PI    1.1      2.3      7.2      1.3      .65      .65      .65      .65      .30      .30
PI    .30      .30
LU   0.95     0.15
UI      0      241      489      761     1196     1767     2405     3022     3742     3889
UI   4131     4350     4350     4350     3744     3157     2953     2702     2265     2142
UI   2032     1842     1467     1402     1343     1086     1005      967      932      920
UI    900      869      580      562      545      529      514      319      295      274
UI    267      260      254      171      150      146      143      140      137      134
UI    131      129      126       67       66       65       64       62       61       60
UI     59       58       57       19        0
KK ROUTE1 TO 4
RM      1      0.7      0.2
KK      4
BA   3.42
PB  15.70
LU    .95      .15
UK    300     0.09     0.15      100
RK   7500     0.05     0.05      0.5     TRAP       25        3
RK  19500     0.05    0.035              TRAP       50        3       NO
KK CCOMBINE1 & 4
HC      2
KK      6
BA   5.79
PB   15.7
LU    .95      .15
UK    300     0.03     0.15      100
RK  10000     0.02     0.04      1.0     TRAP       25        3
RK  19500     0.02    0.035              TRAP       75        3      YES
KK   DAM2
KM TRILBY WASH @ S.R. 74
RS      1     STOR       -1
SA      0      0.9
SE   2050     2061
SQ      0    17600
ST   2061     3500        3      1.5
KK    ROUTEDAM2 TO 13
RM      1      1.1      0.2
KK     13
BA   6.05
PB   15.7
LU    .95      .15
UK    300     0.03     0.15      100
RK  21000     0.02    0.040      1.0     TRAP       25        3
RK  27000     0.02    0.035              TRAP       50        3       NO
KK COMBINEDAM 2 @ 13
HC      2
KK     DAM9
KM    TRILBY WASH @ GRAND AVE.
RS      1     STOR       -1
SA      0       50
SE   1850     1857
SQ      0    30300
ST   1857     9000        3      1.5
KK    ROUTEDAM9 TO 25
RM      1      2.6      0.2
KK     25
BA   9.36
PB   15.7
LU    .95      .15
```

```
UK   300    0.01    0.15     100
RK 20000   0.009   0.040     3.0    TRAP     50      3
RK 40750   0.008   0.035            TRAP    150      3      NO
KK COMBINEDAM9 TO 25
HC     2
KK   DAM22
KM   TRILBY WASH @ C.A.P., STA. 609+0
RS     1    STOR      -1
SQ     0    6903
SE  1540  1548.5
SV     0    3436
ST  1554    2000       3     1.5
KK   ROUTEDAM22 TO 31
RM     1     2.7     0.2
KK     3
BA  4.43
PB  15.7
LU   .95     .15
UK   300    0.05    0.15     100
RK  6200    0.05   0.040     1.0    TRAP     50      3
RK 26500    0.04   0.035            TRAP     75      3      NO
KK     5
BA  2.98
PB  15.7
LU   .95     .15
UK   300    0.03    0.15     100
RK  4500    0.03   0.040     1.0    TRAP     50      3
RK 13000    0.01   0.035            TRAP    100      3     YES
KK  DAM1
KM   IONA WASH @ S.R. 74
RS     1    STOR      -1
SA     0     1.1
SE  2040    2048
SQ     0    7300
ST  2048    6000       3     1.5
KK  ROUTEDAM1 TO 12
RM     1     0.9     0.2
KK    12
BA  4.42
PB  15.7
LU   .95     .15
UK   300    0.02    0.15     100
RK  9300   0.015   0.040     1.0    TRAP     50      3
RK 13500   0.010   0.035            TRAP    100      3      NO
KK CCOMBINEDAM1 TO 12
HC     2
KK DAM8
KM IONA WASH @ GRAND AVE.
RS     1    STOR      -1
SA     0    50.0
SE  1920    1930
SQ     0   10500
ST  1930   70003     1.5
KK   ROUTEDAM8 TO 24
RM     1     3.3     0.2
KK    24
BA 17.92
PB  15.7
LU   .95     .15
UK   300   0.010    0.15     100
RK 16000   0.008   0.040     5.0    TRAP     75      3
RK 60250   0.007   0.035            TRAP    150      3      NO
KK COMBINEDAM8 TO 24
HC     2
KK DAM21
KM   IONA WASH @ C.A.P., STA. 572+5
RS     1    STOR      -1
SQ     0      72     505    1135    1914    2817
SE1545.2    1546    1548    1550    1552    1554
SV     0       7      31      69     288     518
ST  1553    2000       3     1.5
KK   ROUTEDAM 21 TO 31
RM     1     2.8     0.2
KK    31
BA  9.34
PB  15.7
LU   .95     .15
UK   300   0.007    0.15     100
```

```
RK 10000   0.006   0.040     2.0    TRAP     100       3
RK 39750   0.005   0.035            TRAP     175       3      NO
KK COMBINEDAMS 21 & 22 TO 31
HC     3
KK ROUTEDAMS 21 & 22/31 TO 32
RM     1     0.2     0.2
KK     7
BA  7.05
PB  15.7
LU   .95     .15
UK   300    0.03    0.15     100
RK 12400    0.02   0.040     1.0    TRAP      25       3
RK 24750    0.03   0.035            TRAP      50       3      NO
KK  DAM3
KM  S.R. 74
RS     1    STOR      -1
SA     0     1.1
SE  2000    2008
SQ     0   10300
ST  2008    6000       3     1.5
KK   ROUTEDAM3 TO 14
RM     1     2.1     0.2
KK    14
BA  7.21
PB  15.7
LU   .95     .15
UK   300   0.020    0.15     100
RK 19000   0.015   0.040     2.0    TRAP      50       3
RK 32250   0.012   0.035            TRAP     100       3      NO
KK COMBINEDAM3 TO 14
HC     2
KK DAM10
KM GRAND AVE.
RS     1    STOR      -1
SA     0      50
SE  1670    1675
SQ     0    8740
ST  1681    4000       3     1.5
KK   ROUTEDAM10 TO 26
RM     1     1.2     0.2
KK    26
BA  8.42
PB  15.7
LU   .95     .15
UK   300   0.010    0.15     100
RK 20000   0.008   0.040     2.0    TRAP      75       3
RK 27750   0.008   0.035            TRAP     150       3      NO
KK COMBINEDAM 10 TO 26
HC     2
KK DAM23
KM   C.A.P., STA. 688+0
RS     1    STOR      -1
SQ     0     116     440     881    1414    2025    2705    3447
SE1544.3    1545    1546    1547    1548    1549    1550    1551
SV     0       3      10      19      31     139     292     498
ST1550.2    2000       3     1.5
* THE FOLLOWING CARDS WERE FROM SPF HEC-1 INPUT FILE IN THE 1987
* REPORT BECAUSE ONE PAGE IS MISSING IN THE PMP HEC-1 INPUT FILE
* IN THE 1987 REPORT.
KK ROUTEDAM23 TO 32
RM     1     2.7     0.2
KK    32
BA  8.42
PB  15.7
LU  0.95    0.15
UK   300   0.007    0.15     100
RK 10000   0.006   0.040     3.0    TRAP     100       3
RK 38250   0.006   0.035            TRAP     175       3      NO
KK COMBINEDAMS 21,22,23 TO 32
HC     3
KK      ROUTEDAMS 21,22,23/31,32 TO 33
RM     1     0.6     0.2
KK     8
BA  3.38
PB  15.7
LU  0.95    0.15
UK   300    0.04    0.15     100
RK  6500    0.04   0.040     1.0    TRAP      25       3
```

```
RK 24500    0.03   0.035            TRAP      50       3      NO
KK  DAM4
KM   S.R. 74
RS     1    STOR      -1
SA     0    50.0
SE  1990    2000
SQ     0    1525
ST  2001    1500       3      1.5
KK  ROUTEDAM4 TO 15
RM     1     2.6     0.2
KK     9
BA  5.44
PB  15.7
LU  0.95    0.15
UK   300    0.05    0.15      100
RK 12000    0.05    0.04      1.0    TRAP      25       3
RK 27500    0.04   0.035            TRAP      75       3      NO
KK DAM5
KM S.R.74
RS     1    STOR      -1
SA     0     5.0
SE  1980    1988
SQ     0   12000
ST  1988    2500       3      1.5
KK TO 15
RM     1     2.6     0.2
KK    15
BA  6.65
PB  15.7
* THE ABOVE (UP TO *) CARDS ARE FROM SPF HEC-1 INPUT FILE
LU   .95     .15
UK   300    0.02    0.15      100
RK 11400    0.02    0.04      2.0    TRAP      50       3
RK 38000   0.011   0.035            TRAP     100       3      NO
KK COMBINEDAMS 4, 5 TO 15
HC     3
KK DAM11
KM GRAND AVE.
RS     1    STOR      -1
SA     0    50.0
SE  1560    1567
SQ     0    5000
ST  1568    5000       3      1.5
KK   ROUTEDAM 11 TO 27
RM     1    0.07     0.2
KK    27
BA  1.04
PB  15.7
LU   .95     .15
UK   300   0.009    0.15      100
RK 13500   0.008    0.04            TRAP      25       3      NO
KK COMBINEDAM11 TO 27
HC     2
KK DAM24
KM   C.A.P. STA. 804+5
RS     1    STOR      -1
SQ     0      54     233     608    1007    1469    1985    2550    3161    3814
SQ  4506    5236
SE1543.5    1544    1545    1546    1547    1548    1549    1550    1551    1552
SE  1553    1554
SV     0       0       0       0       1       3       9      18      44     114
SV   204     413
ST1552.8    2000       3      1.5
KK   ROUTEDAM24 TO 33
RM     1     2.4     0.2
KK    18
BA  0.87
PB  15.7
LU   .95     .15
UK   300    0.01    0.15      100
RK 17500   0.009    0.04            TRAP      50       3      NO
KK DAM14
KM GRAND AVE.
RS     1    STOR      -1
SA     0    0.30
SE  1520    1527
SQ     0    1500
ST  1527    1500       3      1.5
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KK   ROUTEDAM14 TO 33
RM     1      2.4      0.2
KK    33
BA  7.48
PB  15.7
LU   .95      .15
UK   300    0.005     0.15      100
RK 13000    0.005     0.04      2.0     TRAP      75        3
RK 34750    0.006    0.035              TRAP     100        3       NO
KK COMBINEDAMS 21, 22, 23/31, 32 TO DAMS 14, 24/33
HC     4
KK   ROUTEALL TO 34
RM     1      0.3      0.2
KK     2
BA 17.02
PB  15.7
LU   .95     0.15
UK   300     0.09     0.15      100
RK  6800    0.071    0.040      2.0     TRAP      50        3
RK 48000    0.043    0.035              TRAP     100        3       NO
KK    11
BA  1.40
PB  15.7
LU   .95      .15
UK   300    0.030     0.15      100
RK  9000    0.022     0.04      0.5     TRAP      50        3
RK 11750    0.022    0.035              TRAP     100        3      YES
KK  DAM7
KM   ME WASH @ S.R. 74
RS     1     STOR       -1
SA     0       50
SE  1980     1988
SQ     0    15000
ST  1988     2500        3      1.5
KK   ROUTEDAM7 TO 17
RM     1      2.4      0.2
KK    10
BA  1.43
PB  15.7
LU   .95      .15
UK   300     0.03     0.15      100
RK  8500     0.28     0.04      0.5     TRAP      25        3
RK 17500    0.023    0.035              TRAP      50        3       NO
KK  DAM6
KM  S.R. 74
RS     1     STOR       -1
SA     0     0.20
SE  1980     1988
SQ     0     1325
ST  1988     1000        3      1.5
KK   ROUTEDAM6 TO 17
RM     1      2.4      0.2
KK    17
BA  6.70
PB  15.7
LU   .95      .15
UK   300    0.015     0.15      100
RK 18000    0.014     0.04      2.0     TRAP      50        3
RK 34250    0.013    0.035              TRAP     100        3       NO
KK COMBINEDAM56 & 7 TO 17
HC     3
KK DAM13
KM ME WASH @ C.A.P.
RS     1     STOR       -1
SQ     0       51      778     3740     5531     6875     7646     7773
SE  1540     1542     1548  1549.03  1551.26  1552.82  1553.68  1553.82
SV     0        0        0       44      357      747     1024     1072
ST  1557     2000        3      1.5
KK   ROUTEDAM13 TO 21
RM     1      0.6      0.2
KK    16
BA  3.46
PB  15.7
LU   .95      .15
UK   300    0.015     0.15      100
RK  8500    0.014     0.04      1.0     TRAP      25        3
RK 35750    0.011    0.035              TRAP      75        3       NO
KK DAM12
```

```
KM C.A.P.
RS      1    STOR      -1
SQ      0      51     778    3740    5531    6875    7646    7773
SE   1540    1542    1548 1549.03 1551.26 1552.82 1553.68 1553.82
SV      0       0       0      44     357     747    1024    1072
ST   1557     200       3     1.5
KK   ROUTEDAM12 TO 21
RM      1     0.6     0.2
KK     21
BA   1.04
PB   15.7
LU    .95     .15
UK    300   0.009    0.15     100
RK   8500   0.008    0.04            TRAP      25       3      NO
KK COMBINEDAMS 12, 13 TO 21
HC      3
KK   DAM17
KM GRAND AVE.
RS      1    STOR      -1
SA      0      50
SE   1480    1487
SQ      0   12000
ST   1488    3000       3     1.5
KK   ROUTEDAM 17 TO 34
RM      1     1.3     0.2
KK     19
BA   2.57
PB   15.7
LU    .95     .15
UK    300   0.013    0.15     100
RK  10000   0.012    0.04     1.0    TRAP      25       3
RK  19000   0.012   0.035            TRAP      50       3      NO
KK DAM15
KM C.A.P.
RS      1    STOR      -1
SQ      0      51     778    3740    5531    6875    7646    7773
SE   1540    1542    1548 1549.03 1551.26 1552.82 1553.68 1553.82
SV      0       0       0      44     357     747    1024    1072
ST   1557    2000       3     1.5
KK   ROUTEDAM15 TO 22
RM      0       1     0.2
KK     22
BA   2.31
PB   15.7
LU    .95     .15
UK    300   0.009    0.15     100
RK  14750   0.008    0.04            TRAP      50       3      NO
KK COMBINEDAM15 TO 22
HC      2
KK DAM18
KM GRAND AVE.
RS      1    STOR      -1
SA      0   0.600
SE   1420    1427
SQ      0   10000
ST   1427    3500       3     1.5
KK ROUTEDAM18 TO 34
RM      1     0.8     0.2
KK COMBINEDAM 17 TO DAM 18
HC      2
KK     20
BA   1.08
PB   15.7
LU    .95     .15
UK    300    0.01    0.15     100
RK   6500    0.01    0.04     0.5    TRAP      25       3
RK  12250   0.011   0.035            TRAP      50       3      NO
KK DAM16
KM C.A.P.
RS      1    STOR      -1
SQ      0      51     778    3740    5531    6875    7646    7773
SE   1540    1542    1548 1549.03 1551.26 1552.82 1553.68 1553.82
SV      0       0       0      44     357     747    1024    1072
ST   1557    2000       3     1.5
KK   ROUTEDAM16 TO 23
RM      1     1.6     0.2
KK     23
BA   3.71
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```
PB  15.7
LU   .95      .15
UK   300    0.008     0.15      100
RK 12000    0.008     0.04      1.0     TRAP      50        3
RK 23500    0.007    0.035              TRAP      75        3       NO
KK COM8INEDAM16 TO 23
HC      2
KK DAM19
KM GRAND AVE.
RS      1     STOR       -1
SA      0    0.650
SE   1375     1382
SQ      0    10000
ST   1382     4000        3       1.5
KK   ROUTEDAM19 TO 34
RM      1      0.2       0.2
KK COMBINEDAMS 17, 18 TO DAM 19
HC      2
KK     34
BA   3.23
PB   15.7
LU   .95      .15
UK   300    0.008     0.15      100
RK 12000    0.008     0.04      1.0     TRAP      75        3
RK 24000    0.007    0.035              TRAP     100        3       NO
KK     44
BA    8.7
IN     60
PB   15.7
LU   .95      .15
UI      0      144      292      398      593      826     1097     1476     1794     2129
UI   2582     2587     2710     3037     3037     3037     3037     3037     2621     2242
UI   2127     2024     1883     1597     1529     1466     1409     1345     1040     1003
UI    969      938      802      715      694      674      655      637      620      604
UI    588      523      399      389      380      372      364      351      196      192
UI    188      184      184      181      177      174      110      104      102      100
UI     99       97       96       94       92       91       89       88       87       47
UI     46       45       45       44       44       43       42       42       41       41
UI     40       38        0        0
KK ROUTE44
KM ROUTE 44 TO 43
RK 12500    0.001     0.03              TRAP     100        3
KK     42
BA   5.46
PB   15.7
UI      0      144      292      466      723     1096     1469     1846     2256     2225
UI   2550     2550     2550     2549     1928     1795     1679     1431     1288     1218
UI   1189      875      834      797      684      595      572      550      530      511
UI    494      396      330      319      310      313      164      160      156      152
UI    148      157       87       85       83       81       80       78       76       75
UI     73       81       39       38       38       37       36       36       35       34
UI     34       16        0        0
KK   ROUTE42
KM   ROUTE 42 TO 43
RK 21000    0.013    0.035              TRAP     100        3
KK     43
BA   5.11
PB   15.7
LU   .95      .15
UK   300     0.02     0.15      100
RK   6500     0.02     0.04        1     TRAP      20        3
RK 25500    0.017    0.035              TRAP      50        3
KK COM8INE
HC      3
KK   ROUTE
KM ROUTE COMBINED HYDROGRAPHS
KM     42 43 44 TO 41
RK   5000    0.001     0.03              TRAP     100        3
KK     41
BA   3.05
PB   15.7
LU   .95      .15
UK   300     0.02     0.15      100
RK   6200     0.09     0.04        1     TRAP      20        3
RK 24750     0.09    0.035              TRAP      50        3
KK COMBINE
HC      2
KK   ROUTE41 TO 38
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RK  7000   0.001    0.03            TRAP     100       3
KK    38
BA  7.18
PB  15.7
LU   .95     .15
UK   300    0.02    0.15     100
RK  8500    0.09    0.04       2    TRAP      20       3
RK 33750    0.06   0.035            TRAP      50       3
KK COMBINE
HC     2
KK    39
BA  2.77
PB  15.7
UI     0     137     308     595    1015    1468    1786    1776    1915    1829
UI  1393    1266     997     917     787     629     574     449     424     401
UI   380     318     246     235     201     121     116     112     105      65
UI    62      60      58      57      55      47      29      28      27      27
UI    26      24       0       0
KK   ROUTE39 TO 35
RK 24000    0.01   0.035            TRAP      50       3
KK    35
BA  2.57
PB  15.7
LU   .95     .15
UK   300    0.02    0.15     100
RK  6000    0.02    0.04       1    TRAP      20       3
RK 24000    0.01   0.035            TRAP      50       3
KK    28
BA 17.59
PB  15.7
LU   .95     .15
UK   300   0.007    0.15     100
RK 19000   0.007    0.04       6    TRAP      25       3
RK 44500   0.006   0.035            TRAP      50       3      NO
KK   DAM20
KM   C.A.P., STA. 466+0
RS     1    STOR      -1
SV     0       9      33      97     436     912
SE  1536    1538    1540    1542    1544    1546
SQ     0     432    1222    2245    3457    4830
ST  1546    2000       3     1.5
KK   ROUTE28 TO 29
RK 14000   0.005    0.03            TRAP      75       3
KK    29
BA 10.32
PB  15.7
LU   .95     .15
UK   300    0.04    0.15     100
RK 16000    0.06    0.04       3    TRAP      25       3
RK 44000    0.04   0.035            TRAP      75       3      NO
KK COMBINE28 TO 29
HC     2
KK COMBINE28, 29, 39 & 35
HC     3
KK   ROUTE
RK  6500   0.004   0.035            TRAP     100       3
KK    40
BA  2.15
PB  15.7
UI     0     168     397     786    1319    1870    2068    2259    2259    1805
UI  1532    1254    1095     949     743     665     526     494     466     462
UI   298     283     270     161     139     133     129      76      74      71
UI    69      66      74      35      33      33      32      31      30       4
UI     0
KK   ROUTE40 TO 36
RK 18000    0.01   0.035            TRAP      50       3
KK    36
BA  4.37
PB  15.7
LU   .95     .15
UK   300    0.02    0.15     100
RK  6600    0.02    0.04       2    TRAP      20       3
RK 26500    0.01   0.035            TRAP      50       3
KK    30
BA  1.50
PB  15.7
LU   .95     .15
UK   300   0.007    0.15     100
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```
RK 19000   0.005   0.035            TRAP      25       3
KK COMBINE30, 35, 36, 39 & 40
HC     4
KK   ROUTETO 37
RK  5000    0.01   0.035            TRAP     100       3
KK    37
BA  2.94
PB  15.7
LU   .95     .15
UK   300    0.02    0.15     100
RK  6700    0.09    0.04       1    TRAP      50       3
RK 26750    0.07   0.035            TRAP     100       3
KK COMBINE
HC     2
KK ROUTE
RK 14500   0.005   0.035            TRAP     100       3
KK COMBINE
HC     2
KK ROUTE MCM.SUB. TO 34
RK  3000   0.001    0.03            TRAP     100       3
KK COMBINE ALL TO 34
HC     4
KO     1       2
* KK MCMICKEN DAM
* RS     1    ELEV    1335
* SV     0       0    2200    8800   19000   32400   35500   49800
* SE  1335    1340    1345    1350    1355    1360    1361    1365
* SQ   0.0  1750.0  4600.0  10500.  20100.  47000.  63600.  81150.102200.0
* SE1335.0  1345.0  1353.9  1355.0  1356.0  1358.0  1359.0  1360.0  1361.0
* ST  1361   49500    3.05     1.5
KKNEW MCMICKEN DAM
KM NEW RATING CURVE FOR THE DAM WAS OBTAINED FROM JOE TRAM ON 01/09/1996
* RS     1    ELEV    1335
RS     1    ELEV    1327
SV     0       6      96     471    2196    6112   12926   20070   23126   28121
SV 30824   33615   36501
SE1327.0  1330.0 1332.55  1335.0  1340.0  1345.0  1350.0 1353.65  1355.0  1357.0
SE1358.0  1359.0  1360.0
* SAME SQ-SE RELATIONSHIP BECAUSE Q DEPENDS ON HEAD
SQ   0.0  1950.0  5600.0  19500.  22100.  49000.  64600.  82150.104200.0
SE1335.0  1345.0  1353.9  1355.0  1356.0  1358.0  1359.0  1360.0  1361.0
ST  1361   49500    3.05     1.5
ZZ
```

7.1.3 PMP3.DAT -- 72-hour PMP general storm for 46 contributing sub-basins with old stage/storage rating curve

```
ID filename: pmp3.dat
ID McMicken Dam Watershed
ID Probable Maximum Flood
ID FCMCD Jan 87 J. Rumann
ID Sub Basins 1-46
ID Sub Basins 45 and 46 WERE ADDED BY BING ZHAO
ID (01/09/1996).
*DIAGRAM
IT      5        0        0      900
IO      5
KK      1
BA   9.60
IN    360
PB  15.70
PI    1.1      2.3      7.2      1.3      .65      .65      .65      .65      .30      .30
PI    .30      .30
LU   0.95     0.15
UI      0      241      489      761     1196     1767     2405     3022     3742     3889
UI   4131     4350     4350     4350     3744     3157     2953     2702     2265     2142
UI   2032     1842     1467     1402     1343     1086     1005      967      932      920
UI    900      869      580      562      545      529      514      319      295      274
UI    267      260      254      171      150      146      143      140      137      134
UI    131      129      126       67       66       65       64       62       61       60
UI     59       58       57       19        0
KK ROUTE1 TO 4
RM      1      0.7      0.2
KK      4
BA   3.42
PB  15.70
LU    .95      .15
UK    300     0.09     0.15      100
RK   7500     0.05     0.05      0.5     TRAP       25        3
RK  19500     0.05    0.035             TRAP       50        3       NO
KK CCOMBINE1 & 4
HC      2
KK      6
BA   5.79
PB   15.7
LU    .95      .15
UK    300     0.03     0.15      100
RK  10000     0.02     0.04      1.0     TRAP       25        3
RK  19500     0.02    0.035             TRAP       75        3      YES
KK   DAM2
KM TRILBY WASH @ S.R. 74
RS      1     STOR       -1
SA      0      0.9
SE   2050     2061
SQ      0    17600
ST   2061     3500        3      1.5
KK    ROUTEDAM2 TO 13
RM      1      1.1      0.2
KK     13
BA   6.05
PB   15.7
LU    .95      .15
UK    300     0.03     0.15      100
RK  21000     0.02    0.040      1.0     TRAP       25        3
RK  27000     0.02    0.035             TRAP       50        3       NO
KK COMBINEDAM 2 @ 13
HC      2
KK     DAM9
KM    TRILBY WASH @ GRAND AVE.
RS      1     STOR       -1
SA      0       50
SE   1850     1857
SQ      0    30300
ST   1857     9000        3      1.5
KK    ROUTEDAM9 TO 25
RM      1      2.6      0.2
KK     25
BA   9.36
PB   15.7
LU    .95      .15
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```
UK   300    0.01    0.15     100
RK 20000   0.009   0.040     3.0    TRAP      50       3
RK 40750   0.008   0.035            TRAP     150       3      NO
KK COMBINEDAM9 TO 25
HC     2
KK   DAM22
KM   TRILBY WASH @ C.A.P., STA. 609+0
RS     1    STOR      -1
SQ     0    6903
SE  1540  1548.5
SV     0    3436
ST  1554    2000       3     1.5
KK   ROUTEDAM22 TO 31
RM     1     2.7     0.2
KK     3
BA  4.43
PB  15.7
LU   .95     .15
UK   300    0.05    0.15     100
RK  6200    0.05   0.040     1.0    TRAP      50       3
RK 26500    0.04   0.035            TRAP      75       3      NO
KK     5
BA  2.98
PB  15.7
LU   .95     .15
UK   300    0.03    0.15     100
RK  4500    0.03   0.040     1.0    TRAP      50       3
RK 13000    0.01   0.035            TRAP     100       3     YES
KK  DAM1
KM   IONA WASH @ S.R. 74
RS     1    STOR      -1
SA     0     1.1
SE  2040    2048
SQ     0    7300
ST  2048    6000       3     1.5
KK  ROUTEDAM1 TO 12
RM     1     0.9     0.2
KK    12
BA  4.42
PB  15.7
LU   .95     .15
UK   300    0.02    0.15     100
RK  9300   0.015   0.040     1.0    TRAP      50       3
RK 13500   0.010   0.035            TRAP     100       3      NO
KK CCOMBINEDAM1 TO 12
HC     2
KK DAM8
KM IONA WASH @ GRAND AVE.
RS     1    STOR      -1
SA     0    50.0
SE  1920    1930
SQ     0   10500
ST  1930   70003     1.5
KK   ROUTEDAM8 TO 24
RM     1     3.3     0.2
KK    24
BA 17.92
PB  15.7
LU   .95     .15
UK   300   0.010    0.15     100
RK 16000   0.008   0.040     5.0    TRAP      75       3
RK 60250   0.007   0.035            TRAP     150       3      NO
KK COMBINEDAM8 TO 24
HC     2
KK DAM21
KM   IONA WASH @ C.A.P., STA. 572+5
RS     1    STOR      -1
SQ     0      72     505    1135    1914    2817
SE1545.2    1546    1548    1550    1552    1554
SV     0       7      31      69     288     518
ST  1553    2000       3     1.5
KK   ROUTEDAM 21 TO 31
RM     1     2.8     0.2
KK    31
BA  9.34
PB  15.7
LU   .95     .15
UK   300   0.007    0.15     100
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```
RK 10000   0.006   0.040     2.0    TRAP     100       3
RK 39750   0.005   0.035            TRAP     175       3      NO
KK COMBINEDAMS 21 & 22 TO 31
HC     3
KK ROUTEDAMS 21 & 22/31 TO 32
RM     1     0.2     0.2
KK     7
BA  7.05
PB  15.7
LU   .95     .15
UK   300    0.03    0.15     100
RK 12400    0.02   0.040     1.0    TRAP      25       3
RK 24750    0.03   0.035            TRAP      50       3      NO
KK  DAM3
KM  S.R. 74
RS     1    STOR      -1
SA     0     1.1
SE  2000    2008
SQ     0   10300
ST  2008    6000       3     1.5
KK   ROUTEDAM3 TO 14
RM     1     2.1     0.2
KK    14
BA  7.21
PB  15.7
LU   .95     .15
UK   300   0.020    0.15     100
RK 19000   0.015   0.040     2.0    TRAP      50       3
RK 32250   0.012   0.035            TRAP     100       3      NO
KK COMBINEDAM3 TO 14
HC     2
KK DAM10
KM GRAND AVE.
RS     1    STOR      -1
SA     0      50
SE  1670    1675
SQ     0    8740
ST  1681    4000       3     1.5
KK   ROUTEDAM10 TO 26
RM     1     1.2     0.2
KK    26
BA  8.42
PB  15.7
LU   .95     .15
UK   300   0.010    0.15     100
RK 20000   0.008   0.040     2.0    TRAP      75       3
RK 27750   0.008   0.035            TRAP     150       3      NO
KK COMBINEDAM 10 TO 26
HC     2
KK DAM23
KM   C.A.P., STA. 688+0
RS     1    STOR      -1
SQ     0     116     440     881    1414    2025    2705    3447
SE1544.3    1545    1546    1547    1548    1549    1550    1551
SV     0       3      10      19      31     139     292     498
ST1550.2    2000       3     1.5
* THE FOLLOWING CARDS WERE FROM SPF HEC-1 INPUT FILE IN THE 1987
* REPORT BECAUSE ONE PAGE IS MISSING IN THE PMP HEC-1 INPUT FILE
* IN THE 1987 REPORT.
KK ROUTEDAM23 TO 32
RM     1     2.7     0.2
KK    32
BA  8.42
PB  15.7
LU  0.95    0.15
UK   300   0.007    0.15     100
RK 10000   0.006   0.040     3.0    TRAP     100       3
RK 38250   0.006   0.035            TRAP     175       3      NO
KK COMBINEDAMS 21,22,23 TO 32
HC     3
KK      ROUTEDAMS 21,22,23/31,32 TO 33
RM     1     0.6     0.2
KK     8
BA  3.38
PB  15.7
LU  0.95    0.15
UK   300    0.04    0.15     100
RK  6500    0.04   0.040     1.0    TRAP      25       3
```

```
RK 24500    0.03   0.035            TRAP      50       3      NO
KK  DAM4
KM   S.R. 74
RS     1    STOR      -1
SA     0    50.0
SE  1990    2000
SQ     0    1525
ST  2001    1500       3     1.5
KK  ROUTEDAM4 TO 15
RM     1     2.6     0.2
KK     9
BA  5.44
PB  15.7
LU  0.95    0.15
UK   300    0.05    0.15     100
RK 12000    0.05    0.04     1.0    TRAP      25       3
RK 27500    0.04   0.035            TRAP      75       3      NO
KK DAM5
KM S.R.74
RS     1    STOR      -1
SA     0     5.0
SE  1980    1988
SQ     0   12000
ST  1988    2500       3     1.5
KK TO 15
RM     1     2.6     0.2
KK    15
BA  6.65
PB  15.7
* THE ABOVE (UP TO *) CARDS ARE FROM SPF HEC-1 INPUT FILE
LU   .95     .15
UK   300    0.02    0.15     100
RK 11400    0.02    0.04     2.0    TRAP      50       3
RK 38000   0.011   0.035            TRAP     100       3      NO
KK COMBINEDAMS 4, 5 TO 15
HC     3
KK DAM11
KM GRAND AVE.
RS     1    STOR      -1
SA     0    50.0
SE  1560    1567
SQ     0    5000
ST  1568    5000       3     1.5
KK   ROUTEDAM 11 TO 27
RM     1    0.07     0.2
KK    27
BA  1.04
PB  15.7
LU   .95     .15
UK   300   0.009    0.15     100
RK 13500   0.008    0.04            TRAP      25       3      NO
KK COMBINEDAM11 TO 27
HC     2
KK DAM24
KM   C.A.P. STA. 804+5
RS     1    STOR      -1
SQ     0      54     233     608    1007    1469    1985    2550    3161    3814
SQ  4506    5236
SE1543.5    1544    1545    1546    1547    1548    1549    1550    1551    1552
SE  1553    1554
SV     0       0       0       0       1       3       9      18      44     114
SV   204     413
ST1552.8    2000       3     1.5
KK   ROUTEDAM24 TO 33
RM     1     2.4     0.2
KK    18
BA  0.87
PB  15.7
LU   .95     .15
UK   300    0.01    0.15     100
RK 17500   0.009    0.04            TRAP      50       3      NO
KK DAM14
KM GRAND AVE.
RS     1    STOR      -1
SA     0    0.30
SE  1520    1527
SQ     0    1500
ST  1527    1500       3     1.5
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KK   ROUTEDAM14 TO 33
RM     1      2.4      0.2
KK    33
BA  7.48
PB  15.7
LU   .95      .15
UK   300    0.005     0.15      100
RK 13000    0.005     0.04      2.0     TRAP      75        3
RK 34750    0.006    0.035              TRAP     100        3       NO
KK COMBINEDAMS 21, 22, 23/31, 32 TO DAMS 14, 24/33
HC     4
KK   ROUTEALL TO 34
RM     1      0.3      0.2
KK     2
BA 17.02
PB  15.7
LU   .95     0.15
UK   300     0.09     0.15      100
RK  6800    0.071    0.040      2.0     TRAP      50        3
RK 48000    0.043    0.035              TRAP     100        3       NO
KK    11
BA  1.40
PB  15.7
LU   .95      .15
UK   300    0.030     0.15      100
RK  9000    0.022     0.04      0.5     TRAP      50        3
RK 11750    0.022    0.035              TRAP     100        3      YES
KK  DAM7
KM   ME WASH @ S.R. 74
RS     1     STOR       -1
SA     0       50
SE  1980     1988
SQ     0    15000
ST  1988     2500        3      1.5
KK   ROUTEDAM7 TO 17
RM     1      2.4      0.2
KK    10
BA  1.43
PB  15.7
LU   .95      .15
UK   300     0.03     0.15      100
RK  8500     0.28     0.04      0.5     TRAP      25        3
RK 17500    0.023    0.035              TRAP      50        3       NO
KK  DAM6
KM  S.R. 74
RS     1     STOR       -1
SA     0     0.20
SE  1980     1988
SQ     0     1325
ST  1988     1000        3      1.5
KK   ROUTEDAM6 TO 17
RM     1      2.4      0.2
KK    17
BA  6.70
PB  15.7
LU   .95      .15
UK   300    0.015     0.15      100
RK 18000    0.014     0.04      2.0     TRAP      50        3
RK 34250    0.013    0.035              TRAP     100        3       NO
KK COMBINEDAM56 & 7 TO 17
HC     3
KK DAM13
KM ME WASH @ C.A.P.
RS     1     STOR       -1
SQ     0       51      778     3740     5531     6875     7646     7773
SE  1540     1542     1548  1549.03  1551.26  1552.82  1553.68  1553.82
SV     0        0        0       44      357      747     1024     1072
ST  1557     2000        3      1.5
KK   ROUTEDAM13 TO 21
RM     1      0.6      0.2
KK    16
BA  3.46
PB  15.7
LU   .95      .15
UK   300    0.015     0.15      100
RK  8500    0.014     0.04      1.0     TRAP      25        3
RK 35750    0.011    0.035              TRAP      75        3       NO
KK DAM12
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KM C.A.P.
RS      1     STOR       -1
SQ      0       51      778     3740     5531     6875     7646     7773
SE   1540     1542     1548 1549.03 1551.26 1552.82 1553.68 1553.82
SV      0        0        0       44      357      747     1024     1072
ST   1557      200        3      1.5
KK    ROUTEDAM12 TO 21
RM      1      0.6      0.2
KK     21
BA   1.04
PB   15.7
LU    .95      .15
UK    300    0.009     0.15      100
RK   8500    0.008     0.04              TRAP       25        3       NO
KK COMBINEDAMS 12, 13 TO 21
HC      3
KK    DAM17
KM GRAND AVE.
RS      1     STOR       -1
SA      0       50
SE   1480     1487
SQ      0    12000
ST   1488     3000        3      1.5
KK    ROUTEDAM 17 TO 34
RM      1      1.3      0.2
KK     19
BA   2.57
PB   15.7
LU    .95      .15
UK    300    0.013     0.15      100
RK  10000    0.012     0.04      1.0     TRAP       25        3
RK  19000    0.012    0.035              TRAP       50        3       NO
KK DAM15
KM C.A.P.
RS      1     STOR       -1
SQ      0       51      778     3740     5531     6875     7646     7773
SE   1540     1542     1548 1549.03 1551.26 1552.82 1553.68 1553.82
SV      0        0        0       44      357      747     1024     1072
ST   1557     2000        3      1.5
KK    ROUTEDAM15 TO 22
RM      0        1      0.2
KK     22
BA   2.31
PB   15.7
LU    .95      .15
UK    300    0.009     0.15      100
RK  14750    0.008     0.04              TRAP       50        3       NO
KK COMBINEDAM15 TO 22
HC      2
KK DAM18
KM GRAND AVE.
RS      1     STOR       -1
SA      0    0.600
SE   1420     1427
SQ      0    10000
ST   1427     3500        3      1.5
KK ROUTEDAM18 TO 34
RM      1      0.8      0.2
KK COMBINEDAM 17 TO DAM 18
HC      2
KK     20
BA   1.08
PB   15.7
LU    .95      .15
UK    300     0.01     0.15      100
RK   6500     0.01     0.04      0.5     TRAP       25        3
RK  12250    0.011    0.035              TRAP       50        3       NO
KK DAM16
KM C.A.P.
RS      1     STOR       -1
SQ      0       51      778     3740     5531     6875     7646     7773
SE   1540     1542     1548 1549.03 1551.26 1552.82 1553.68 1553.82
SV      0        0        0       44      357      747     1024     1072
ST   1557     2000        3      1.5
KK    ROUTEDAM16 TO 23
RM      1      1.6      0.2
KK     23
BA   3.71
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PB  15.7
LU   .95     .15
UK   300   0.008    0.15     100
RK 12000   0.008    0.04     1.0    TRAP      50       3
RK 23500   0.007   0.035            TRAP      75       3      NO
KK COM8INEDAM16 TO 23
HC     2
KK DAM19
KM GRAND AVE.
RS     1    STOR      -1
SA     0   0.650
SE  1375    1382
SQ     0   10000
ST  1382    4000       3     1.5
KK   ROUTEDAM19 TO 34
RM     1     0.2     0.2
KK COMBINEDAMS 17, 18 TO DAM 19
HC     2
KK    34
BA  3.23
PB  15.7
LU   .95     .15
UK   300   0.008    0.15     100
RK 12000   0.008    0.04     1.0    TRAP      75       3
RK 24000   0.007   0.035            TRAP     100       3      NO
* THE FOLLOWING CARDS WERE ADDED FOR SUB-BASINS 45 AND 46.
* (01/09/1996, BING ZHAO)
* THE FOLLOWING WERE OBTAINED BY RUNNING MCUHP2
KK    45
KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM  L=     5.45  Lca=      2.94   S=  379.8  Kn= .050  LAG=  66.8
KM  NOTE: C=1.2 (FROM RUMANN'S 1987 REPORT). C=24Kn ==> Kn=0.05.
KM  PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
BA 3.224
LU   .95     .15
UI  162.    162.    162.    444.    607.    819.    994.   1118.   1234.   1371.
UI 1685.   1946.   1348.   1113.    995.    936.    866.    800.    752.    679.
UI  637.    572.    511.    438.    406.    386.    369.    340.    292.    267.
UI  220.    208.    196.    178.    178.    147.    125.    125.    125.     99.
UI   79.     79.     79.     79.     79.     66.     31.     31.     31.     31.
UI   31.     31.     31.     31.     31.     31.     31.     31.     31.     31.
UI   31.      0.
* THE ABOVE WERE OBTAINED BY RUNNING MCUHP2
KK ROUTE THROUGH 46
RK  3000   0.017   0.035            TRAP     100       3
* THE CHANNEL LENTH (3000 FT) AND SLOPE (0.017) WERE MEASURED ON THE BASE MAP
* THE MANNING'S COEFFICIENT, BOTTOM WIDTH, AND SIDE SLOPE ARE THE SAME AS
* THOSE IN THE ROUTING FOR 42==>43.
* THE FOLLOWING WERE OBTAINED BY RUNNING MCUHP2
KK    46
KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM  L=     6.134  Lca=      3.124   S=  306.5  Kn= .050  LAG=  74.5
KM  NOTE: C=1.2 (FROM RUMANN'S 1987 REPORT). C=24Kn ==> Kn=0.05.
KM  PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
BA 5.475
LU   .95     .15
UI  247.    247.    247.    513.    801.   1041.   1360.   1550.   1733.   1882.
UI 2059.   2462.   3001.   2400.   1818.   1614.   1479.   1405.   1311.   1219.
UI 1156.   1059.    987.    915.    822.    742.    654.    608.    586.    567.
UI  517.    472.    406.    377.    316.    316.    287.    271.    271.    230.
UI  190.    190.    190.    187.    121.    121.    121.    121.    121.    121.
UI  118.     47.     47.     47.     47.     47.     47.     47.     47.     47.
UI   47.     47.     47.     47.     47.     47.     47.     47.      0.
* THE ABOVE WERE OBTAINED BY RUNNING MCUHP2
KK COMBINE THE ABOVE ROUTED HYDROGRAPH AND 46
HC     2
KK ROUTE THE COMBINED HYDROGRAPH THROUGH 44
RK  5800   0.001    0.03            TRAP     100       3
* THE CHANNEL LENTH (5800 FT) WAS MEASURED ON THE BASE MAP.
* THE CHANNEL SLOPE, MANNING'S COEFFICIENT, BOTTOM WIDTH, AND SIDE SLOPE ARE
* THE SAME AS THOSE IN THE ROUTING FOR 44==>43.
* THE ABOVE CARDS ARE FOR SUB-BASINS 45 AND 46.
KK    44
BA   8.7
IN    60
PB  15.7
LU   .95     .15
UI     0     144     292     398     593     826    1097    1476    1794    2129
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UI  2582    2587    2710    3037    3037    3037    3037    3037    2621    2242
UI  2127    2024    1883    1597    1529    1466    1409    1345    1040    1003
UI   969     938     802     715     694     674     655     637     620     604
UI   588     523     399     389     380     372     364     351     196     192
UI   188     184     184     181     177     174     110     104     102     100
UI    99      97      96      94      92      91      89      88      87      47
UI    46      45      45      44      44      43      42      42      41      41
UI    40      38       0       0
* THE FOLLOWING ARE FOR COMBINING THE ROUTED AND 44.
* (01/09/1996, BING ZHAO)
KK COMBINE 46 AND 44
HC     2
* THE ABOVE ARE FOR COMBINING THE ROUTED AND 44.
KK ROUTE44
KM ROUTE 44 TO 43
RK 12500   0.001    0.03            TRAP     100       3
KK    42
BA  5.46
PB  15.7
UI     0     144     292     466     723    1096    1469    1846    2256    2225
UI  2550    2550    2550    2549    1928    1795    1679    1431    1288    1218
UI  1189     875     834     797     684     595     572     550     530     511
UI   494     396     330     319     310     313     164     160     156     152
UI   148     157      87      85      83      81      80      78      76      75
UI    73      81      39      38      38      37      36      36      35      34
UI    34      16       0       0
KK   ROUTE42
KM   ROUTE 42 TO 43
RK 21000   0.013   0.035            TRAP     100       3
KK    43
BA  5.11
PB  15.7
LU   .95     .15
UK   300    0.02    0.15     100
RK  6500    0.02    0.04       1    TRAP      20       3
RK 25500   0.017   0.035            TRAP      50       3
KK COM8INE
HC     3
KK   ROUTE
KM ROUTE COMBINED HYDROGRAPHS
KM    42 43 44 TO 41
RK  5000   0.001    0.03            TRAP     100       3
KK    41
BA  3.05
PB  15.7
LU   .95     .15
UK   300    0.02    0.15     100
RK  6200    0.09    0.04       1    TRAP      20       3
RK 24750    0.09   0.035            TRAP      50       3
KK COMBINE
HC     2
KK   ROUTE41 TO 38
RK  7000   0.001    0.03            TRAP     100       3
KK    38
BA  7.18
PB  15.7
LU   .95     .15
UK   300    0.02    0.15     100
RK  8500    0.09    0.04       2    TRAP      20       3
RK 33750    0.06   0.035            TRAP      50       3
KK COMBINE
HC     2
KK    39
BA  2.77
PB  15.7
UI     0     137     308     595    1015    1468    1786    1776    1915    1829
UI  1393    1266     997     917     787     629     574     449     424     401
UI   380     318     246     235     201     121     116     112     105      65
UI    62      60      58      57      55      47      29      28      27      27
UI    26      24       0       0
KK   ROUTE39 TO 35
RK 24000    0.01   0.035            TRAP      50       3
KK    35
BA  2.57
PB  15.7
LU   .95     .15
UK   300    0.02    0.15     100
RK  6000    0.02    0.04       1    TRAP      20       3
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RK 24000    0.01   0.035            TRAP      50       3
KK    28
BA 17.59
PB  15.7
LU   .95     .15
UK   300   0.007    0.15     100
RK 19000   0.007    0.04       6    TRAP      25       3
RK 44500   0.006   0.035            TRAP      50       3      NO
KK   DAM20
KM   C.A.P., STA. 466+0
RS     1    STOR      -1
SV     0       9      33      97     436     912
SE  1536    1538    1540    1542    1544    1546
SQ     0     432    1222    2245    3457    4830
ST  1546    2000       3     1.5
KK   ROUTE28 TO 29
RK 14000   0.005    0.03            TRAP      75       3
KK    29
BA 10.32
PB  15.7
LU   .95     .15
UK   300    0.04    0.15     100
RK 16000    0.06    0.04       3    TRAP      25       3
RK 44000    0.04   0.035            TRAP      75       3      NO
KK COMBINE28 TO 29
HC     2
KK COMBINE28, 29, 39 & 35
HC     3
KK   ROUTE
RK  6500   0.004   0.035            TRAP     100       3
KK    40
BA  2.15
PB  15.7
UI     0     168     397     786    1319    1870    2068    2259    2259    1805
UI  1532    1254    1095     949     743     665     526     494     466     462
UI   298     283     270     161     139     133     129      76      74      71
UI    69      66      74      35      33      33      32      31      30       4
UI     0
KK   ROUTE40 TO 36
RK 18000    0.01   0.035            TRAP      50       3
KK    36
BA  4.37
PB  15.7
LU   .95     .15
UK   300    0.02    0.15     100
RK  6600    0.02    0.04       2    TRAP      20       3
RK 26500    0.01   0.035            TRAP      50       3
KK    30
BA  1.50
PB  15.7
LU   .95     .15
UK   300   0.007    0.15     100
RK 19000   0.005   0.035            TRAP      25       3
KK COMBINE30, 35, 36, 39 & 40
HC     4
KK   ROUTETO 37
RK  5000    0.01   0.035            TRAP     100       3
KK    37
BA  2.94
PB  15.7
LU   .95     .15
UK   300    0.02    0.15     100
RK  6700    0.09    0.04       1    TRAP      50       3
RK 26750    0.07   0.035            TRAP     100       3
KK COMBINE
HC     2
KK ROUTE
RK 14500   0.005   0.035            TRAP     100       3
KK COMBINE
HC     2
KK ROUTE MCM.SUB. TO 34
RK  3000   0.001    0.03            TRAP     100       3
KK COMBINE ALL TO 34
HC     4
KO     1       2
KK MCMICKEN DAM
RS     1    ELEV    1335
SV     0       0    2200    8800   19000   32400   35500   49800
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SE  1335    1340    1345    1350    1355    1360    1361    1365
SQ   0.0  1750.0  4600.0  10500.  20100.  47000.  63600.  81150.102200.0
SE1335.0  1345.0  1353.9  1355.0  1356.0  1358.0  1359.0  1360.0  1361.0
ST  1361   49500    3.05     1.5
* KKNEW MCMICKEN DAM
* KM NEW RATING CURVE FOR THE DAM WAS OBTAINED FROM JOE TRAM ON 01/09/1996
* RS      1    ELEV    1335
* SV      0       6      96     471    2196    6112   12926   20070   23126   28121
* SV 30824   33615   36501
* SE1327.0  1330.0 1332.55  1335.0  1340.0  1345.0  1350.0 1353.65  1355.0  1357.0
* SE1358.0  1359.0  1360.0
* * SAME SQ-SE RELATIONSHIP BECAUSE Q DEPENDS ON HEAD
* SQ   0.0  1950.0  5600.0  19500.  22100.  49000.  64600.  82150.104200.0
* SE1335.0  1345.0  1353.9  1355.0  1356.0  1358.0  1359.0  1360.0  1361.0
* ST  1361   49500    3.05     1.5
ZZ
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7.1.4 PMP4.DAT -- 72-hour PMP general storm for 46 contributing sub-basins with new stage/storage rating curve

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ID pmp4.dat
ID McMicken Dam Watershed
ID Probable Maximum Flood
ID FCMCD Jan 87 J. Rumann
ID Sub Basins 1-46
ID Sub Basins 45 and 46 WERE ADDED BY BING ZHAO
ID (01/09/1996).
*DIAGRAM
IT      5        0        0      900
IO      5
KK      1
BA   9.60
IN    360
PB  15.70
PI    1.1      2.3      7.2      1.3      .65      .65      .65      .65      .30      .30
PI    .30      .30
LU   0.95     0.15
UI      0      241      489      761     1196     1767     2405     3022     3742     3889
UI   4131     4350     4350     4350     3744     3157     2953     2702     2265     2142
UI   2032     1842     1467     1402     1343     1086     1005      967      932      920
UI    900      869      580      562      545      529      514      319      295      274
UI    267      260      254      171      150      146      143      140      137      134
UI    131      129      126       67       66       65       64       62       61       60
UI     59       58       57       19        0
KK ROUTE1 TO 4
RM      1      0.7      0.2
KK      4
BA   3.42
PB  15.70
LU    .95      .15
UK    300     0.09     0.15      100
RK   7500     0.05     0.05      0.5     TRAP       25        3
RK  19500     0.05    0.035             TRAP       50        3       NO
KK CCOMBINE1 & 4
HC      2
KK      6
BA   5.79
PB   15.7
LU    .95      .15
UK    300     0.03     0.15      100
RK  10000     0.02     0.04      1.0     TRAP       25        3
RK  19500     0.02    0.035             TRAP       75        3      YES
KK  DAM2
KM TRILBY WASH @ S.R. 74
RS      1     STOR       -1
SA      0      0.9
SE   2050     2061
SQ      0    17600
ST   2061     3500        3      1.5
KK   ROUTEDAM2 TO 13
RM      1      1.1      0.2
KK     13
BA   6.05
PB   15.7
LU    .95      .15
UK    300     0.03     0.15      100
RK  21000     0.02    0.040      1.0     TRAP       25        3
RK  27000     0.02    0.035             TRAP       50        3       NO
KK COMBINEDAM 2 @ 13
HC      2
KK     DAM9
KM   TRILBY WASH @ GRAND AVE.
RS      1     STOR       -1
SA      0       50
SE   1850     1857
SQ      0    30300
ST   1857     9000        3      1.5
KK   ROUTEDAM9 TO 25
RM      1      2.6      0.2
KK     25
BA   9.36
PB   15.7
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LU   .95      .15
UK   300     0.01     0.15      100
RK 20000    0.009    0.040      3.0    TRAP      50        3
RK 40750    0.008    0.035             TRAP     150        3       NO
KK COMBINEDAM9 TO 25
HC      2
KK   DAM22
KM   TRILBY WASH @ C.A.P., STA. 609+0
RS      1     STOR       -1
SQ      0     6903
SE   1540   1548.5
SV      0     3436
ST   1554     2000        3      1.5
KK   ROUTEDAM22 TO 31
RM      1      2.7      0.2
KK      3
BA   4.43
PB   15.7
LU   .95      .15
UK   300     0.05     0.15      100
RK   6200    0.05    0.040      1.0    TRAP      50        3
RK 26500     0.04    0.035             TRAP      75        3       NO
KK      5
BA   2.98
PB   15.7
LU   .95      .15
UK   300     0.03     0.15      100
RK   4500    0.03    0.040      1.0    TRAP      50        3
RK 13000     0.01    0.035             TRAP     100        3      YES
KK   DAM1
KM   IONA WASH @ S.R. 74
RS      1     STOR       -1
SA      0      1.1
SE   2040     2048
SQ      0     7300
ST   2048     6000        3      1.5
KK   ROUTEDAM1 TO 12
RM      1      0.9      0.2
KK     12
BA   4.42
PB   15.7
LU   .95      .15
UK   300     0.02     0.15      100
RK   9300    0.015    0.040      1.0    TRAP      50        3
RK 13500     0.010    0.035             TRAP     100        3       NO
KK CCOMBINEDAM1 TO 12
HC      2
KK DAM8
KM IONA WASH @ GRAND AVE.
RS      1     STOR       -1
SA      0     50.0
SE   1920     1930
SQ      0    10500
ST   1930    70003      1.5
KK   ROUTEDAM8 TO 24
RM      1      3.3      0.2
KK     24
BA  17.92
PB   15.7
LU   .95      .15
UK   300     0.010     0.15      100
RK 16000     0.008    0.040      5.0    TRAP      75        3
RK 60250     0.007    0.035             TRAP     150        3       NO
KK COMBINEDAM8 TO 24
HC      2
KK DAM21
KM   IONA WASH @ C.A.P., STA. 572+5
RS      1     STOR       -1
SQ      0       72      505     1135     1914     2817
SE1545.2     1546     1548     1550     1552     1554
SV      0        7       31       69      288      518
ST   1553     2000        3      1.5
KK   ROUTEDAM 21 TO 31
RM      1      2.8      0.2
KK     31
BA   9.34
PB   15.7
LU   .95      .15
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UK   300    0.007     0.15      100
RK 10000    0.006    0.040      2.0     TRAP      100        3
RK 39750    0.005    0.035              TRAP      175        3       NO
KK COMBINEDAMS 21 & 22 TO 31
HC      3
KK ROUTEDAMS 21 & 22/31 TO 32
RM      1      0.2      0.2
KK      7
BA   7.05
PB   15.7
LU    .95      .15
UK   300     0.03     0.15      100
RK 12400     0.02    0.040      1.0     TRAP       25        3
RK 24750     0.03    0.035              TRAP       50        3       NO
KK   DAM3
KM   S.R. 74
RS      1     STOR       -1
SA      0      1.1
SE   2000     2008
SQ      0    10300
ST   2008     6000        3      1.5
KK    ROUTEDAM3 TO 14
RM      1      2.1      0.2
KK     14
BA   7.21
PB   15.7
LU    .95      .15
UK   300    0.020     0.15      100
RK 19000    0.015    0.040      2.0     TRAP       50        3
RK 32250    0.012    0.035              TRAP      100        3       NO
KK COMBINEDAM3 TO 14
HC      2
KK DAM10
KM GRAND AVE.
RS      1     STOR       -1
SA      0       50
SE   1670     1675
SQ      0     8740
ST   1681     4000        3      1.5
KK    ROUTEDAM10 TO 26
RM      1      1.2      0.2
KK     26
BA   8.42
PB   15.7
LU    .95      .15
UK   300    0.010     0.15      100
RK 20000    0.008    0.040      2.0     TRAP       75        3
RK 27750    0.008    0.035              TRAP      150        3       NO
KK COMBINEDAM 10 TO 26
HC      2
KK DAM23
KM    C.A.P., STA. 688+0
RS      1     STOR       -1
SQ      0      116      440      881     1414     2025     2705     3447
SE1544.3     1545     1546     1547     1548     1549     1550     1551
SV      0        3       10       19       31      139      292      498
ST1550.2     2000        3      1.5
* THE FOLLOWING CARDS WERE FROM SPF HEC-1 INPUT FILE IN THE 1987
* REPORT BECAUSE ONE PAGE IS MISSING IN THE PMP HEC-1 INPUT FILE
* IN THE 1987 REPORT.
KK ROUTEDAM23 TO 32
RM      1      2.7      0.2
KK     32
BA   8.42
PB   15.7
LU   0.95     0.15
UK   300    0.007     0.15      100
RK 10000    0.006    0.040      3.0     TRAP      100        3
RK 38250    0.006    0.035              TRAP      175        3       NO
KK COMBINEDAMS 21,22,23 TO 32
HC      3
KK      ROUTEDAMS 21,22,23/31,32 TO 33
RM      1      0.6      0.2
KK      8
BA   3.38
PB   15.7
LU   0.95     0.15
UK   300     0.04     0.15      100
```

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RK  6500    0.04   0.040     1.0    TRAP      25       3
RK 24500    0.03   0.035            TRAP      50       3      NO
KK  DAM4
KM   S.R. 74
RS     1    STOR      -1
SA     0    50.0
SE  1990    2000
SQ     0    1525
ST  2001    1500       3     1.5
KK  ROUTEDAM4 TO 15
RM     1     2.6     0.2
KK     9
BA  5.44
PB  15.7
LU  0.95    0.15
UK   300    0.05    0.15     100
RK 12000    0.05    0.04     1.0    TRAP      25       3
RK 27500    0.04   0.035            TRAP      75       3      NO
KK DAM5
KM S.R.74
RS     1    STOR      -1
SA     0     5.0
SE  1980    1988
SQ     0   12000
ST  1988    2500       3     1.5
KK TO 15
RM     1     2.6     0.2
KK    15
BA  6.65
PB  15.7
* THE ABOVE (UP TO *) CARDS ARE FROM SPF HEC-1 INPUT FILE
LU   .95     .15
UK   300    0.02    0.15     100
RK 11400    0.02    0.04     2.0    TRAP      50       3
RK 38000   0.011   0.035            TRAP     100       3      NO
KK COMBINEDAMS 4, 5 TO 15
HC     3
KK DAM11
KM GRAND AVE.
RS     1    STOR      -1
SA     0    50.0
SE  1560    1567
SQ     0    5000
ST  1568    5000       3     1.5
KK   ROUTEDAM 11 TO 27
RM     1    0.07     0.2
KK    27
BA  1.04
PB  15.7
LU   .95     .15
UK   300   0.009    0.15     100
RK 13500   0.008    0.04            TRAP      25       3      NO
KK COMBINEDAM11 TO 27
HC     2
KK DAM24
KM   C.A.P. STA. 804+5
RS     1    STOR      -1
SQ     0      54     233     608    1007    1469    1985    2550    3161    3814
SQ  4506    5236
SE1543.5    1544    1545    1546    1547    1548    1549    1550    1551    1552
SE  1553    1554
SV     0       0       0       0       1       3       9      18      44     114
SV   204     413
ST1552.8    2000       3     1.5
KK   ROUTEDAM24 TO 33
RM     1     2.4     0.2
KK    18
BA  0.87
PB  15.7
LU   .95     .15
UK   300    0.01    0.15     100
RK 17500   0.009    0.04            TRAP      50       3      NO
KK DAM14
KM GRAND AVE.
RS     1    STOR      -1
SA     0    0.30
SE  1520    1527
SQ     0    1500
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ST  1527    1500       3     1.5
KK   ROUTEDAM14 TO 33
RM     1     2.4     0.2
KK    33
BA  7.48
PB  15.7
LU   .95     .15
UK   300   0.005    0.15     100
RK 13000   0.005    0.04     2.0    TRAP      75       3
RK 34750   0.006   0.035            TRAP     100       3      NO
KK COMBINEDAMS 21, 22, 23/31, 32 TO DAMS 14, 24/33
HC     4
KK   ROUTEALL TO 34
RM     1     0.3     0.2
KK     2
BA 17.02
PB  15.7
LU   .95    0.15
UK   300    0.09    0.15     100
RK  6800   0.071   0.040     2.0    TRAP      50       3
RK 48000   0.043   0.035            TRAP     100       3      NO
KK    11
BA  1.40
PB  15.7
LU   .95     .15
UK   300   0.030    0.15     100
RK  9000   0.022    0.04     0.5    TRAP      50       3
RK 11750   0.022   0.035            TRAP     100       3     YES
KK  DAM7
KM   ME WASH @ S.R. 74
RS     1    STOR      -1
SA     0      50
SE  1980    1988
SQ     0   15000
ST  1988    2500       3     1.5
KK   ROUTEDAM7 TO 17
RM     1     2.4     0.2
KK    10
BA  1.43
PB  15.7
LU   .95     .15
UK   300    0.03    0.15     100
RK  8500    0.28    0.04     0.5    TRAP      25       3
RK 17500   0.023   0.035            TRAP      50       3      NO
KK  DAM6
KM  S.R. 74
RS     1    STOR      -1
SA     0    0.20
SE  1980    1988
SQ     0    1325
ST  1988    1000       3     1.5
KK   ROUTEDAM6 TO 17
RM     1     2.4     0.2
KK    17
BA  6.70
PB  15.7
LU   .95     .15
UK   300   0.015    0.15     100
RK 18000   0.014    0.04     2.0    TRAP      50       3
RK 34250   0.013   0.035            TRAP     100       3      NO
KK COMBINEDAM56 & 7 TO 17
HC     3
KK DAM13
KM ME WASH @ C.A.P.
RS     1    STOR      -1
SQ     0      51     778    3740    5531    6875    7646    7773
SE  1540    1542    1548 1549.03 1551.26 1552.82 1553.68 1553.82
SV     0       0       0      44     357     747    1024    1072
ST  1557    2000       3     1.5
KK   ROUTEDAM13 TO 21
RM     1     0.6     0.2
KK    16
BA  3.46
PB  15.7
LU   .95     .15
UK   300   0.015    0.15     100
RK  8500   0.014    0.04     1.0    TRAP      25       3
RK 35750   0.011   0.035            TRAP      75       3      NO
```

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KK DAM12
KM C.A.P.
RS      1     STOR       -1
SQ      0       51      778     3740     5531     6875     7646     7773
SE   1540     1542     1548 1549.03 1551.26 1552.82 1553.68 1553.82
SV      0        0        0       44      357      747     1024     1072
ST   1557      200        3      1.5
KK    ROUTEDAM12 TO 21
RM      1      0.6      0.2
KK     21
BA   1.04
PB   15.7
LU    .95      .15
UK    300    0.009     0.15      100
RK   8500    0.008     0.04              TRAP       25        3       NO
KK COMBINEDAMS 12, 13 TO 21
HC      3
KK    DAM17
KM GRAND AVE.
RS      1     STOR       -1
SA      0       50
SE   1480     1487
SQ      0    12000
ST   1488     3000        3      1.5
KK    ROUTEDAM 17 TO 34
RM      1      1.3      0.2
KK     19
BA   2.57
PB   15.7
LU    .95      .15
UK    300    0.013     0.15      100
RK  10000    0.012     0.04      1.0     TRAP       25        3
RK  19000    0.012    0.035              TRAP       50        3       NO
KK DAM15
KM C.A.P.
RS      1     STOR       -1
SQ      0       51      778     3740     5531     6875     7646     7773
SE   1540     1542     1548 1549.03 1551.26 1552.82 1553.68 1553.82
SV      0        0        0       44      357      747     1024     1072
ST   1557     2000        3      1.5
KK    ROUTEDAM15 TO 22
RM      0        1      0.2
KK     22
BA   2.31
PB   15.7
LU    .95      .15
UK    300    0.009     0.15      100
RK  14750    0.008     0.04              TRAP       50        3       NO
KK COMBINEDAM15 TO 22
HC      2
KK DAM18
KM GRAND AVE.
RS      1     STOR       -1
SA      0    0.600
SE   1420     1427
SQ      0    10000
ST   1427     3500        3      1.5
KK ROUTEDAM18 TO 34
RM      1      0.8      0.2
KK COMBINEDAM 17 TO DAM 18
HC      2
KK     20
BA   1.08
PB   15.7
LU    .95      .15
UK    300     0.01     0.15      100
RK   6500     0.01     0.04      0.5     TRAP       25        3
RK  12250    0.011    0.035              TRAP       50        3       NO
KK DAM16
KM C.A.P.
RS      1     STOR       -1
SQ      0       51      778     3740     5531     6875     7646     7773
SE   1540     1542     1548 1549.03 1551.26 1552.82 1553.68 1553.82
SV      0        0        0       44      357      747     1024     1072
ST   1557     2000        3      1.5
KK    ROUTEDAM16 TO 23
RM      1      1.6      0.2
KK     23
```

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BA  3.71
PB  15.7
LU   .95      .15
UK   300   0.008    0.15     100
RK 12000   0.008    0.04     1.0    TRAP      50       3
RK 23500   0.007   0.035            TRAP      75       3      NO
KK COM8INEDAM16 TO 23
HC     2
KK DAM19
KM GRAND AVE.
RS     1    STOR      -1
SA     0   0.650
SE  1375    1382
SQ     0   10000
ST  1382    4000       3     1.5
KK   ROUTEDAM19 TO 34
RM     1     0.2     0.2
KK COMBINEDAMS 17, 18 TO DAM 19
HC     2
KK    34
BA  3.23
PB  15.7
LU   .95      .15
UK   300   0.008    0.15     100
RK 12000   0.008    0.04     1.0    TRAP      75       3
RK 24000   0.007   0.035            TRAP     100       3      NO
* THE FOLLOWING CARDS WERE ADDED FOR SUB-BASINS 45 AND 46.
* (01/09/1996, BING ZHAO)
* THE FOLLOWING WERE OBTAINED BY RUNNING MCUHP2
KK    45
KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM  L=     5.45  Lca=      2.94   S=  379.8  Kn= .050  LAG=  66.8
KM  NOTE: C=1.2 (FROM RUMANN'S 1987 REPORT). C=24Kn ==> Kn=0.05.
KM  PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
BA 3.224
LU   .95      .15
UI  162.    162.    162.    444.    607.    819.    994.   1118.   1234.   1371.
UI 1685.   1946.   1348.   1113.    995.    936.    866.    800.    752.    679.
UI  637.    572.    511.    438.    406.    386.    369.    340.    292.    267.
UI  220.    208.    196.    178.    178.    147.    125.    125.    125.     99.
UI   79.     79.     79.     79.     79.     66.     31.     31.     31.     31.
UI   31.     31.     31.     31.     31.     31.     31.     31.     31.     31.
UI   31.      0.
* THE ABOVE WERE OBTAINED BY RUNNING MCUHP2
KK ROUTE THROUGH 46
RK  3000   0.017   0.035            TRAP     100       3
* THE CHANNEL LENTH (3000 FT) AND SLOPE (0.017) WERE MEASURED ON THE BASE MAP
* THE MANNING'S COEFFICIENT, BOTTOM WIDTH, AND SIDE SLOPE ARE THE SAME AS
* THOSE IN THE ROUTING FOR 42==>43.
* THE FOLLOWING WERE OBTAINED BY RUNNING MCUHP2
KK    46
KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM  L=     6.134  Lca=      3.124   S=  306.5  Kn= .050  LAG=  74.5
KM  NOTE: C=1.2 (FROM RUMANN'S 1987 REPORT). C=24Kn ==> Kn=0.05.
KM  PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
BA 5.475
LU   .95      .15
UI  247.    247.    247.    513.    801.   1041.   1360.   1550.   1733.   1882.
UI 2059.   2462.   3001.   2400.   1818.   1614.   1479.   1405.   1311.   1219.
UI 1156.   1059.    987.    915.    822.    742.    654.    608.    586.    567.
UI  517.    472.    406.    377.    316.    316.    287.    271.    271.    230.
UI  190.    190.    190.    187.    121.    121.    121.    121.    121.    121.
UI  118.     47.     47.     47.     47.     47.     47.     47.     47.     47.
UI   47.     47.     47.     47.     47.     47.     47.     47.      0.
* THE ABOVE WERE OBTAINED BY RUNNING MCUHP2
KK COMBINE THE ABOVE ROUTED HYDROGRAPH AND 46
HC     2
KK ROUTE THE COMBINED HYDROGRAPH THROUGH 44
RK  5800   0.001    0.03            TRAP     100       3
* THE CHANNEL LENTH (5800 FT) WAS MEASURED ON THE BASE MAP.
* THE CHANNEL SLOPE, MANNING'S COEFFICIENT, BOTTOM WIDTH, AND SIDE SLOPE ARE
* THE SAME AS THOSE IN THE ROUTING FOR 44==>43.
* THE ABOVE CARDS ARE FOR SUB-BASINS 45 AND 46.
KK    44
BA   8.7
IN    60
PB  15.7
LU   .95      .15
```

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UI      0     144     292     398     593     826    1097    1476    1794    2129
UI   2582    2587    2710    3037    3037    3037    3037    3037    2621    2242
UI   2127    2024    1883    1597    1529    1466    1409    1345    1040    1003
UI    969     938     802     715     694     674     655     637     620     604
UI    588     523     399     389     380     372     364     351     196     192
UI    188     184     184     181     177     174     110     104     102     100
UI     99      97      96      94      92      91      89      88      87      47
UI     46      45      45      44      44      43      42      42      41      41
UI     40      38       0       0
* THE FOLLOWING ARE FOR COMBINING THE ROUTED AND 44.
* (01/09/1996, BING ZHAO)
KK COMBINE 46 AND 44
HC      2
* THE ABOVE ARE FOR COMBINING THE ROUTED AND 44.
KK ROUTE44
KM ROUTE 44 TO 43
RK 12500   0.001    0.03            TRAP     100       3
KK     42
BA   5.46
PB   15.7
UI      0     144     292     466     723    1096    1469    1846    2256    2225
UI   2550    2550    2550    2549    1928    1795    1679    1431    1288    1218
UI   1189     875     834     797     684     595     572     550     530     511
UI    494     396     330     319     310     313     164     160     156     152
UI    148     157      87      85      83      81      80      78      76      75
UI     73      81      39      38      38      37      36      36      35      34
UI     34      16       0       0
KK   ROUTE42
KM   ROUTE 42 TO 43
RK 21000   0.013   0.035            TRAP     100       3
KK     43
BA   5.11
PB   15.7
LU    .95     .15
UK    300    0.02    0.15     100
RK   6500    0.02    0.04       1    TRAP      20       3
RK 25500   0.017   0.035            TRAP      50       3
KK COM8INE
HC      3
KK   ROUTE
KM ROUTE COMBINED HYDROGRAPHS
KM     42 43 44 TO 41
RK   5000   0.001    0.03            TRAP     100       3
KK     41
BA   3.05
PB   15.7
LU    .95     .15
UK    300    0.02    0.15     100
RK   6200    0.09    0.04       1    TRAP      20       3
RK 24750    0.09   0.035            TRAP      50       3
KK COMBINE
HC      2
KK   ROUTE41 TO 38
RK   7000   0.001    0.03            TRAP     100       3
KK     38
BA   7.18
PB   15.7
LU    .95     .15
UK    300    0.02    0.15     100
RK   8500    0.09    0.04       2    TRAP      20       3
RK 33750    0.06   0.035            TRAP      50       3
KK COMBINE
HC      2
KK     39
BA   2.77
PB   15.7
UI      0     137     308     595    1015    1468    1786    1776    1915    1829
UI   1393    1266     997     917     787     629     574     449     424     401
UI    380     318     246     235     201     121     116     112     105      65
UI     62      60      58      57      55      47      29      28      27      27
UI     26      24       0       0
KK   ROUTE39 TO 35
RK 24000    0.01   0.035            TRAP      50       3
KK     35
BA   2.57
PB   15.7
LU    .95     .15
UK    300    0.02    0.15     100
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RK  6000    0.02    0.04       1    TRAP      20       3
RK 24000    0.01   0.035            TRAP      50       3
KK    28
BA 17.59
PB  15.7
LU   .95     .15
UK   300   0.007    0.15     100
RK 19000   0.007    0.04       6    TRAP      25       3
RK 44500   0.006   0.035            TRAP      50       3       NO
KK   DAM20
KM   C.A.P., STA. 466+0
RS     1    STOR      -1
SV     0       9      33      97     436     912
SE  1536    1538    1540    1542    1544    1546
SQ     0     432    1222    2245    3457    4830
ST  1546    2000       3     1.5
KK   ROUTE28 TO 29
RK 14000   0.005    0.03            TRAP      75       3
KK    29
BA 10.32
PB  15.7
LU   .95     .15
UK   300    0.04    0.15     100
RK 16000    0.06    0.04       3    TRAP      25       3
RK 44000    0.04   0.035            TRAP      75       3       NO
KK COMBINE28 TO 29
HC     2
KK COMBINE28, 29, 39 & 35
HC     3
KK   ROUTE
RK  6500   0.004   0.035            TRAP     100       3
KK    40
BA  2.15
PB  15.7
UI     0     168     397     786    1319    1870    2068    2259    2259    1805
UI  1532    1254    1095     949     743     665     526     494     466     462
UI   298     283     270     161     139     133     129      76      74      71
UI    69      66      74      35      33      33      32      31      30       4
UI     0
KK   ROUTE40 TO 36
RK 18000    0.01   0.035            TRAP      50       3
KK    36
BA  4.37
PB  15.7
LU   .95     .15
UK   300    0.02    0.15     100
RK  6600    0.02    0.04       2    TRAP      20       3
RK 26500    0.01   0.035            TRAP      50       3
KK    30
BA  1.50
PB  15.7
LU   .95     .15
UK   300   0.007    0.15     100
RK 19000   0.005   0.035            TRAP      25       3
KK COMBINE30, 35, 36, 39 & 40
HC     4
KK   ROUTETO 37
RK  5000    0.01   0.035            TRAP     100       3
KK    37
BA  2.94
PB  15.7
LU   .95     .15
UK   300    0.02    0.15     100
RK  6700    0.09    0.04       1    TRAP      50       3
RK 26750    0.07   0.035            TRAP     100       3
KK COMBINE
HC     2
KK ROUTE
RK 14500   0.005   0.035            TRAP     100       3
KK COMBINE
HC     2
KK ROUTE MCM.SUB. TO 34
RK  3000   0.001    0.03            TRAP     100       3
KK COMBINE ALL TO 34
HC     4
KO     1       2
* KK MCMICKEN DAM
* RS     1    ELEV    1335
```

```
* SV      0        0    2200    8800   19000   32400   35500   49800
* SE  1335     1340    1345    1350    1355    1360    1361    1365
* SQ    0.0  1750.0  4600.0  10500.  20100.  47000.  63600.  81150.102200.0
* SE1335.0  1345.0  1353.9  1355.0  1356.0  1358.0  1359.0  1360.0  1361.0
* ST  1361   49500    3.05     1.5
KKNEW MCMICKEN DAM
KM NEW RATING CURVE FOR THE DAM WAS OBTAINED FROM JOE TRAM ON 01/09/1996
* RS      1     ELEV    1335
RS      1     ELEV    1327
SV      0        6      96     471    2196    6112   12926   20070   23126   28121
SV 30824   33615   36501
SE1327.0  1330.0 1332.55  1335.0  1340.0  1345.0  1350.0 1353.65  1355.0  1357.0
SE1358.0  1359.0  1360.0
* SAME SQ-SE RELATIONSHIP BECAUSE Q DEPENDS ON HEAD
SQ    0.0  1950.0  5600.0  19500.  22100.  49000.  64600.  82150.104200.0
SE1335.0  1345.0  1353.9  1355.0  1356.0  1358.0  1359.0  1360.0  1361.0
ST  1361   49500    3.05     1.5
ZZ
```

7.1.5 PMP52.DAT -- 6-hour PMP local storm for 2 additional sub-basins

```
ID filename: pmp52.dat
ID Dike for McMicken Dam
ID PMP 6-hour PMP Local Storm
ID FCMCD, Bing Zhao, January 10, 1996
ID Sub Basins 45 and 46
ID Modified from PMP4.DAT
ID Modify the method used for Rawhide PMP
*DIAGRAM
IT   10     0     0    900
IO    3
* THE FOLLOWING CARDS WERE ADDED FOR SUB-BASINS 45 AND 46.
* (01/09/1996, BING ZHAO)
* THE FOLLOWING WERE OBTAINED BY RUNNING MCUHP2
KK   45
KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM  L=    5.45  Lca=     2.94  S= 379.8  Kn= .050  LAG= 66.8
KM  NOTE: C=1.2 (FROM RUMANN'S 1987 REPORT). C=24Kn ==> Kn=0.05.
KM  PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
BA 3.224
PB  12.2
IN   15
PI0.0875  0.0875  0.0875  0.0875 0.17625 0.17625 0.17625 0.17625    5.6    1.76
PI  0.71    0.59  0.4125  0.4125  0.4125  0.4125  0.1475  0.1475  0.1475  0.1475
PI  0.06    0.06    0.06    0.06
LU  .95     .15
UI  162.   303.   713.  1056.  1303.  1815.  1231.   965.   833.   716.
UI  604.   475.   396.   354.   279.   214.   187.   163.   125.   112.
UI   79.    79.    73.    31.    31.    31.    31.    31.    31.    31.
UI    0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
UI    0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
* THE ABOVE WERE OBTAINED BY RUNNING MCUHP2
KK ROUTE THROUGH 46
RK  3000  0.017  0.035          TRAP    100     3
* THE CHANNEL LENTH (3000 FT) AND SLOPE (0.017) WERE MEASURED ON THE BASE MAP
* THE MANNING'S COEFFICIENT, BOTTOM WIDTH, AND SIDE SLOPE ARE THE SAME AS
* THOSE IN THE ROUTING FOR 42==>43.
* THE FOLLOWING WERE OBTAINED BY RUNNING MCUHP2
KK   46
KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM  L=     6.1  Lca=     3.1  S= 306.5  Kn= .050  LAG=  74.5
KM  NOTE: C=1.2 (FROM RUMANN'S 1987 REPORT). C=24Kn ==> Kn=0.05.
KM  PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
BA 5.475
LU  .95     .15
UI  247.   380.   921.  1455.  1807.  2261.  2701.  1716.  1442.  1265.
UI 1107.   951.   782.   631.   576.   495.   392.   316.   279.   250.
UI  190.   188.   121.   121.   121.    83.    47.    47.    47.    47.
UI   47.    47.    47.    47.     0.
* THE ABOVE WERE OBTAINED BY RUNNING MCUHP2
KK COMBINE THE ABOVE ROUTED HYDROGRAPH AND 46
HC    2
ZZ
```

7.1.6 PMP62.DAT -- 6-hour 100-year storm for 2 additional sub-basins

```
ID filename: pmp62.dat
ID Dike for McMicken Dam
ID 100-year 6-hourlocal Storm
ID FCMCD, Bing Zhao, January 10, 1996
ID Sub Basins 45 and 46
ID Modified from PMP4.DAT
ID Each basin has its own PC and PB card
*DIAGRAM
IT    10        0        0      900
IO     3
* THE FOLLOWING CARDS WERE ADDED FOR SUB-BASINS 45 AND 46.
* (01/09/1996, BING ZHAO)
* THE FOLLOWING WERE OBTAINED BY RUNNING MCUHP2
KK     45
KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM  L=      5.45  Lca=       2.94   S=  379.8  Kn= .050  LAG=  66.8
KM  NOTE: C=1.2 (FROM RUMANN'S 1987 REPORT). C=24Kn ==> Kn=0.05.
KM  PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
BA 3.224
IN     15
KM RAINFALL DEPTH OF 3.40 WAS SPACIALLY REDUCED AS SHOWN BY THE PB RECORD
KM AN AREAL REDUCTION COEFFICIENT OF  .972 WAS USED
KM THE FOLLOWING PC RECORD USED A 6-HOUR RAINFALL WITH PATTERN NO. 2.08
PB 3.305
PC  .000    .009    .016    .025    .035    .044    .053    .062    .070    .079
PC  .091    .104    .124    .168    .256    .453    .692    .834    .897    .936
PC  .950    .963    .975    .988   1.000
LU   .95     .15
UI  162.    303.    713.   1056.   1303.   1815.   1231.    965.    833.    716.
UI  604.    475.    396.    354.    279.    214.    187.    163.    125.    112.
UI   79.     79.     73.     31.     31.     31.     31.     31.     31.     31.
UI    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
UI    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
* THE ABOVE WERE OBTAINED BY RUNNING MCUHP2
KK ROUTE THROUGH 46
RK  3000   0.017   0.035            TRAP     100       3
* THE CHANNEL LENTH (3000 FT) AND SLOPE (0.017) WERE MEASURED ON THE BASE MAP
* THE MANNING'S COEFFICIENT, BOTTOM WIDTH, AND SIDE SLOPE ARE THE SAME AS
* THOSE IN THE ROUTING FOR 42==>43.
* THE FOLLOWING WERE OBTAINED BY RUNNING MCUHP2
KK     46
KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM  L=       6.1  Lca=       3.1   S=  306.5  Kn= .050  LAG=  74.5
KM  NOTE: C=1.2 (FROM RUMANN'S 1987 REPORT). C=24Kn ==> Kn=0.05.
KM  PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
BA 5.475
KM RAINFALL DEPTH OF 3.40 WAS SPACIALLY REDUCED AS SHOWN BY THE PB RECORD
KM AN AREAL REDUCTION COEFFICIENT OF  .958 WAS USED
KM THE FOLLOWING PC RECORD USED A 6-HOUR RAINFALL WITH PATTERN NO. 2.38
PB 3.258
PC  .000    .011    .018    .027    .039    .050    .061    .071    .082    .093
PC  .105    .120    .141    .186    .272    .459    .685    .821    .888    .928
PC  .948    .962    .974    .988   1.000
LU   .95     .15
UI  247.    380.    921.   1455.   1807.   2261.   2701.   1716.   1442.   1265.
UI 1107.    951.    782.    631.    576.    495.    392.    316.    279.    250.
UI  190.    188.    121.    121.    121.     83.     47.     47.     47.     47.
UI   47.     47.     47.     47.      0.      0.      0.      0.      0.      0.
UI    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
* THE ABOVE WERE OBTAINED BY RUNNING MCUHP2
KK COMBINE THE ABOVE ROUTED HYDROGRAPH AND 46
HC      2
ZZ
```

7.2 Application of PMP Storms

7.2.1 Application of 72-hour PMP general storm procedures

The procedures for 72-hour PMP general storm are based on Hansen et al. (1977). The procedures were applied to the study area to obtain the rainfall depth and temporal distribution by Rumann and Sutko (1987). The following pages show the results. Since too many figures and tables in Hansen et al. (1977) are used, they are not attached here.

P1

Report on

A HYDROLOGIC ANALYSIS OF THE MCMICKEN DAM WATERSHED

Prepared for

Maricopa County Flood Control District

by

J.M. Rumann, Hydrologist
Timothy E. Sutko, Hydrologist

March 1987

A HYDROLOGIC ANALYSIS
OF THE
MCMICKEN DAM WATERSHED

PMP Computation for Trilby Wash

General-storm PMP computations for the Colorado River and Great basin

P2

Drainage Trilby Wash Area 247 mi^2

Latitude 33.8, Longitude 112.6 of basin center

Month September

Step	Duration (hrs) 6	12	18	24	48	72
A. Convergence PMP						
1. Drainage average value from one of figures 2.5 to 2.16	13.6 in.					
2. Reduction for barrier-elevation [fig. 2.18]	82%					
3. Barrier-elevation reduced PMP [step 1 X step 2]	11.2 in.					
4. Durational variation [figs. 2.25 to 2.27 and table 2.7].	74	89	95	100	112	117%
5. Convergence PMP for indicated durations [steps 3 X 4]	8.3	10.0	10.6	11.2	12.5	13.1 in.
6. Incremental 10 mi^2 (26 km^2) PMP [successive subtraction in step 5]	8.3	1.7	0.6	0.6	1.3	0.6 in.
7. Areal reduction [select from figs. 2.28 and 2.29]	73	90	94	98	100	100%
8. Areally reduced PMP [step 6 X step 7]	6.1	1.5	0.6	0.6	1.3	0.6 in.
9. Drainage average PMP [accumulated values of step 8]	6.1	7.6	8.2	8.8	10.1	10.7 in.
B. Orographic PMP						
1. Drainage average orographic index from figure 3.11a to d.	3.4 in.					
2. Areal reduction [figure 3.20]	90%					
3. Adjustment for month [one of figs. 3.12 to 3.17]	100%					
4. Areally and seasonally adjusted PMP [steps 1 X 2 X 3]	3.1 in.					
5. Durational variation [table 3.9]	35	62	83	100	142	161%
6. Orographic PMP for given durations [steps 4 X 5]	1.1	1.9	2.6	3.1	4.4	5.0 in.
	6 hr	12 hr	18 hr	24 hr	48 hr	72 hr
C. Total PMP						
1. Add steps A9 and B6	7.2	9.5	10.8	11.9	14.5	15.7 in.

Figures and tables are in Hansen et al. (1977)

2. PMP for other durations from smooth curve fitted to plot of computed data.

3. Comparison with local-storm PMP (see sec. 6.3).

D. Determine Temporal Distribution

1. 0–6 hr 7.2" | 6hr–12hr 2.3" | 12hr–18hr 1.3" | 18hr–24hr 1.1" | 24–48 hr 2.6" | 48hr–72hr 1.2 hr

24–30hr 0.65" | 30–36hr 0.65" | 36–42hr 0.65" | 42–48hr 0.65"

48–54hr 0.3" | 54–60hr 0.3" | 60–66hr 0.3" | 66–72hr 0.3"

2. Follow (a), (b), and (c) in 6.15 in HMR43 (see the attached)

(a) 0–24 hr, 24–48 hr, 48–72 hr

(b) (1st group) 0-24 hr: 1.1 2.3 7.2 1.3 pick any one

or

2.3 7.2 1.3 1.1

or

1.3 2.3 7.2 1.1

or

1.1 1.3 2.3 7.2

or

1.3 7.2 2.3 1.1

or

1.1 1.3 7.2 2.3

or

1.1 7.2 2.3 1.3

or

⋮

total 1.1+2.3+3.2+1.3 = 11.9"

(2nd group) 24-48 hr: 0.65" 0.65" 0.65" 0.65" total 2.6"

(3rd group) 48-72 hr: 0.3" 0.3" 0.3" 0.3" total 1.2"

(c) 2nd 1st 3rd pick any one

or

3rd 2nd 1st

or

1st 2nd 3rd

3rd 1st 2nd

∴ 1.1 2.3 7.2 1.3 0.65 0.65 0.65 0.65 0.3 0.3 0.3 0.3

6-B. TIME DISTRIBUTION

6.13. Development of PMP in this report is by 6-hr. increments where the "1st" 6-hr. increment or period refers to the highest amount and the "12th" the lowest. A necessary step for determining a probable maximum flood hydrograph is to arrange these 6-hr. increments in a time sequence during the PMP storm. If the "2nd" increment is placed next to the "1st", PMP for 12 hours duration is obtained. Similarly each smaller increment, strictly speaking, needs to be placed adjacent to the next higher to obtain PMP for each duration through 3 days.

6.14. Guidance in setting up time sequences is obtained from sequences as observed in storms. These show much variation. For example, one of the first four highest rain increments in nine western Washington storms occurred in each of the 12 6-hr. periods. Yet there was a decided tendency for two to four of the higher rain increments to occur adjacent to each other.

Tim Dis

6.15. Since storms show characteristic grouping of highest increments in several bursts it is reasonable to allow some deviation from the strict sequential requirement resulting from the method of developing PMP. The following guidelines allow such a compromise.

(a) Group the four heaviest 6-hr. increments of the 72-hr. PMP in a 24-hr. sequence, the middle four increments in a 24-hr sequence, and the smallest four increments in a 24-hr. sequence.

3, 1, 2, 4

(b) Within each of these 24-hr. sequences arrange the four increments such that the second highest is next to the highest, the third highest adjacent to these, and the fourth highest at either end.

3, 2, 1, 4 or 4, 2, 1, 3

(c) Arrange the three 24-hr. sequences so that the second highest 24-hr. period is next to the highest with the third at either end.

6.16. Examples of rain sequences arranged according to these guidelines are shown in figure 6-1. Other distributions patterned after major storms in the basins may be used provided they do not give appreciably less critical flood hydrographs.

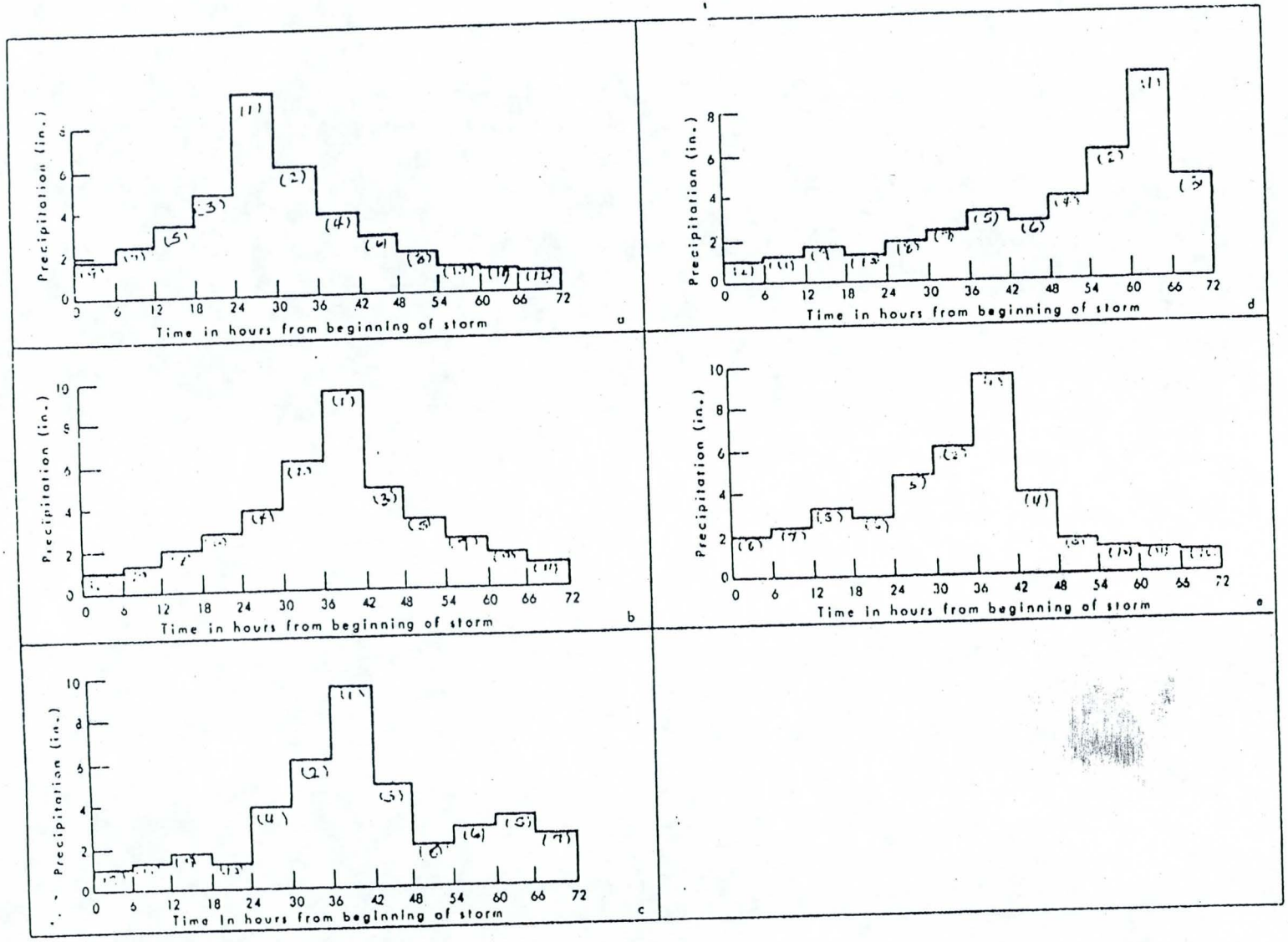


Figure 6-1. Sample PMP time sequences

P 6

From Rumann and Sutko

```
 7          KK       1
 8          BA    9.60
 9          IN     360
10          PB   15.70
11          PI     1.1      2.3      7.2      1.3      .65      .65      .65      .65      .30      .30
12          PI     .30      .30
13          LU     .95      .15
14          UI       0      241      489      761     1196     1767     2405     3022     3742     3889
15          UI    4131     4350     4350     4350     3744     3157     2953     2702     2265     2142
16          UI    2032     1842     1467     1402     1343     1086     1005      967      932      920
17          UI     900      869      580      562      545      529      514      319      295      274
18          UI     267      260      254      171      150      146      143      140      137      134
19          UI     131      129      126       67       66       65       64       62       61       60
20          UI      59       58       57       19        0

21          KK   ROUTE1 TO 4
22          RM       1      0.7      0.2

23          KK       4
24          BA    3.42
25          PB   15.70
26          LU     .95      .15
27          UK     300     0.09     0.15      100
28          RK    7500     0.05     0.05      0.5     TRAP       25        3
29          RK   19500     0.05    0.035              TRAP       50        3       NO

30          KK COMBINE1 & 4
31          HC       2

32          KK       6
33          BA    5.79
34          PB    15.7
35          LU     .95      .15
36          UK     300     0.03     0.15      100
37          RK   10000     0.02     0.04      1.0     TRAP       25        3
38          RK   19500     0.02    0.035              TRAP       75        3      YES

39          KK    DAM2
40          KM   TRILBY WASH @ S.R. 74
41          RS       1     STOR       -1
42          SA       0      0.9
43          SE    2050     2061
44          SQ       0    17600
45          ST    2061     3500        3      1.5
```



```
LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

46          KK   ROUTEDAM2 TO 13
47          RM       1      1.1      0.2

48          KK      13
49          BA    6.05
50          PB    15.7
51          LU     .95      .15
52          UK     300     0.03     0.15      100
53          RK   21000     0.02    0.040      1.0     TRAP       25        3
54          RK   27000     0.02    0.035              TRAP       50        3       NO

55          KK COMBINEDAM 2 &13
56          HC       2
```

7.2.2 Application of 6-hour PMP local storm procedures

The procedures for 6-hour PMP local storm are based on Hansen et al. (1977). The procedures are applied to the 2 additional sub-basins. The following pages show the results.

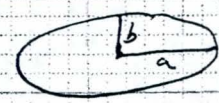
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT _____ PAGE 1 OF _____

DETAIL _____ COMPUTED _____ DATE _____

_____ CHECKED BY _____ DATE _____

$Area = \pi a b$, $a = 2b$, $b = \sqrt{\frac{area}{2\pi}}$



ellipse	Area (mi^2)	b (mi)	a=2b (mi)	b (inch) 1:24000	a (inch) 1:24000
A	1	0.4	0.8	1.1	2.2
B	5	0.89	1.78	2.4	4.8
C	25	2	4	5.3	10.6
D	55	3	6	7.9	15.8

Now we can plot the ellipses

Place above ellipses (A, B, & C) over the working map (1:24000) such that the ellipses cover most drainage area

Now, From Fig 4.5 in HMR 49, rainfall depth $= \frac{12'' + 11.5''}{2} = 11.75''$

Now, we start to fill out the work-sheet

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT _____ PAGE 3 OF _____

DETAIL _____ COMPUTED _____ DATE _____

_____ CHECKED BY _____ DATE _____

Now we need to find the rainfall depth over the drainage area ($8.7\ mi^2$) for each time step. (use A, B, and C isohyets to find it)

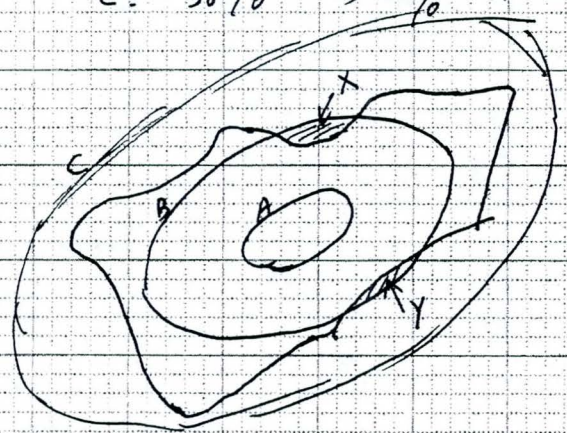
(Use areal-weighted method)

Based on Table 4.5 in HMR49,

A: 100% ⇒ 11.75"

B: 82% ⇒ 82% × 11.75" = 9.64"

C: 58% ⇒ 58% × 11.75" = 6.82"



area for A = $1\ mi^2$

- - - - B = $5\ mi^2$

- - - - C = $25\ mi^2$

Drainage area = $8.7\ mi^2$

The drainage area which A covers = $1\ mi^2$

The drainage area which B covers (excluding area A) = $(5-1)-(X+Y)$

$= (5-1)-(0.044+0.031)$

$= 3.925\ mi^2$

The drainage area which C covers (excluding area B) = $8.7-(3.925+1) = 3.775\ mi^2$

Actually, the above 3 numbers are the area between the isohyets, which covers the drainage area.

Now we can use the areal-weighted method to find the rainfall depth over the drainage area

Table 6.3B.--Local-storm PMP computation, Colorado River and Great Basin, and California drainages. (Giving areal distribution of PMP).

Steps correspond to those in sec. 6.3B.

1. Place idealized isohyetal pattern [~~fig. 4.10~~] which was based on the ellipses in the table (see the previous page) over drainage adjusted to ~~1:500,000~~ 1:24,000 scale to obtain most critical placement.
2. Note the isohyets within drainage.
3. Average 1-hr 1-mi^2 (2.6-km^2) PMP for drainage [fig. 4.5]. 11.75 in. ~~(mm)~~
4. a. Reduction for elevation. [No adjustment for elevations up to 5,000 feet (1,524 m), 5% decrease per 1,000 feet (305 m) above 5,000 feet (1,524 m)]. 100 %

   b. Multiply step 3 by step 4a. 11.75 in. ~~(mm)~~
5. Average 6/1-hr ratio for drainage [fig. 4.7]. 1.30
6. Obtain isohetal labels for 15-min incremental and the highest PMP from table 4.5 corresponding 6/1-hr ratio of step 5.

PMP Increment	Isohyet A	B	C	D	E	F	G	H	I	J	
Highest 1-hr	100	82	58								
Highest 15-min.	74	56	32								
2nd "	15	15	15								
3rd "	6	6	6								in %
4th "	5	5	5								

7. Obtain isohyetal labels in % of 1-hr PMP for 2nd to 6th highest hourly incremental PMP values from table 4.6 using 6/1-hr ratio of step 5.

2nd Highest 1-hr PMP	14	14	14								
3rd "	6	6	6								
4th "	5	5	5								in %
5th "	3	3	3								
6th "	2	2	2								

8. Multiply steps 6 and 7 by step 4b to get incremental isohyetal labels of PMP.

Highest 15-min.	8.7	6.58	3.76								
2nd "	1.76	1.76	1.76								
3rd "	0.71	0.71	0.71								
4th "	0.59	0.59	0.59								
Highest 1-hr	11.75	9.64	6.82								in in. (mm)
2nd "	1.65	1.65	1.65								
3rd "	0.705	0.705	0.705								
4th "	0.59	0.59	0.59								
5th "	0.35	0.35	0.35								
6th "	0.24	0.24	0.24								

~~9. Arrange values of step 8 in time sequence [tables 4.7 and 4.8].~~

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT _____ PAGE 4 OF _____

DETAIL _____ COMPUTED _____ DATE _____

_____ CHECKED BY _____ DATE _____

Rainfall depth over 8.7 mi²:

formula: $\frac{1}{8.7}A + \frac{3.925}{8.7}B + \frac{3.775}{8.7}C$

From previous page:

	A	B	C
Highest 15-min	8.7	6.58	3.76
2nd "	1.76	1.76	1.76
3rd "	0.71	0.71	0.71
4th "	0.59	0.59	0.59
Highest 1-hr	11.75	9.64	6.82
2nd "	1.65	1.65	1.65
3rd "	0.705	0.705	0.705
4th "	0.59	0.59	0.59
5th "	0.35	0.35	0.35
6th	0.24	0.24	0.24

5.6
1.76
0.71
0.59

8.66
1.65
0.705
0.59
0.35
0.24

Table 4.7 → Arrange values to get time sequence

0.35
0.705
8.66
1.65
0.59
0.24

total depth = 12.195

∴ total rainfall depth = 12.195

Temporal distribution:

0.35 — 0.0875, 0.0875, 0.0875, 0.0875
0.705 — 0.17625, 0.17625, 0.17625, 0.17625
8.66
1.65
0.59 — 0.4125, 0.4125, 0.4125, 0.4125
0.24 — 0.06, 0.06, 0.06, 0.06, 0.1475, 0.1475, 0.1475, 0.1475

5.6
1.76
0.71
0.59

From Hansen et al. (1977) p5

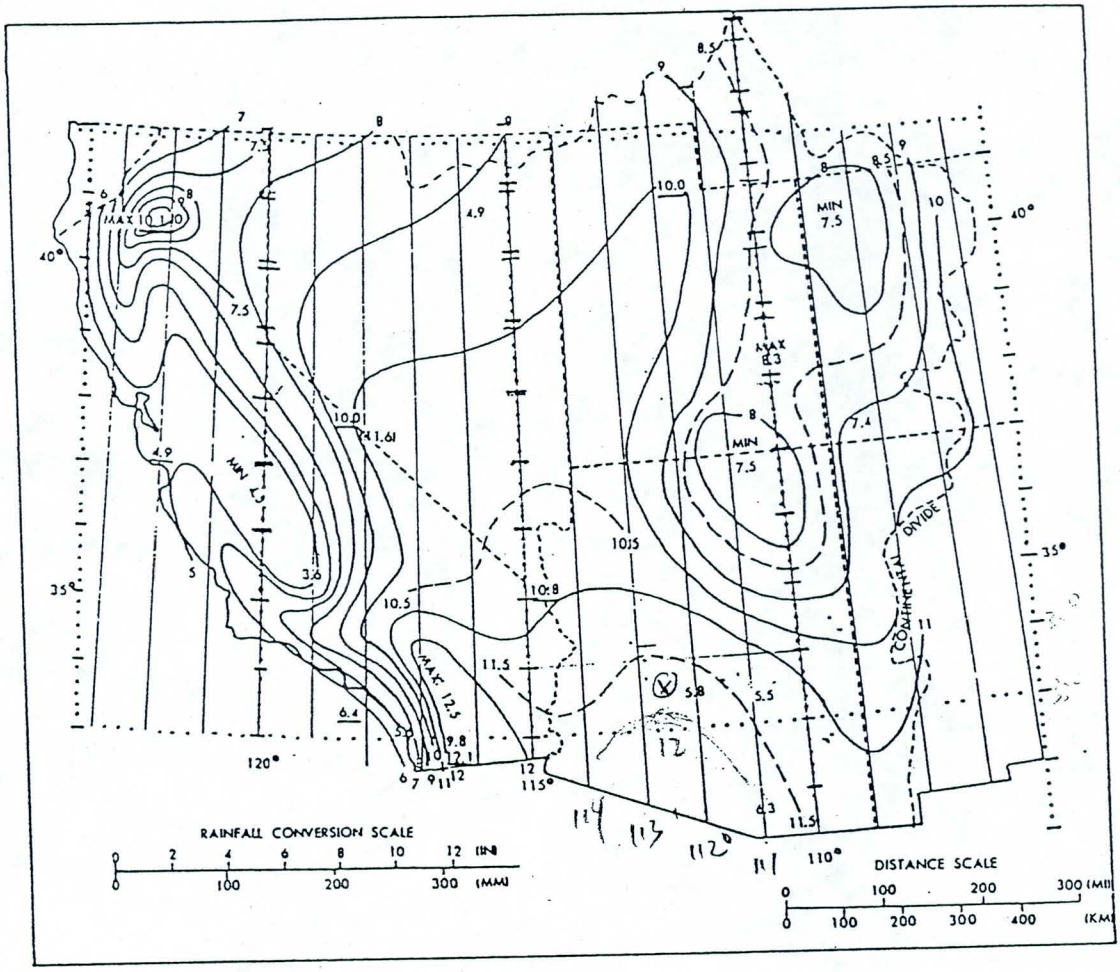


Figure 4.5--Local-storm PMP for 1 mi^2 (2.6 km^2) 1 hr. Directly applicable for locations between sea level and 5000 ft (1524 m). Elevation adjustment must be applied for locations above 5000 ft.

events. In contrast to figure 4.4, figure 4.5 maintains a maximum between these two locations. There is no known meteorological basis for a different solution. The analysis suggests that in the northern portion of the region maximum PMP occurs between the Sierra Nevada on the west and the Wasatch range on the east.

A discrete maximum (> 10 inches, 254 mm) occurs at the north end of the Sacramento Valley in northern California because the northward-flowing moist air is increasingly channeled and forced upslope. Support for this PMP center comes from the Newton, Kennett, and Red Bluff storms (fig. 4.1). Although the analysis in this region appears to be an extension of the broad maximum through the center of the Southwestern Region, it does not indicate the direction of moist inflow. The pattern has evolved primarily as a result of attempts to tie plotted maxima into a reasonable picture while considering inflow directions, terrain effects, and moisture potential.

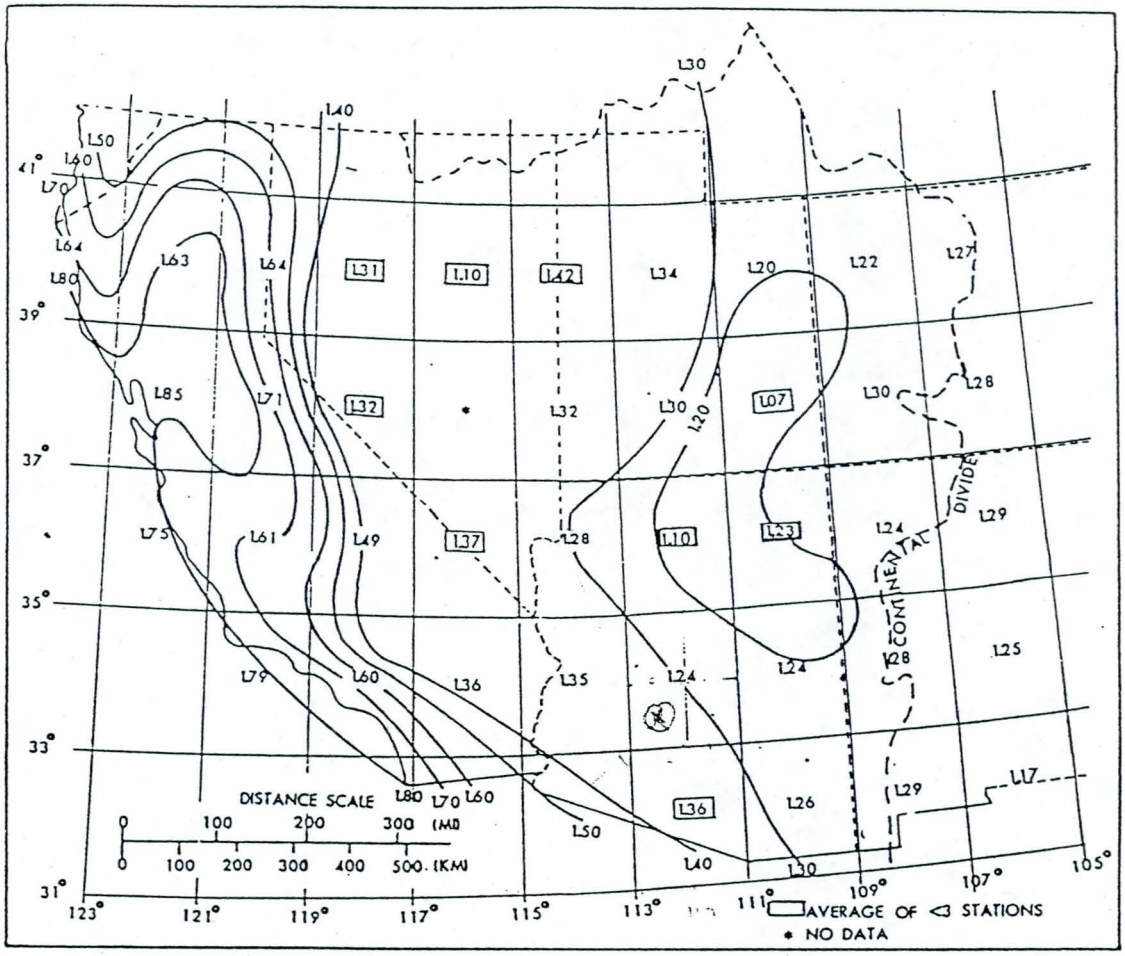


Figure 4.7.--Analysis of 6/1-hr ratios of averaged maximum station data (plotted at midpoints of a 2° latitude-longitude grid).

establish the basic depth-duration curve, then structure a variable set of depth-duration curves to cover the range of 6/1-hr ratios that are needed.

Three sets of data were considered for obtaining a base relation (see table 4.3 for depth-duration data):

a. An average of depth-duration relations from each of 17 greatest 3-hr rains from summer storms (1940-49) in Utah (U. S. Weather Bureau 1951b) and in unpublished tabulations for Nevada and Arizona (1940-63). The 3-hr amounts ranged from 1 to 3 inches (25 to 76 mm) in these events.

b. An average depth-duration relation from 14 of the most extreme short-duration storms listed in Storm Rainfall (U. S. Army, Corps of Engineers 1945-). These storms come from Eastern and Central States and have 3-hr amounts of 5 to 22 inches (127 to 559 mm).

Table 4.5.--Isohyetal labels for the 4 highest 15-min PMP increments and for 1-hr PMP

6/hr ratio (%)	PMP Increment	Isohyet A	B	C	D	E	F	G	H	I	J
		Enclosed area mi^2 (km^2)									
		1 (2.6)	5 (13)	25 (65)	55 (142)	95 (246)	150 (388)	220 (570)	300 (777)	385 (997)	500 (1,295)
		Percent of 1-hr, 1-mi^2 (2.6-km^2) PMP									
<115 (A)	Highest 15-min.	86	68	44	30	18	10	7	6	5	4
	2nd. 15-min.	7	7	7	7	7	6	4	3	3	3
	3rd. 15-min.	4	4	4	4	4	4	3	2	2	2
	4th. 15-min.	3	3	3	3	3	3	2	2	2	2
116-135 (B)	Highest 15-min.	74	56	32	21	14	8	7	6	5	4
	2nd. 15-min.	15	15	15	12	9	6	4	3	3	3
	3rd. 15-min.	6	6	6	6	5	5	3	2	2	2
	4th. 15-min.	5	5	5	5	4	4	2	2	2	2
136-155 (C)	Highest 15-min.	63	45	27	18	11	7	6	5	4	4
	2nd. 15-min.	20	20	15	12	9	6	4	3	3	3
	3rd. 15-min.	10	10	9	8	7	5	3	3	3	3
	4th. 15-min.	7	7	7	6	5	5	3	2	2	2
>156 (D)	Highest 15-min.	43	31	19	14	9	7	5	4	4	4
	2nd. 15-min.	27	23	16	12	8	6	4	3	3	3
	3rd. 15-min.	17	16	13	10	8	5	4	3	3	3
	4th. 15-min.	13	12	10	8	7	5	3	3	2	2
1-hr.PMP		100	82	58	44	32	23	16	13	12	11

130

Isohyetes

82%

50%

P7

Table 4.6.--Isohyetal labels for second to sixth hourly incremental PMP in perceont of 1-hr 1-mi^2 (2.6-km^2) PMP

6/1-hr ratio	Isohyet A	B	C	D	E	F	G	H	I	J
	Second highest 1-hr PMP increment									
1.1	7	7	7	7	7	7	6	4	4	4
1.2	11	11	11	11	10	8	7	5	5	5
1.3	14	14	14	12	11	9	7	5	5	5
1.4	17	17	16	14	12	10	8	6	6	6
1.5	21	20	18	16	13	11	8	6	6	6
1.6	24	23	20	18	15	12	9	7	7	6
1.7	27	26	23	20	16	13	10	7	7	7
1.8	30	29	25	21	17	14	10	8	8	7
1.9	34	32	27	23	18	14	11	8	8	8
	Third highest 1-hr PMP increment									
1.1	2	2	2	2	2	2	2	2	2	2
1.2	4	4	4	4	4	4	4	4	4	4
1.3	6	6	6	6	6	6	5	5	5	5
1.4	9	9	9	9	8	7	6	5	5	5
1.5	11	11	11	11	10	8	7	5	5	5
1.6	14	14	14	13	11	10	8	6	6	6
1.7	17	17	17	14	13	11	8	7	6	6
1.8	19	19	18	16	14	12	9	7	6	6
1.9	21	21	20	18	15	13	10	8	7	7
	Fourth highest 1-hr PMP increment									
1.1	1	1	1	1	1	1	1	1	1	1
1.2	3	3	3	3	3	3	3	3	3	3
1.3	5	5	5	5	5	5	5	4	4	4
1.4	6	6	6	6	6	5	5	4	4	4
1.5	7	7	7	7	7	6	5	4	4	4
1.6	8	8	8	8	7	6	5	5	5	5
1.7	10	10	10	9	8	7	6	5	5	5
1.8	12	11	11	10	9	8	7	6	5	5
1.9	14	13	12	11	10	9	7	6	6	6
	Fifth highest 1-hr PMP increment									
1.1	1	1	1	1	1	1	1	1	1	1
1.2	2	2	2	2	2	2	2	2	2	2
1.3	3	3	3	3	3	3	3	3	3	3
1.4	5	5	5	5	5	5	4	4	4	4
1.5	6	6	6	6	6	5	5	4	4	4
1.6	7	7	7	7	7	6	5	5	5	5
1.7	9	9	9	9	8	7	5	5	5	5
1.8	10	10	10	10	9	7	6	6	5	5
1.9	12	12	12	11	9	8	6	6	6	6
	Sixth highest 1-hr PMP increment									
1.1	1	1	1	1	1	1	1	1	1	1
1.2	1	1	1	1	1	1	1	1	1	1
1.3	2	2	2	2	2	2	2	2	2	2
1.4	4	4	4	4	4	4	4	4	4	3
1.5	5	5	5	5	5	5	4	4	4	4
1.6	6	6	6	6	6	5	5	5	5	5
1.7	7	7	7	7	7	6	5	5	5	5
1.8	8	8	8	8	8	6	5	5	5	5
1.9	9	9	9	9	9	8	6	6	5	5

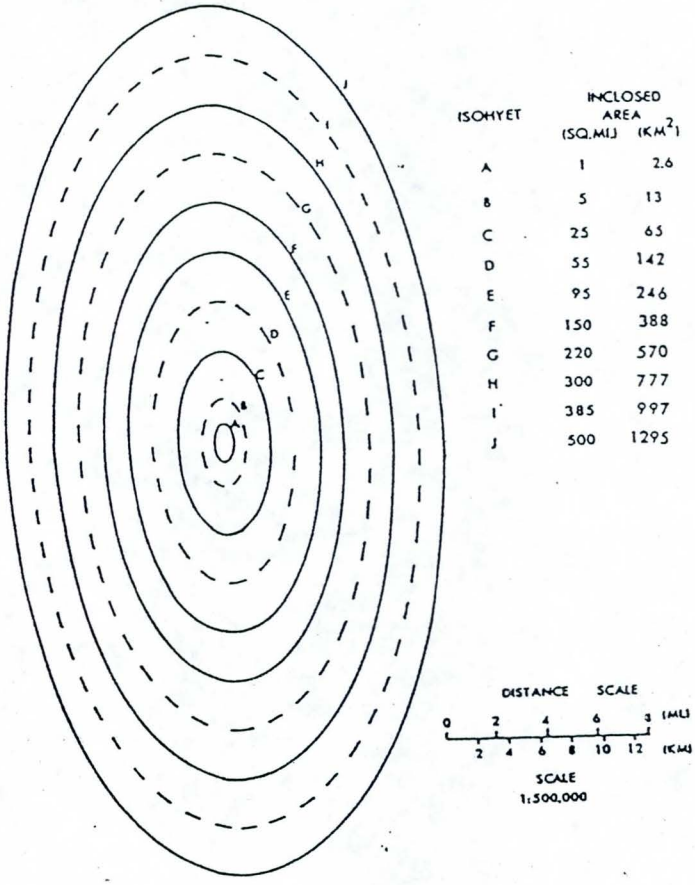


Figure 4.10.--Idealized local-storm isohyetal pattern.

storm period. The sequence of hourly incremental PMP for the Southwest 6-hr thunderstorm in accord with this study is presented in column 2 of table 4.7. A small variation from this sequence is given in Engineering Manual 1110-2-1411 (U. S. Army, Corps of Engineers 1965). The latter, listed in column 3 of table 4.7, places greater incremental amounts somewhat more toward the end of the 6-hr storm period. In application, the choice of either of these distributions is left to the user since one may prove to be more critical in a specific case than the other.

Table 4.7.--Time sequence for hourly incremental PMP in 6-hr storm

Increment	HMR No. 5[1] Sequence Position	EM1110-2-1411[2] Sequence Position
Largest hourly amount	Third	Fourth
2nd largest	Fourth	Third
3rd largest	Second	Fifth
4th largest	Fifth	Second
5th largest	First	Last
least	Last	First

[1] U. S. Weather Bureau 1947.
[2] U. S. Corps of Engineers 1952.

Also of importance is the sequence of the four 15-min incremental PMP values. We recommend a time distribution, table 4.8, giving the greatest intensity in the first 15-min interval (U.S. Weather Bureau 1947). This is based on data from a broad geographical region. Additional support for this time distribution is found in the reports of specific storms by Keppell (1963) and Osborn and Renard (1969).

Table 4.8.--Time sequence for 15-min incremental PMP within 1 hr.

Increment	Sequence Position
Largest 15-min amount	First
2nd largest	Second
3rd largest	Third
least	Last

4.8 Seasonal Distribution

The time of the year when local-storm PMP is most likely is of interest. Guidance was obtained from analysis of the distribution of maximum 1-hr thunderstorm events through the warm season at the recording stations in Utah, Arizona, and in southern California (south of 37°N and east of the Sierra Nevada ridgeline). The period of record used was for 1940-72 with an average record length for the stations considered of 27 years. The month with the one greatest thunderstorm rainfall for the period of record at each station was noted. The totals of these events for each month, by States, are shown in table 4.9.

Table 4.9.--Seasonal distribution of thunderstorm rainfalls.

(The maximum event at each of 108 stations, period of record 1940-72.)

	Month						
	M	J	J	A	S	O	No. of Cases
Utah	1	5	9	14	5		34
Arizona		4	16	19	4		43
S. Calif.*		14	10	7			31
No. of cases/mo.	1	23	35	40	9	0	

*South of 37°N and east of Sierra Nevada ridgeline.