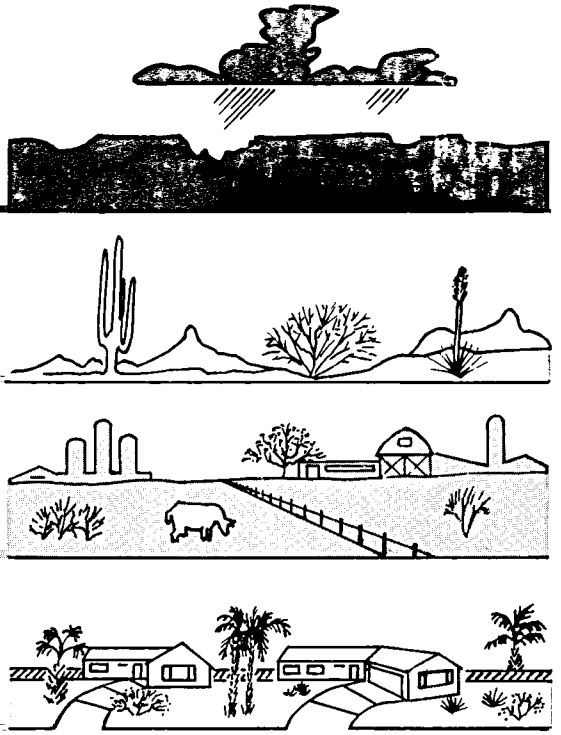

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DAMBREAK ANALYSIS OF NEW RIVER DAM
ON NEW RIVER - - PHOENIX, ARIZONA

Brian C. Dietterick

August 1987

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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Dambreak Analysis of New River Dam on New River
Phoenix, Arizona

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August, 1987

INTRODUCTION

This report presents the results of an analysis of downstream flooding which would result from the failure of New River Dam, an earthen flood control structure located near northwest Phoenix. The analysis was performed by the Flood Control District of Maricopa County using the DAMBRK computer model developed by Dr. D. L. Fread of the National Weather Service. The report includes a map of the inundated area to assist in emergency planning.

PURPOSE

This study was conducted in order to determine the area that would be at substantial risk of loss of life and property in the event of a failure of New River Dam. Such a determination is required by the Arizona Department of Water Resources, Office of Dam Safety, under Arizona Revised Statutes 45-701 through 45-717.

LIMITATIONS

While any number of scenarios describing the failure of New River Dam and the downstream hydraulic regime can be conceived, an exhaustive analysis of each of them is not feasible. Inasmuch as the purpose of this analysis was to estimate the extent of flooding resulting from a dam failure so as to prevent loss of life, a range of "worst case" scenarios were modeled. The time of failure was assumed to be relatively short (30-60 minutes), the size of the breach was assumed to be large (bottom width = 100-330 feet), and the reservoir was assumed to be at spillway elevation when computations commenced. The dam failure was assumed to be caused by piping.

An attempt was made to model the downstream flooding which would result from dam failure caused by overtopping of the structure. For this effort, The PMF, or probable maximum flood hydrograph (as determined by the U.S. Army Corps of Engineers) was used as the input to the reservoir, with the initial water surface elevation at spillway level. However, the emergency spillway passed this design flow without the dam overtopping, and resulted in a peak discharge far less than any of the dambreak hydrographs.

The downstream limit of the study was the confluence of New River with the Aqua Fria River. Recent bridge designs for channelization on the Aqua Fria River were designed to pass 100000 cfs. The results of this study indicate that flows entering the Aqua Fria would be less than 100000 cfs.

STUDY AREA AND STRUCTURE DESCRIPTION

New River Dam is located north of metropolitan Phoenix (T.5N R.1E Sec 35). It is an earthen dam that has a maximum height of 104 feet and is 2320 feet long. The drainage area is 164 mi^2 and the storage capacity of the reservoir is 43520 acre-feet.

New River Dam was completed in February, 1985 and was jointly sponsored by the U.S. Army Corps of Engineers and the Flood Control District of Maricopa County. The operating objective of the dam is to decrease the peak inflow into New River, offsetting the effect of diverting flows from the Cave Creek drainage area to New River when the Arizona Canal Diversion Channel (ACDC) is constructed. New River Dam was designed to detain water only during times of floods.

New River Dam is equipped with a box outlet structure and an emergency spillway. The reservoir was designed to detain the Standard Project Flood (SPF).

METHODOLOGY

The simulation of a dambreak flood resulting from the failure of New River Dam was modeled using the June, 1986 release of DAMBRK. DAMBRK computes downstream water surface elevations resulting from the failure of an upstream dam. There are several options available to simulate the various combinations of reservoir and channel routing possibilities. The option to use dynamic reservoir routing and dynamic channel routing was selected for the New River dambreak simulation. Dynamic reservoir routing is preferred over level-pool routing because of the ability to account for positive and/or negative wave generation. Positive wave generation can result from a significant inflow to a reservoir and negative wave generation can result from an extremely rapid drawdown such as would be expected following a dam failure. Dynamic routing through the downstream channel is preferred because it accounts for the effects of acceleration, an important consideration in dambreak floodwaves.

The DAMBRK model is designed to solve three functional steps. The first step consists of the routing of an inflow hydrograph through the reservoir. For this analysis, the reservoir was assumed to be full (i.e., at spillway elevation).

To ensure that the modeled reservoir accurately reflected the design pool volume, steps to correctly size the reservoir dimensions were taken using the DAMBRK model. Several cross sections were used to describe the reservoir dimensions. The SPF hydrograph was routed into an empty reservoir, and the

cross section dimensions were then varied to adjust the resulting maximum water surface elevation. When the maximum elevation in the reservoir equaled the elevation of the spillway (i.e., the reservoir retained the volume of the design inflow hydrograph), the cross sections describing the reservoir were assumed to be accurate.

2000 (see input data)

An inflow hydrograph with a constant flow of ~~1000~~ cfs was used to model the dam failure scenarios. The flow of 2000 ~~1000~~ cfs was insignificant relative to the outflow hydrograph and was used only to maintain computational stability within the model.

The second functional step is the development of the breach hydrograph, which is highly dependent upon initial water surface in the reservoir, breach geometry, and the total time of breach formation. For this study, the water surface elevation was assumed to be at spillway level when the computations commenced.

The selection of parameters describing the formation of the breach and the final breach dimensions is very subjective, particularly in predictive rather than historic modeling. It is difficult to predict where a breach will begin forming, how large it will ultimately become, and over how long a time period it will form. Fread (1983) reports that earthen dams do not tend to fail completely or instantaneously. Total breach widths are usually between one and five times the depth of the water behind the dam, with the middle portion of the range being more common (Fread, 1986) (Johnson and Illes, 1976). Total time of failure may range from a few minutes to a few hours, depending upon the

height of the dam, type of materials used in construction, and the degree of compaction of these materials.

For this study it was assumed that the time of failure (i.e., the period of time extending from the time of breach formation until it attains its maximum dimensions) was either 30 or 60 minutes. These times are at the low end and the middle of the range of recommended failure times for well constructed earthen dams (Fread, 1983). Also the breach was assumed to have a final bottom width of either 100 or 330 feet with 1:1 sloping sides. Inasmuch as New River Dam is 90 feet high and 2320 feet long at the crest, the described breach dimensions is in the range of the maximum range that should be expected.

The third functional step in the DAMBRK modeling process is the routing of the outflow hydrograph through the downstream valley and the determination of peak elevations and flood discharges at points downstream. As with the reservoir routing, the dynamic wave method was used for the downstream routing. As mentioned earlier, the dynamic wave method was selected over other available routing techniques because it accounts for the acceleration effects associated with dambreak floodwaves and the influence of downstream unsteady backwater effects produced by channel constrictions and bridge-road embankments. Below New River Dam several roadways cross the channel, but only one of the bridge crossings was modeled. It was suspected that the bridge at Grand Avenue would obstruct the flow and effectively act as a small dam. Thus, it was modeled as a dam. The bridge was assumed to fail when the water surface elevation reached the top of the bridge. The other bridge crossings were not modeled as dams because they do not have significant embankments extending beyond both ends of the bridge, as does the Grand Avenue bridge.

The breach outflow hydrograph is modified as it is routed through the valley due to the effects of valley storage, frictional resistance to flow, floodwave acceleration components, and downstream obstructions and/or flow control structures. Thus, as the dambreak floodwave is translated downstream it is attenuated, reducing the flood peak elevation, dispersing the floodwave volume, and affecting the travel time of the floodwave. Consequently, the downstream routing requires a description of channel, or valley cross sections (including both effective and ineffective flow areas), hydraulic resistance coefficients and expansion coefficients.

Cross-sectional information was readily available from topographic maps developed by the COE for floodplain delineation in this area. Estimates of hydraulic resistance and ineffective flow areas are subject to some uncertainty in urban areas where water tends to flow not only down gradient, but also tends to concentrate in streets and along fences and walls. The parameters selected for these parameters are considered to be reasonable.

DISCUSSION OF RESULTS

The failure of New River Dam under the conditions modeled would result in downstream flooding of a magnitude that is not known to have ever occurred on New River. Peak discharges for the four scenarios modeled along with approximate travel times are presented in Table 1 for each of the major streets crossing New River between the Dam and the Aqua Fria River. The maximum elevations associated with the peak discharges are delineated on the map found on Plate 1. The map presents the results of the worst case modeled.

The maximum extent of flooding in the communities adjacent to the New River can be significant. Note that this modeling scheme assumes that block walls or other property fences will not limit the extent of flooding. Attempting to realistically model flow paths through numerous clusters of urbanized areas would increase the degree of uncertainty in the results. To compensate for this difficulty ineffective flow areas were specified in the floodplain extremities. This accounts for the lateral spreading of the flow through the urbanized areas and reduces velocities in areas known to be densely urbanized. This technique was also used to account for low velocities in the orchard areas.

Although the effect of the different scenarios was significant near the dam, about ten miles downstream, near Grand Avenue, peak discharges for all scenarios are within 16 percent of each other. Velocities, in the active flow portion of the channel near the dam, are approximately 10 feet per second.

Table 1. Approximate peak discharges (cfs) and travel times (hrs) below New River Dam.

Time of Failure Breach width	0.5 hr 330 ft	1.0 hr 330 ft	0.5 hr 100 ft	1.0 hr 100 ft	Approx. Travel Time (hrs)
Happy Valley Rd	410000	380000	206000	197000	0.20
Pinnacle Peak Rd	335000	319000	185000	180000	0.35
Deer Valley Rd	286000	274000	168000	164000	0.55
Beardsley Rd	254000	248000	158000	156000	0.75
Union Hills Dr	227000	218000	150000	147000	1.00
Bell Rd	218000	211000	147000	145000	1.35
Greenway Rd	212000	205000	145000	143000	1.75
Thunderbird Rd	190000	186000	137000	135000	2.00
Grand Ave	156000	152000	120000	119000	2.40
Peoria Rd	144000	139000	114000	113000	2.80
Olive Ave	138000	133000	111000	110000	5.50
Northern Ave	132000	128000	108000	107000	6.00
Glendale Ave	127000	124000	106000	105000	6.50
Bethany Home Rd	124000	122000	105000	104000	7.00
Camelback Rd	119000	117000	101000	100000	7.50

Further downstream velocities fluctuate between 6 and 10 feet per second and are gradually reduced due to attenuation of the floodwave. As mentioned in the previous paragraph, the floodwave spreads as ineffective flow on the broad, flat floodplains. This accounts for the very low, or negligible velocities in the overbank areas, or floodplains. Thus, the velocities mentioned above are only for the active flow portion of the flood flow.

EVACUATION RECOMMENDATIONS

The most important tool to be used for evacuation purposes is the flood inundation map found on Plate 1. Only the most severe scenario is mapped. Mapping the other "worst case" scenarios does not significantly change the inundation boundary. It is recognized that the these scenarios may be improbable, but considering the potential risk to human life, these limits of evacuation, or even greater, are warranted. This conservative evacuation recommendation is also suggested in light of some uncertainty inherent in all computer simulations.

An area of concern is the northern-most annexations of Peoria, particularly near Pinnacle Peak Road between 91st and 83rd Avenues. This area is only 2.5 miles downstream of the dam. However, the flow in this vicinity rapidly spreads laterally away from the channel. The two-directional nature of the flow and the resulting shallower depths indicate that overbank flows will experience minimal velocities. Thus, the northern extremities of Peoria are certainly in a flood hazard area, but extreme flow velocities are not expected to be a concern. There is also an area developing near 59th Avenue and Beardsley Road that is not within the inundation area defined by the model, but is within the "recommended evacuation area".

Results indicate that half of Sun City is in the hazard area. Although this represents the worst case, all of Sun City should be evacuated to account for uncertainty in the model results. The same conservative attitude should be

exercised for the all the hazard areas indicated on the inundation map as the "recommended evacuation area".

It should be noted that all power lines crossing New River are extremely susceptible to being washed away. Thus, power outages in the vicinity of New River should be expected. Bridges crossing New River are also likely to be washed away. There are numerous schools (Alta Loma and Sundance ELementary Schools, and Peoria High School) and hospitals (Valley View and Boswell Memorial) that are priority areas that will probably be affected by both flooding and power outages. Water treatment plants that are within the inundation area could pose health hazards caused by the spread of sewage effluent.

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SUMMARY OF INPUT DATA
FOR DAMBRK ANALYSIS OF
NEW RIVER DAM

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INPUT CONTROL PARAMETERS FOR NEW RIVER DAM

PARAMETER	VARIABLE	VALUE
NUMBER OF DYNAMIC ROUTING REACHES	KKN	1
TYPE OF RESERVOIR ROUTING	KUI	1
MULTIPLE DAM INDICATOR	MULDAM	2
PRINTING INSTRUCTIONS FOR INPUT SUMMARY	KDMP	5
NO. OF RESERVOIR INFLOW HYDROGRAPH POINTS	ITEH	8
INTERVAL OF CROSS-SECTION INFO PRINTED OUT WHEN JNK=9	NPRT	0
FLOOD-PLAIN MODEL PARAMETER	KFLP	0
LANDSLIDE PARAMETER	KSL	0

IOPUT= 1 0 1 1 1 1 1 1 0 1 0 0

IDAM= 3

IDAM= 11

DAM NUMBER 1

NEW RIVER DAM RESERVOIR AND BREACH PARAMETERS

PARAMETER	UNITS	VARIABLE	VALUE
ELEVATION OF WATER SURFACE	FT	YO	1456.20
SIDE SLOPE OF BREACH		Z	1.00
ELEVATION OF BOTTOM OF BREACH	FT	YBMIN	1390.00
WIDTH OF BASE OF BREACH	FT	BB	100.00
TIME TO MAXIMUM BREACH SIZE	HR	TFH	.50
ELEVATION OF WATER WHEN BREACHED	FT	HF	1456.10
ELEVATION OF TOP OF DAM	FT	HD	1488.00
ELEVATION OF UNCONTROLLED SPILLWAY CREST	FT	HSP	1456.20
ELEVATION OF CENTER OF GATE OPENINGS	FT	HGT	1390.50
DISCHARGE COEF. FOR UNCONTROLLED SPILLWAY		CS	.00
DISCHARGE COEF. FOR GATE FLOW		CG	25.00
DISCHARGE COEF. FOR UNCONTROLLED WEIR FLOW		CDO	6496.00
DISCHARGE THRU TURBINES	CFS	QT	600.60

DAM NUMBER 2

NEW RIVER DAM RESERVOIR AND BREACH PARAMETERS

PARAMETER	UNITS	VARIABLE	VALUE
ELEVATION OF WATER SURFACE	FT	YO	1121.65
SIDE SLOPE OF BREACH		Z	.50
ELEVATION OF BOTTOM OF BREACH	FT	YBMIN	1116.25
WIDTH OF BASE OF BREACH	FT	BB	300.00
TIME TO MAXIMUM BREACH SIZE	HR	TFH	.20
ELEVATION OF WATER WHEN BREACHED	FT	HF	1141.00
ELEVATION OF TOP OF DAM	FT	HD	1140.00
ELEVATION OF UNCONTROLLED SPILLWAY CREST	FT	HSP	1140.00
ELEVATION OF CENTER OF GATE OPENINGS	FT	HGT	1120.00
DISCHARGE COEF. FOR UNCONTROLLED SPILLWAY		CS	90.00
DISCHARGE COEF. FOR GATE FLOW		CG	.00
DISCHARGE COEF. FOR UNCONTROLLED WEIR FLOW		CDO	30360.00
DISCHARGE THRU TURBINES	CFS	QT	1193.30

QSPILL(K, 1)	HEAD(K, 1)
0.	.0
1500.	2.5
3750.	6.5
6750.	9.5
11250.	13.5
15750.	16.5
19000.	18.5
32500.	26.0

QSPILL(K, 2)	HEAD(K, 2)
0.	.0
200.	1.0
800.	2.0
1200.	3.0
2000.	4.0
10000.	6.0
20000.	10.0
60000.	27.0

DHF(INTERVAL BETWEEN INPUT HYDROGRAPH ORDINATES) = .00 HRS.

TEH(TIME AT WHICH COMPUTATIONS TERMINATE) = 8.0000 HRS.

INFLOW HYDROGRAPH TO NEW RIVER DAM
****

2207.00 2207.00 2207.00 2000.00 2000.00 2000.00 2000.00 2000.00

TIME OF INFLOW HYDROGRAPH ORDINATES

.1000 1.0000 2.5000 3.0000 4.5000 5.0000 6.0000 8.0000

CROSS-SECTIONAL PARAMETERS FOR
BELOW NEW RIVER DAM

PARAMETER	VARIABLE	VALUE
NUMBER OF CROSS-SECTIONS	NS	18
MAXIMUM NUMBER OF TOP WIDTHS	NCS	5
NUMBER OF CROSS-SECTIONAL HYDROGRAPHS TO PLOT	NTT	5
TYPE OF OUTPUT OTHER THAN HYDROGRAPH PLOTS	JNK	4
CROSS-SECTIONAL SMOOTHING PARAMETER	KSA	0
DOWNSTREAM SUPERCRITICAL OR NOT	KSUPC	0
NO. OF LATERAL INFLOW HYDROGRAPHS	LQ	0
NO. OF POINTS IN GATE CONTROL CURVE	KCG	0

NUMBER OF CROSS-SECTION WHERE HYDROGRAPH DESIRED
(MAX NUMBER OF HYDROGRAPHS = 6)

1 4 11 12 13

CROSS-SECTIONAL VARIABLES FOR
BELOW NEW RIVER DAM

PARAMETER	UNITS	VARIABLE
LOCATION OF CROSS-SECTION	MI	XS(I)
ELEVATION (MSL) OF FLOODING AT CROSS-SECTION	FT	FSTG(I)
ELEV CORRESPONDING TO EACH TOP WIDTH	FT	HS(K,I)
TOP WIDTH CORRESPONDING TO EACH ELEV (ACTIVE FLOW PORTION)	FT	BS(K,I)
TOP WIDTH CORRESPONDING TO EACH ELEV (OFF-CHANNEL PORTION)	FT	BSS(K,I)
SURFACE AREA CORRESPONDING TO EACH ELEV (ACTIVE FLOW PORTION)	ACRES	DSA(K,I)
SURFACE AREA CORRESPONDING TO EACH ELEV (OFF-CHANNEL PORTION)	ACRES	SSA(K,I)
NUMBER OF CROSS-SECTION		I
NUMBER OF ELEVATION LEVEL		K

CROSS-SECTION NUMBER 1

XS(I) = .000 FSTG(I) = .00 XSL(I) = .0 XSR(I) = .0

HS ...	1450.0	1460.0	1470.0	1480.0	1500.0
BS ...	100.0	500.0	2200.0	5000.0	6900.0
BSS ...	.0	.0	.0	.0	.0

CROSS-SECTION NUMBER 2
****

XS(I) = 1.200 FSTG(I) = .00 XSL(I) = .0 XSR(I) = .0

HS ...	1420.0	1435.0	1455.0	1465.0	1482.0
BS ...	100.0	2000.0	3900.0	9000.0	11500.0
BSS ...	.0	.0	.0	.0	.0

CROSS-SECTION NUMBER 3
****

XS(I) = 2.500 FSTG(I) = .00 XSL(I) = .0 XSR(I) = .0

HS ...	1389.0	1400.0	1425.0	1457.0	1491.0
BS ...	100.0	800.0	4000.0	6800.0	10300.0
BSS ...	.0	.0	.0	.0	.0

CROSS-SECTION NUMBER 4
****

XS(I) = 2.600 FSTG(I) = .00 XSL(I) = .0 XSR(I) = .0

HS ...	1387.0	1400.0	1425.0	1457.0	1491.0
BS ...	100.0	900.0	4100.0	7000.0	11400.0
BSS ...	.0	.0	.0	500.0	1500.0

CROSS-SECTION NUMBER 5
****

XS(I) = 4.230 FSTG(I) = .00 XSL(I) = .0 XSR(I) = .0

HS ...	1334.0	1339.0	1342.0	1350.0	1366.0
BS ...	75.0	175.0	400.0	1600.0	2200.0
BSS ...	.0	.0	.0	1000.0	3200.0

CROSS-SECTION NUMBER 6
****

XS(I) = 6.620 FSTG(I) = .00 XSL(I) = .0 XSR(I) = .0

HS ...	1274.0	1277.0	1280.0	1290.0	1305.0
BS ...	35.0	185.0	450.0	800.0	2500.0
BSS ...	.0	.0	.0	1500.0	5500.0

CROSS-SECTION NUMBER 7
****

XS(I) = 8.140 FSTG(I) = .00 XSL(I) = .0 XSR(I) = .0

HS ...	1226.0	1230.0	1240.0	1245.0	1255.0
BS ...	30.0	240.0	370.0	800.0	2000.0
BSS ...	.0	.0	.0	1500.0	4200.0

CROSS-SECTION NUMBER 8
****

XS(I) = 8.680 FSTG(I) = .00 XSL(I) = .0 XSR(I) = .0

HS ...	1216.0	1220.0	1230.0	1235.0	1245.0
BS ...	30.0	240.0	400.0	800.0	1500.0
BSS ...	.0	.0	.0	1000.0	3000.0

CROSS-SECTION NUMBER 9
****

XS(I) = 10.080 FSTG(I) = .00 XSL(I) = .0 XSR(I) = .0

HS ...	1186.0	1191.0	1194.0	1201.0	1215.0
BS ...	35.0	200.0	400.0	1600.0	2000.0
BSS ...	.0	.0	.0	1000.0	3000.0

CROSS-SECTION NUMBER 10
****

XS(I) = 11.950 FSTG(I) = .00 XSL(I) = .0 XSR(I) = .0

HS ...	1140.0	1144.0	1148.0	1150.0	1175.0
BS ...	100.0	175.0	250.0	300.0	2000.0
BSS ...	.0	.0	.0	1000.0	3500.0

CROSS-SECTION NUMBER 11
****

XS(I) = 13.250 FSTG(I) = .00 XSL(I) = .0 XSR(I) = .0

HS ...	1118.0	1121.0	1136.0	1140.0	1150.0
BS ...	125.0	220.0	355.0	400.0	1000.0
BSS ...	.0	.0	.0	2500.0	5200.0

CROSS-SECTION NUMBER 12
****

XS(I) = 13.350 FSTG(I) = .00 XSL(I) = .0 XSR(I) = .0

HS ...	1116.7	1121.5	1136.5	1141.5	1146.5
BS ...	175.0	300.0	500.0	750.0	1200.0
BSS ...	.0	.0	.0	2500.0	6200.0

CROSS-SECTION NUMBER 13
****

XS(I) = 14.350 FSTG(I) = .00 XSL(I) = .0 XSR(I) = .0

HS ...	1095.0	1100.0	1110.0	1120.0	1125.0
BS ...	75.0	280.0	350.0	1000.0	1500.0
BSS ...	.0	.0	300.0	2500.0	6200.0

CROSS-SECTION NUMBER 14
****

XS(I) = 16.250 FSTG(I) = .00 XSL(I) = .0 XSR(I) = .0

HS ...	1065.0	1070.0	1080.0	1090.0	1095.0
BS ...	120.0	180.0	350.0	1000.0	1500.0
BSS ...	.0	.0	300.0	1800.0	4200.0

CROSS-SECTION NUMBER 15
****

XS(I) = 19.370 FSTG(I) = .00 XSL(I) = .0 XSR(I) = .0

HS ...	1028.0	1033.0	1036.0	1041.0	1149.0
BS ...	71.0	170.0	225.0	900.0	1600.0
BSS ...	.0	.0	.0	1500.0	3200.0

CROSS-SECTION NUMBER 16
****

XS(I) = 19.600 FSTG(I) = .00 XSL(I) = .0 XSR(I) = .0

HS ...	1026.0	1031.0	1034.0	1039.0	1050.0
BS ...	100.0	190.0	250.0	975.0	1650.0
BSS ...	.0	.0	.0	1000.0	2500.0

CROSS-SECTION NUMBER 17
****

XS(I) = 20.730 FSTG(I) = .00 XSL(I) = .0 XSR(I) = .0

HS ...	1012.0	1018.0	1024.0	1028.0	1034.0
BS ...	195.0	290.0	350.0	1075.0	1750.0
BSS ...	.0	.0	.0	1000.0	2500.0

CROSS-SECTION NUMBER 18
****

XS(I) = 21.870 FSTG(I) = .00 XSL(I) = .0 XSR(I) = .0

HS ...	1000.0	1006.0	1011.0	1021.0	1024.0
BS ...	210.0	425.0	550.0	1125.0	1800.0
BSS ...	.0	.0	.0	1000.0	2500.0

MANNING N ROUGHNESS COEFFICIENTS FOR THE GIVEN REACHES
(CM(K,I),K=1,NCS) WHERE I = REACH NUMBER
****

REACH 1 ...	.030	.030	.030	.030	.030
REACH 2 ...	.030	.030	.030	.030	.030
REACH 3 ...	.040	.040	.040	.040	.040
REACH 4 ...	.090	.090	.090	.090	.090
REACH 5 ...	.070	.070	.070	.070	.070
REACH 6 ...	.060	.060	.060	.050	.050
REACH 7 ...	.060	.060	.060	.050	.050
REACH 8 ...	.060	.060	.060	.050	.050
REACH 9 ...	.060	.060	.060	.050	.050
REACH 10 ...	.060	.060	.060	.050	.050
REACH 11 ...	.060	.060	.060	.050	.050
REACH 12 ...	.060	.060	.060	.050	.050
REACH 13 ...	.060	.060	.060	.050	.050
REACH 14 ...	.060	.060	.060	.050	.050
REACH 15 ...	.060	.060	.060	.050	.050
REACH 16 ...	.060	.060	.060	.050	.050
REACH 17 ...	.060	.060	.060	.050	.050

CROSS-SECTIONAL VARIABLES FOR
BELOW NEW RIVER DAM

PARAMETER	UNITS	VARIABLE
MINIMUM COMPUTATIONAL DISTANCE USED BETWEEN CROSS-SECTIONS	MI	DXM(I)
CONTRACTION - EXPANSION COEFFICIENTS BETWEEN CROSS-SECTIONS		FKC(I)

REACH NUMBER	DXM(I)	FKC(I)
1	.200	.000
2	.100	.000
3	.010	.000
4	.250	.000
5	.250	.000
6	.250	.000
7	.200	.000
8	.200	.000
9	.100	.000
10	.100	.000
11	.005	.000
12	1.000	.000
13	1.000	.000
14	1.000	.000
15	1.000	.000
16	1.000	.000
17	1.000	.000

DOWNSTREAM FLOW PARAMETERS FOR
BELOW NEW RIVER DAM

PARAMETER	UNITS	VARIABLE	VALUE
MAX DISCHARGE AT DOWNSTREAM EXTREMITY	CFS	QMAXD	115000.0
MAX LATERAL OUTFLOW PRODUCING LOSSES	CFS/FT	QLL	.000
INITIAL SIZE OF TIME STEP	HR	DTHM	.0000
INITIAL WATER SURFACE ELEVATION DOWNSTREAM	FT	YDN	.00
SLOPE OF CHANNEL DOWNSTREAM OF DAM	FT/MI	SOM	25.00
THETA WEIGHTING FACTOR		THETA	.00
CONVERGENCE CRITERION FOR STAGE	FT	EPSY	.100
TIME AT WHICH DAM STARTS TO FAIL	HR	TFI	1.00

TOTAL NUMBER OF CROSS SECTIONS (ORIGINAL+INTERPOLATED) (N) = 119 (MAXIMUM ALLOWABLE = 400

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***                           ***
***  SUMMARY OF OUTPUT DATA   ***
*** TIME OF FAILURE = 0.5 HR ***
***  BREACH SIZE = 330 FEET   ***
***      FULL RESERVOIR       ***
***      MINIMAL INFLOW       ***
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PROFILE OF CRESTS AND TIMES FOR
BELOW NEW RIVER DAM

RVR MILE FROM DAM	MAX ELEV (FT)	MAX FLOW (CFS)	TIME MAX ELEV(HR)	MAX VEL (FT/SEC)	FLOOD ELEV (FT)	TIME FLOOD ELEV(HR)
********	********	********	********	********	**********	**********
.000	1456.20	2207	.000	5.43	.00	.00
.200	1456.20	5416	.000	5.77	.00	.00
.400	1456.20	12331	.000	6.79	.00	.00
.600	1456.20	26615	.000	6.33	.00	.00
.800	1456.20	50606	.000	6.34	.00	.00
1.000	1456.20	84464	.000	6.57	.00	.00
1.200	1456.20	127013	.000	4.43	.00	.00
1.300	1456.20	151026	.000	4.42	.00	.00
1.400	1456.20	176329	.000	4.42	.00	.00
1.500	1456.20	202604	.000	4.42	.00	.00
1.600	1456.20	231283	.000	4.42	.00	.00
1.700	1456.20	263728	.000	4.42	.00	.00
1.800	1456.20	297495	.000	4.44	.00	.00
1.900	1456.20	331379	.000	4.45	.00	.00
2.000	1456.20	368352	.000	4.58	.00	.00
2.100	1456.20	406291	.000	4.49	.00	.00
2.200	1456.20	443013	.000	4.84	.00	.00
2.300	1456.20	477245	.000	4.70	.00	.00
2.400	1456.20	507472	.000	5.64	.00	.00
2.500	1456.20	543513	.000	3.81	.00	.00
2.510	1423.54	543513	.550	9.57	.00	.00
2.520	1423.47	540590	.550	9.50	.00	.00
2.530	1423.40	537664	.550	9.43	.00	.00
2.540	1423.33	534735	.550	9.36	.00	.00
2.550	1423.27	531804	.562	9.29	.00	.00
2.560	1423.21	530431	.562	9.22	.00	.00
2.570	1423.15	530001	.562	9.15	.00	.00
2.580	1423.08	529532	.562	9.08	.00	.00
2.590	1423.02	529030	.562	9.00	.00	.00
2.600	1422.96	528501	.562	8.93	.00	.00
2.872	1413.56	503785	.612	8.84	.00	.00
3.143	1404.39	490069	.650	8.83	.00	.00

PROFILE OF CRESTS AND TIMES FOR
BELOW NEW RIVER DAM

RVR MILE FROM DAM	MAX ELEV (FT)	MAX FLOW (CFS)	TIME MAX ELEV(HR)	MAX VEL (FT/SEC)	FLOOD ELEV (FT)	TIME FLOOD ELEV(HR)
3.415	1395.37	476048	.712	8.79	.00	.00
3.687	1386.10	462723	.762	8.86	.00	.00
3.958	1376.93	447272	.837	8.96	.00	.00
4.230	1366.23	427669	.937	11.29	.00	.00
4.496	1359.40	406495	1.012	11.04	.00	.00
4.761	1352.59	386799	1.112	10.80	.00	.00
5.027	1345.79	368371	1.187	10.58	.00	.00
5.292	1339.00	350847	1.287	10.35	.00	.00
5.558	1332.22	333731	1.387	10.11	.00	.00
5.823	1325.42	317555	1.512	9.85	.00	.00
6.089	1318.73	300950	1.637	9.76	.00	.00
6.354	1312.18	286816	1.712	9.02	.00	.00
6.620	1301.47	278579	1.837	12.53	.00	.00
6.873	1293.85	271465	1.912	12.19	.00	.00
7.127	1286.25	264870	2.012	11.94	.00	.00
7.380	1278.64	258654	2.112	11.81	.00	.00
7.633	1271.12	253050	2.187	11.48	.00	.00
7.887	1263.17	247781	2.312	11.88	.00	.00
8.140	1257.78	239147	2.462	10.06	.00	.00
8.410	1252.60	230655	2.537	10.18	.00	.00
8.680	1245.77	226142	2.612	11.92	.00	.00
8.880	1240.24	223998	2.662	11.79	.00	.00
9.080	1234.77	222287	2.712	11.65	.00	.00
9.280	1229.34	220901	2.762	11.48	.00	.00
9.480	1223.95	219774	2.812	11.29	.00	.00
9.680	1218.60	218844	2.837	11.10	.00	.00
9.880	1213.27	217948	2.887	10.92	.00	.00
10.080	1208.59	216966	2.937	10.17	.00	.00
10.184	1206.24	216380	2.962	10.22	.00	.00
10.288	1203.90	215750	2.987	10.26	.00	.00
10.392	1201.58	215078	3.037	10.30	.00	.00
10.496	1199.28	214358	3.062	10.34	.00	.00

PROFILE OF CRESTS AND TIMES FOR
BELOW NEW RIVER DAM

RVR MILE FROM DAM	MAX ELEV (FT)	MAX FLOW (CFS)	TIME MAX ELEV(HR)	MAX VEL (FT/SEC)	FLOOD ELEV (FT)	TIME FLOOD ELEV(HR)
********	********	********	********	********	**********	**********
10.599	1196.99	213588	3.087	10.37	.00	.00
10.703	1194.73	212764	3.112	10.40	.00	.00
10.807	1192.48	211882	3.147	10.43	.00	.00
10.911	1190.25	210939	3.182	10.45	.00	.00
11.015	1188.05	209973	3.212	10.47	.00	.00
11.119	1185.86	208925	3.252	10.49	.00	.00
11.223	1183.70	207868	3.282	10.50	.00	.00
11.327	1181.56	206711	3.332	10.51	.00	.00
11.431	1179.47	205444	3.372	10.51	.00	.00
11.534	1177.43	204006	3.422	10.52	.00	.00
11.638	1175.51	202317	3.482	10.52	.00	.00
11.742	1173.75	200286	3.542	10.50	.00	.00
11.846	1172.23	197925	3.602	10.41	.00	.00
11.950	1170.96	195329	3.652	9.84	.00	.00
12.050	1169.68	192647	3.702	10.20	.00	.00
12.150	1168.36	189829	3.762	10.61	.00	.00
12.250	1167.03	186825	3.812	11.01	.00	.00
12.350	1165.66	183731	3.872	11.38	.00	.00
12.450	1164.26	180387	3.942	11.71	.00	.00
12.550	1162.82	176990	4.002	11.99	.00	.00
12.650	1161.32	173510	4.062	12.19	.00	.00
12.750	1159.76	169897	4.122	12.35	.00	.00
12.850	1158.10	166433	4.182	12.03	.00	.00
12.950	1156.26	163148	4.232	11.77	.00	.00
13.050	1154.15	160331	4.272	12.23	.00	.00
13.150	1151.44	158063	4.332	12.88	.00	.00
13.250	1147.08	155862	4.472	16.61	.00	.00
13.255	1146.87	155862	4.482	16.65	.00	.00
13.260	1146.78	155732	4.482	16.25	.00	.00
13.265	1146.69	155600	4.482	15.89	.00	.00
13.270	1146.59	155465	4.482	15.57	.00	.00
13.275	1146.50	155327	4.472	15.27	.00	.00

PROFILE OF CRESTS AND TIMES FOR
BELOW NEW RIVER DAM

RVR MILE FROM DAM	MAX ELEV (FT)	MAX FLOW (CFS)	TIME MAX ELEV(HR)	MAX VEL (FT/SEC)	FLOOD ELEV (FT)	TIME FLOOD ELEV(HR)
********	********	********	********	********	**********	**********
13.280	1146.41	155189	4.482	15.00	.00	.00
13.285	1146.32	155051	4.472	14.75	.00	.00
13.290	1146.23	154912	4.472	14.51	.00	.00
13.295	1146.14	154774	4.472	14.29	.00	.00
13.300	1146.04	154637	4.472	14.08	.00	.00
13.305	1145.95	154499	4.472	13.89	.00	.00
13.310	1145.86	154362	4.472	13.70	.00	.00
13.315	1145.77	154226	4.472	13.52	.00	.00
13.320	1145.68	154089	4.472	13.35	.00	.00
13.325	1145.59	153954	4.472	13.19	.00	.00
13.330	1145.50	153818	4.472	13.03	.00	.00
13.335	1145.40	153682	4.472	12.88	.00	.00
13.340	1145.31	153545	4.472	12.74	.00	.00
13.345	1145.22	153407	4.462	12.60	.00	.00
13.350	1145.12	153265	4.462	12.47	.00	.00
14.350	1124.56	141316	5.133	9.19	.00	.00
16.250	1095.33	132300	6.033	8.14	.00	.00
17.290	1080.33	127971	6.393	8.81	.00	.00
18.330	1065.70	124778	6.723	9.04	.00	.00
19.370	1051.63	121973	7.003	8.79	.00	.00
19.600	1049.17	121484	7.043	6.95	.00	.00
20.730	1036.15	115255	7.703	6.54	.00	.00
21.870	1024.51	104372	7.993	7.33	.00	.00

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***                          ***
***  SUMMARY OF OUTPUT DATA  ***
*** TIME OF FAILURE = 1.0 HR ***
***  BREACH SIZE = 330 FEET  ***
***      FULL RESERVOIR      ***
***      MINIMAL INFLOW      ***
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PROFILE OF CRESTS AND TIMES FOR
BELOW NEW RIVER DAM

RVR MILE FROM DAM	MAX ELEV (FT)	MAX FLOW (CFS)	TIME MAX ELEV(HR)	MAX VEL (FT/SEC)	FLOOD ELEV (FT)	TIME FLOOD ELEV(HR)
********	********	********	********	********	**********	**********
.000	1456.20	2207	.000	5.22	.00	.00
.200	1456.20	4620	.000	5.98	.00	.00
.400	1456.20	8946	.000	6.01	.00	.00
.600	1456.20	18099	.000	6.15	.00	.00
.800	1456.20	33123	.000	6.01	.00	.00
1.000	1456.20	55486	.000	6.16	.00	.00
1.200	1456.20	85960	.000	4.40	.00	.00
1.300	1456.20	104258	.000	4.43	.00	.00
1.400	1456.20	123928	.000	4.46	.00	.00
1.500	1456.20	145180	.000	4.49	.00	.00
1.600	1456.20	168044	.000	4.53	.00	.00
1.700	1456.20	192956	.000	4.56	.00	.00
1.800	1456.20	220561	.000	4.62	.00	.00
1.900	1456.20	250895	.000	4.64	.00	.00
2.000	1456.20	283217	.000	4.75	.00	.00
2.100	1456.20	317117	.000	4.68	.00	.00
2.200	1456.20	352248	.000	5.01	.00	.00
2.300	1456.20	388335	.000	4.69	.00	.00
2.400	1456.20	425134	.000	5.82	.00	.00
2.500	1456.20	462428	.000	3.81	.00	.00
2.510	1421.89	462428	1.050	8.65	.00	.00
2.520	1421.83	461412	1.050	8.62	.00	.00
2.530	1421.77	460395	1.050	8.58	.00	.00
2.540	1421.71	459377	1.050	8.54	.00	.00
2.550	1421.66	458359	1.050	8.50	.00	.00
2.560	1421.60	457340	1.050	8.46	.00	.00
2.570	1421.54	456320	1.050	8.42	.00	.00
2.580	1421.48	455299	1.050	8.38	.00	.00
2.590	1421.43	454278	1.050	8.34	.00	.00
2.600	1421.37	453256	1.050	8.29	.00	.00
2.872	1412.13	442870	1.050	8.22	.00	.00
3.143	1403.01	430768	1.100	8.27	.00	.00

PROFILE OF CRESTS AND TIMES FOR
BELOW NEW RIVER DAM

RVR MILE FROM DAM	MAX ELEV (FT)	MAX FLOW (CFS)	TIME MAX ELEV(HR)	MAX VEL (FT/SEC)	FLOOD ELEV (FT)	TIME FLOOD ELEV(HR)
********	********	********	********	********	**********	**********
3.415	1394.06	420640	1.150	8.24	.00	.00
3.687	1384.87	412584	1.200	8.37	.00	.00
3.958	1375.78	401643	1.250	8.45	.00	.00
4.230	1365.25	387742	1.350	10.49	.00	.00
4.496	1358.52	373485	1.400	10.32	.00	.00
4.761	1351.82	358277	1.500	10.15	.00	.00
5.027	1345.09	344011	1.600	9.98	.00	.00
5.292	1338.37	329380	1.700	9.81	.00	.00
5.558	1331.65	315033	1.800	9.65	.00	.00
5.823	1324.91	301251	1.900	9.48	.00	.00
6.089	1318.26	286649	2.000	9.43	.00	.00
6.354	1311.74	273979	2.100	8.71	.00	.00
6.620	1301.08	266427	2.200	12.15	.00	.00
6.873	1293.48	259856	2.300	11.92	.00	.00
7.127	1285.88	253860	2.400	11.75	.00	.00
7.380	1278.28	248173	2.500	11.63	.00	.00
7.633	1270.78	242999	2.550	11.31	.00	.00
7.887	1262.85	238044	2.700	11.72	.00	.00
8.140	1257.43	230093	2.850	9.87	.00	.00
8.410	1252.24	222136	2.900	10.03	.00	.00
8.680	1245.43	217903	3.000	11.79	.00	.00
8.880	1239.92	215939	3.050	11.66	.00	.00
9.080	1234.45	214358	3.100	11.51	.00	.00
9.280	1229.03	213054	3.150	11.34	.00	.00
9.480	1223.66	211972	3.200	11.15	.00	.00
9.680	1218.32	211051	3.200	10.96	.00	.00
9.880	1213.00	210160	3.250	10.78	.00	.00
10.080	1208.31	209243	3.300	10.05	.00	.00
10.184	1205.96	208758	3.350	10.09	.00	.00
10.288	1203.61	208115	3.360	10.14	.00	.00
10.392	1201.29	207526	3.410	10.18	.00	.00
10.496	1198.98	206867	3.420	10.22	.00	.00

PROFILE OF CRESTS AND TIMES FOR
BELOW NEW RIVER DAM

RVR MILE FROM DAM	MAX ELEV (FT)	MAX FLOW (CFS)	TIME MAX ELEV(HR)	MAX VEL (FT/SEC)	FLOOD ELEV (FT)	TIME FLOOD ELEV(HR)
********	********	********	********	********	**********	**********
10.599	1196.69	206097	3.470	10.25	.00	.00
10.703	1194.42	205394	3.480	10.28	.00	.00
10.807	1192.17	204475	3.530	10.31	.00	.00
10.911	1189.94	203707	3.560	10.33	.00	.00
11.015	1187.73	202679	3.590	10.35	.00	.00
11.119	1185.55	201817	3.630	10.36	.00	.00
11.223	1183.39	200821	3.660	10.38	.00	.00
11.327	1181.25	199749	3.710	10.38	.00	.00
11.431	1179.16	198575	3.750	10.38	.00	.00
11.534	1177.13	197240	3.800	10.38	.00	.00
11.638	1175.20	195671	3.860	10.37	.00	.00
11.742	1173.45	193784	3.920	10.32	.00	.00
11.846	1171.93	191622	3.980	10.17	.00	.00
11.950	1170.66	189134	4.030	9.57	.00	.00
12.050	1169.38	186615	4.080	9.87	.00	.00
12.150	1168.07	183998	4.140	10.26	.00	.00
12.250	1166.74	181193	4.190	10.66	.00	.00
12.350	1165.38	178260	4.250	11.04	.00	.00
12.450	1163.97	175123	4.310	11.38	.00	.00
12.550	1162.54	171940	4.380	11.69	.00	.00
12.650	1161.04	168663	4.440	11.94	.00	.00
12.750	1159.48	165250	4.500	12.06	.00	.00
12.850	1157.81	161993	4.550	11.80	.00	.00
12.950	1155.98	158896	4.610	11.59	.00	.00
13.050	1153.85	156210	4.650	12.13	.00	.00
13.150	1151.14	154048	4.710	12.80	.00	.00
13.250	1146.79	151913	4.850	16.42	.00	.00
13.255	1146.58	151913	4.850	16.47	.00	.00
13.260	1146.49	151780	4.850	16.07	.00	.00
13.265	1146.40	151650	4.850	15.72	.00	.00
13.270	1146.31	151520	4.850	15.40	.00	.00
13.275	1146.22	151388	4.850	15.11	.00	.00

PROFILE OF CRESTS AND TIMES FOR
BELOW NEW RIVER DAM

RVR MILE FROM DAM	MAX ELEV (FT)	MAX FLOW (CFS)	TIME MAX ELEV(HR)	MAX VEL (FT/SEC)	FLOOD ELEV (FT)	TIME FLOOD ELEV(HR)
********	********	********	********	********	**********	**********
13.280	1146.12	151261	4.850	14.84	.00	.00
13.285	1146.03	151130	4.850	14.59	.00	.00
13.290	1145.94	151001	4.850	14.37	.00	.00
13.295	1145.85	150873	4.850	14.15	.00	.00
13.300	1145.76	150747	4.840	13.95	.00	.00
13.305	1145.66	150618	4.840	13.75	.00	.00
13.310	1145.57	150492	4.840	13.57	.00	.00
13.315	1145.48	150363	4.840	13.40	.00	.00
13.320	1145.39	150232	4.840	13.23	.00	.00
13.325	1145.30	150104	4.840	13.08	.00	.00
13.330	1145.20	149973	4.840	12.93	.00	.00
13.335	1145.11	149839	4.840	12.79	.00	.00
13.340	1145.02	149709	4.840	12.65	.00	.00
13.345	1144.93	149577	4.840	12.51	.00	.00
13.350	1144.83	149445	4.840	12.39	.00	.00
14.350	1124.35	138302	5.500	9.14	.00	.00
16.250	1095.14	129753	6.380	8.11	.00	.00
17.290	1080.17	125549	6.750	8.75	.00	.00
18.330	1065.52	122401	7.080	8.98	.00	.00
19.370	1051.49	119658	7.370	8.71	.00	.00
19.600	1049.03	119174	7.410	6.91	.00	.00
20.730	1036.00	113082	7.990	6.50	.00	.00
21.870	1023.29	98630	7.990	7.31	.00	.00

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***                           ***
***  SUMMARY OF OUTPUT DATA   ***
*** TIME OF FAILURE = 0.5 HR ***
***  BREACH SIZE = 100 FEET   ***
***      FULL RESERVOIR       ***
***      MINIMAL INFLOW       ***
***                           ***
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PROFILE OF CRESTS AND TIMES FOR
BELOW NEW RIVER DAM

RVR MILE FROM DAM	MAX ELEV (FT)	MAX FLOW (CFS)	TIME MAX ELEV(HR)	MAX VEL (FT/SEC)	FLOOD ELEV (FT)	TIME FLOOD ELEV(HR)
********	********	********	********	********	**********	********
.000	1456.20	2207	.000	5.42	.00	.00
.200	1456.20	5146	.000	7.00	.00	.00
.400	1456.20	9775	.000	8.60	.00	.00
.600	1456.20	18954	.000	9.82	.00	.00
.800	1456.20	31889	.000	9.65	.00	.00
1.000	1456.20	48299	.000	9.73	.00	.00
1.200	1456.20	67087	.000	5.03	.00	.00
1.300	1456.20	77102	.000	4.82	.00	.00
1.400	1456.20	88028	.000	4.55	.00	.00
1.500	1456.20	101275	.000	4.59	.00	.00
1.600	1456.20	115711	.000	4.54	.00	.00
1.700	1456.20	130458	.000	4.63	.00	.00
1.800	1456.20	145085	.000	4.65	.00	.00
1.900	1456.20	159236	.000	4.61	.00	.00
2.000	1456.20	172692	.000	4.64	.00	.00
2.100	1456.20	188011	.000	4.67	.00	.00
2.200	1456.20	202513	.000	4.76	.00	.00
2.300	1456.20	215795	.000	5.04	.00	.00
2.400	1456.20	227351	.000	5.22	.00	.00
2.500	1456.20	238598	.000	2.27	.00	.00
2.510	1415.14	238598	.600	8.10	.00	.00
2.520	1415.08	236885	.600	8.02	.00	.00
2.530	1415.01	235940	.600	7.94	.00	.00
2.540	1414.94	235543	.600	7.86	.00	.00
2.550	1414.88	235108	.600	7.77	.00	.00
2.560	1414.82	234636	.600	7.69	.00	.00
2.570	1414.76	234134	.600	7.60	.00	.00
2.580	1414.70	233605	.600	7.52	.00	.00
2.590	1414.64	233054	.600	7.43	.00	.00
2.600	1414.58	232487	.600	7.34	.00	.00
2.872	1405.50	225524	.675	7.17	.00	.00

PROFILE OF CRESTS AND TIMES FOR
BELOW NEW RIVER DAM

RVR MILE FROM DAM	MAX ELEV (FT)	MAX FLOW (CFS)	TIME MAX ELEV(HR)	MAX VEL (FT/SEC)	FLOOD ELEV (FT)	TIME FLOOD ELEV(HR)
********	********	********	********	********	**********	********
3.143	1396.42	221893	.750	7.05	.00	.00
3.415	1387.45	218588	.800	7.01	.00	.00
3.687	1378.57	215478	.875	7.03	.00	.00
3.958	1369.48	212323	.950	6.99	.00	.00
4.230	1359.00	207448	1.100	8.49	.00	.00
4.496	1352.43	202224	1.200	8.45	.00	.00
4.761	1345.88	196969	1.300	8.41	.00	.00
5.027	1339.36	191873	1.425	8.36	.00	.00
5.292	1332.85	186871	1.550	8.30	.00	.00
5.558	1326.37	181917	1.700	8.24	.00	.00
5.823	1319.89	177065	1.850	8.16	.00	.00
6.089	1313.48	171838	2.000	8.28	.00	.00
6.354	1307.21	167600	2.100	7.74	.00	.00
6.620	1297.05	165159	2.250	11.20	.00	.00
6.873	1289.61	163106	2.350	10.87	.00	.00
7.127	1282.17	161190	2.475	10.63	.00	.00
7.380	1274.72	159380	2.575	10.47	.00	.00
7.633	1267.34	157744	2.675	10.22	.00	.00
7.887	1259.57	156092	2.800	10.56	.00	.00
8.140	1254.05	153378	2.975	8.80	.00	.00
8.410	1248.79	150826	3.075	9.01	.00	.00
8.680	1242.16	149530	3.150	10.58	.00	.00
8.880	1236.83	148946	3.200	10.41	.00	.00
9.080	1231.54	148483	3.250	10.23	.00	.00
9.280	1226.29	148108	3.300	10.03	.00	.00
9.480	1221.06	147803	3.350	9.83	.00	.00
9.680	1215.86	147556	3.400	9.62	.00	.00
9.880	1210.64	147333	3.425	9.45	.00	.00
10.080	1205.87	147061	3.475	8.87	.00	.00
10.184	1203.46	146902	3.500	8.93	.00	.00
10.288	1201.07	146729	3.550	9.00	.00	.00
10.392	1198.70	146537	3.575	9.06	.00	.00

PROFILE OF CRESTS AND TIMES FOR
BELOW NEW RIVER DAM

RVR MILE FROM DAM	MAX ELEV (FT)	MAX FLOW (CFS)	TIME MAX ELEV(HR)	MAX VEL (FT/SEC)	FLOOD ELEV (FT)	TIME FLOOD ELEV(HR)
********	********	********	********	********	**********	**********
10.496	1196.35	146329	3.600	9.11	.00	.00
10.599	1194.02	146100	3.635	9.16	.00	.00
10.703	1191.71	145847	3.665	9.21	.00	.00
10.807	1189.43	145573	3.705	9.25	.00	.00
10.911	1187.17	145279	3.735	9.29	.00	.00
11.015	1184.94	144955	3.775	9.32	.00	.00
11.119	1182.74	144594	3.815	9.34	.00	.00
11.223	1180.57	144204	3.865	9.36	.00	.00
11.327	1178.43	143768	3.895	9.37	.00	.00
11.431	1176.34	143267	3.965	9.38	.00	.00
11.534	1174.32	142701	4.015	9.37	.00	.00
11.638	1172.40	141986	4.075	9.33	.00	.00
11.742	1170.66	141070	4.155	9.25	.00	.00
11.846	1169.14	139989	4.235	9.06	.00	.00
11.950	1167.89	138769	4.295	8.53	.00	.00
12.050	1166.65	137488	4.355	8.89	.00	.00
12.150	1165.37	136149	4.415	9.32	.00	.00
12.250	1164.06	134679	4.485	9.72	.00	.00
12.350	1162.73	133150	4.555	10.09	.00	.00
12.450	1161.35	131567	4.625	10.42	.00	.00
12.550	1159.92	129920	4.695	10.70	.00	.00
12.650	1158.43	128204	4.765	10.91	.00	.00
12.750	1156.85	126479	4.825	10.86	.00	.00
12.850	1155.16	124816	4.895	10.64	.00	.00
12.950	1153.27	123348	4.945	10.87	.00	.00
13.050	1151.05	122044	5.005	11.42	.00	.00
13.150	1148.22	121047	5.085	12.14	.00	.00
13.250	1143.85	120009	5.175	15.11	.00	.00
13.255	1143.60	120009	5.175	15.15	.00	.00
13.260	1143.52	119947	5.175	14.83	.00	.00
13.265	1143.44	119886	5.175	14.54	.00	.00
13.270	1143.35	119825	5.175	14.28	.00	.00

PROFILE OF CRESTS AND TIMES FOR
BELOW NEW RIVER DAM

RVR MILE FROM DAM	MAX ELEV (FT)	MAX FLOW (CFS)	TIME MAX ELEV(HR)	MAX VEL (FT/SEC)	FLOOD ELEV (FT)	TIME FLOOD ELEV(HR)
********	********	********	********	********	**********	**********
13.275	1143.27	119765	5.175	14.03	.00	.00
13.280	1143.18	119707	5.165	13.81	.00	.00
13.285	1143.09	119650	5.165	13.59	.00	.00
13.290	1143.01	119594	5.165	13.39	.00	.00
13.295	1142.92	119538	5.165	13.20	.00	.00
13.300	1142.83	119483	5.165	13.02	.00	.00
13.305	1142.75	119430	5.165	12.85	.00	.00
13.310	1142.66	119377	5.165	12.69	.00	.00
13.315	1142.57	119326	5.165	12.53	.00	.00
13.320	1142.49	119276	5.165	12.38	.00	.00
13.325	1142.40	119227	5.165	12.24	.00	.00
13.330	1142.32	119200	5.165	12.10	.00	.00
13.335	1142.23	119173	5.165	11.96	.00	.00
13.340	1142.15	119151	5.165	11.83	.00	.00
13.345	1142.07	119129	5.165	11.71	.00	.00
13.350	1141.99	119108	5.165	11.59	.00	.00
14.350	1122.60	113810	5.835	8.70	.00	.00
16.250	1093.61	108787	6.735	7.77	.00	.00
17.290	1078.89	107031	7.115	8.19	.00	.00
18.330	1064.23	105172	7.425	8.50	.00	.00
19.370	1050.47	103650	7.715	8.10	.00	.00
19.600	1048.04	103329	7.765	6.57	.00	.00
20.730	1034.89	98500	7.995	6.24	.00	.00
21.870	1020.80	88951	7.995	7.12	.00	.00

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***                           ***
***  SUMMARY OF OUTPUT DATA   ***
*** TIME TO FAILURE = 1.0 HR ***
***  BREACH SIZE = 100 FEET   ***
***      FULL RESERVOIR       ***
***      MINIMAL INFLOW       ***
***                           ***
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PROFILE OF CRESTS AND TIMES FOR
BELOW NEW RIVER DAM

RVR MILE FROM DAM	MAX ELEV (FT)	MAX FLOW (CFS)	TIME MAX ELEV(HR)	MAX VEL (FT/SEC)	FLOOD ELEV (FT)	TIME FLOOD ELEV(HR)
********	********	********	********	********	**********	**********
.000	1456.20	2207	.000	5.43	.00	.00
.200	1456.20	4726	.000	6.74	.00	.00
.400	1456.20	8207	.000	8.13	.00	.00
.600	1456.20	14673	.000	8.54	.00	.00
.800	1456.20	24628	.000	8.33	.00	.00
1.000	1456.20	37767	.000	7.56	.00	.00
1.200	1456.20	54150	.000	4.99	.00	.00
1.300	1456.20	63297	.000	4.62	.00	.00
1.400	1456.20	73171	.000	4.59	.00	.00
1.500	1456.20	84314	.000	4.49	.00	.00
1.600	1456.20	96794	.000	4.80	.00	.00
1.700	1456.20	110169	.000	5.36	.00	.00
1.800	1456.20	124108	.000	4.65	.00	.00
1.900	1456.20	138344	.000	4.69	.00	.00
2.000	1456.20	152651	.000	4.65	.00	.00
2.100	1456.20	166836	.000	4.73	.00	.00
2.200	1456.20	180742	.000	4.79	.00	.00
2.300	1456.20	194212	.000	4.90	.00	.00
2.400	1456.20	208847	.000	5.20	.00	.00
2.500	1456.20	223994	.000	2.27	.00	.00
2.510	1414.67	223994	1.050	7.50	.00	.00
2.520	1414.60	223215	1.050	7.45	.00	.00
2.530	1414.54	222436	1.050	7.40	.00	.00
2.540	1414.48	221655	1.050	7.34	.00	.00
2.550	1414.42	220874	1.050	7.29	.00	.00
2.560	1414.36	220091	1.050	7.24	.00	.00
2.570	1414.30	219671	1.050	7.18	.00	.00
2.580	1414.24	219701	1.050	7.13	.00	.00
2.590	1414.18	219725	1.050	7.07	.00	.00
2.600	1414.12	219743	1.050	7.01	.00	.00
2.872	1405.05	214780	1.150	6.91	.00	.00
3.143	1396.01	211450	1.200	6.85	.00	.00

PROFILE OF CRESTS AND TIMES FOR
BELOW NEW RIVER DAM

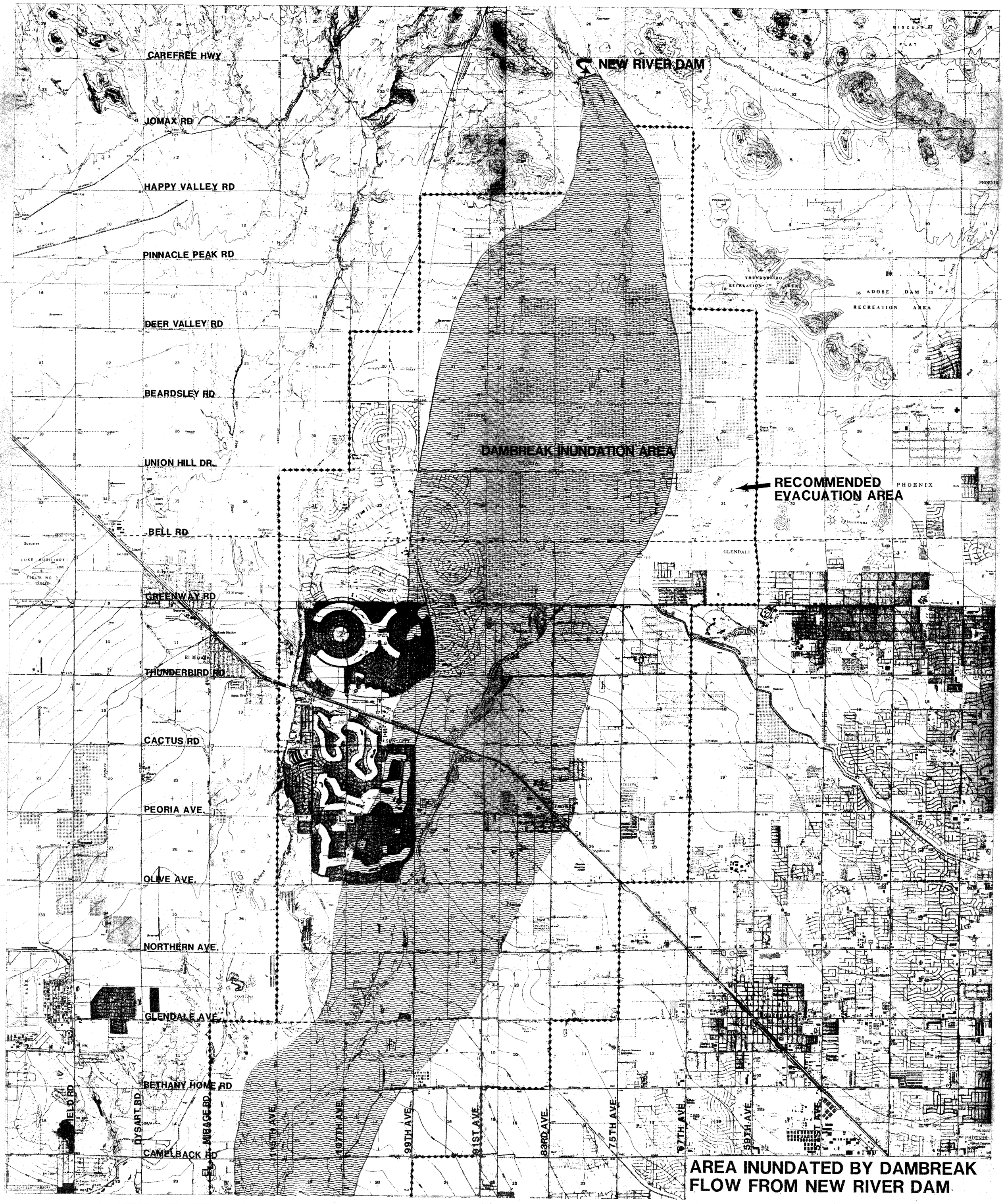
RVR MILE FROM DAM	MAX ELEV (FT)	MAX FLOW (CFS)	TIME MAX ELEV(HR)	MAX VEL (FT/SEC)	FLOOD ELEV (FT)	TIME FLOOD ELEV(HR)
********	********	********	********	********	**********	**********
3.415	1387.06	208635	1.250	6.84	.00	.00
3.687	1378.20	206358	1.300	6.84	.00	.00
3.958	1369.15	203889	1.400	6.86	.00	.00
4.230	1358.71	199890	1.500	8.24	.00	.00
4.496	1352.16	195298	1.600	8.21	.00	.00
4.761	1345.64	191061	1.725	8.17	.00	.00
5.027	1339.13	186654	1.825	8.14	.00	.00
5.292	1332.64	182106	1.950	8.10	.00	.00
5.558	1326.17	177749	2.075	8.08	.00	.00
5.823	1319.70	173210	2.250	8.03	.00	.00
6.089	1313.31	168466	2.375	8.07	.00	.00
6.354	1307.04	164393	2.475	7.62	.00	.00
6.620	1296.89	162084	2.650	11.07	.00	.00
6.873	1289.46	160080	2.750	10.74	.00	.00
7.127	1282.03	158189	2.850	10.54	.00	.00
7.380	1274.58	156426	2.950	10.41	.00	.00
7.633	1267.20	154862	3.050	10.16	.00	.00
7.887	1259.43	153262	3.200	10.50	.00	.00
8.140	1253.90	150608	3.350	8.73	.00	.00
8.410	1248.64	148163	3.450	8.96	.00	.00
8.680	1242.01	146879	3.550	10.53	.00	.00
8.880	1236.69	146304	3.600	10.36	.00	.00
9.080	1231.41	145861	3.650	10.17	.00	.00
9.280	1226.16	145493	3.700	9.97	.00	.00
9.480	1220.94	145187	3.750	9.77	.00	.00
9.680	1215.75	144930	3.750	9.55	.00	.00
9.880	1210.53	144688	3.800	9.39	.00	.00
10.080	1205.75	144409	3.850	8.81	.00	.00
10.184	1203.34	144282	3.900	8.88	.00	.00
10.288	1200.95	144077	3.910	8.94	.00	.00
10.392	1198.58	143923	3.960	9.00	.00	.00
10.496	1196.22	143688	3.970	9.06	.00	.00

PROFILE OF CRESTS AND TIMES FOR
BELOW NEW RIVER DAM

RVR MILE FROM DAM	MAX ELEV (FT)	MAX FLOW (CFS)	TIME MAX ELEV(HR)	MAX VEL (FT/SEC)	FLOOD ELEV (FT)	TIME FLOOD ELEV(HR)
********	********	********	********	********	**********	**********
10.599	1193.89	143492	4.020	9.11	.00	.00
10.703	1191.58	143230	4.050	9.16	.00	.00
10.807	1189.29	142974	4.090	9.20	.00	.00
10.911	1187.03	142696	4.120	9.24	.00	.00
11.015	1184.80	142386	4.160	9.27	.00	.00
11.119	1182.60	142049	4.200	9.29	.00	.00
11.223	1180.42	141676	4.240	9.31	.00	.00
11.327	1178.29	141260	4.280	9.32	.00	.00
11.431	1176.19	140785	4.350	9.32	.00	.00
11.534	1174.17	140252	4.400	9.31	.00	.00
11.638	1172.26	139566	4.470	9.27	.00	.00
11.742	1170.52	138685	4.540	9.17	.00	.00
11.846	1169.00	137650	4.610	8.95	.00	.00
11.950	1167.75	136486	4.680	8.40	.00	.00
12.050	1166.51	135251	4.740	8.72	.00	.00
12.150	1165.23	133966	4.800	9.13	.00	.00
12.250	1163.93	132555	4.860	9.55	.00	.00
12.350	1162.59	131085	4.930	9.92	.00	.00
12.450	1161.21	129565	5.000	10.26	.00	.00
12.550	1159.78	127983	5.080	10.55	.00	.00
12.650	1158.29	126343	5.140	10.76	.00	.00
12.750	1156.71	124681	5.210	10.70	.00	.00
12.850	1155.01	123079	5.270	10.53	.00	.00
12.950	1153.11	121664	5.330	10.77	.00	.00
13.050	1150.90	120412	5.390	11.34	.00	.00
13.150	1148.05	119453	5.460	12.10	.00	.00
13.250	1143.66	118501	5.550	15.04	.00	.00
13.255	1143.41	118501	5.550	15.08	.00	.00
13.260	1143.33	118447	5.550	14.77	.00	.00
13.265	1143.25	118394	5.550	14.48	.00	.00
13.270	1143.17	118340	5.550	14.22	.00	.00
13.275	1143.08	118286	5.540	13.98	.00	.00

PROFILE OF CRESTS AND TIMES FOR
BELOW NEW RIVER DAM

RVR MILE FROM DAM	MAX ELEV (FT)	MAX FLOW (CFS)	TIME MAX ELEV(HR)	MAX VEL (FT/SEC)	FLOOD ELEV (FT)	TIME FLOOD ELEV(HR)
********	********	********	********	********	**********	**********
13.280	1143.00	118234	5.540	13.75	.00	.00
13.285	1142.91	118181	5.540	13.54	.00	.00
13.290	1142.82	118130	5.540	13.33	.00	.00
13.295	1142.74	118078	5.540	13.15	.00	.00
13.300	1142.65	118028	5.540	12.96	.00	.00
13.305	1142.57	117978	5.540	12.79	.00	.00
13.310	1142.48	117928	5.540	12.63	.00	.00
13.315	1142.39	117880	5.540	12.47	.00	.00
13.320	1142.31	117832	5.540	12.32	.00	.00
13.325	1142.22	117787	5.540	12.18	.00	.00
13.330	1142.14	117745	5.540	12.04	.00	.00
13.335	1142.06	117722	5.540	11.91	.00	.00
13.340	1141.98	117701	5.540	11.78	.00	.00
13.345	1141.89	117681	5.540	11.66	.00	.00
13.350	1141.82	117663	5.540	11.54	.00	.00
14.350	1122.49	112431	6.190	8.68	.00	.00
16.250	1093.51	107589	7.100	7.75	.00	.00
17.290	1078.80	105871	7.490	8.16	.00	.00
18.330	1064.14	104043	7.790	8.47	.00	.00
19.370	1050.38	102546	7.990	8.06	.00	.00
19.600	1047.93	102109	7.990	6.54	.00	.00
20.730	1034.11	91736	7.990	6.23	.00	.00
21.870	1019.48	76023	7.990	6.87	.00	.00


NEW RIVER DAM
CAREFREE HWY
JOMAX RD
HAPPY VALLEY RD
PINNACLE PEAK RD
DEER VALLEY RD
BEARDSLEY RD
UNION HILL DR.
BELL RD
GREENWAY RD
THUNDERBIRD RD
CACTUS RD
PEORIA AVE.
OLIVE AVE.
NORTHERN AVE.
GLENDALE AVE.
BETHANY HOME RD
CAMELBACK RD
ELDER RD
DYSART RD
EL MIRAGE RD
115TH AVE.
107TH AVE.
99TH AVE.
91ST AVE.
83RD AVE.
75TH AVE.
67TH AVE.
59TH AVE.
51ST AVE.
DAMBREAK INUNDATION AREA
RECOMMENDED EVACUATION AREA
PHOENIX
GLENDALE
PEORIA
SUN CITY
THUNDERBIRD RECREATION AREA
ADOBE DAM RECREATION AREA
BISCUIT FLAT
LUKE AUXILIARY FIELD NO 3
AREA INUNDATED BY DAMBREAK FLOW FROM NEW RIVER DAM