PECOS RIVER COMPACT

No. 65, Original

In The Supreme Court of the United States

Amended Decree

Final Report of the River Master

Water Year 1987

Accounting Year 1988

June 23, 1988

Neil S. Grigg

River Master of the Pecos River

P.O. Box 8581

Ft. Collins, Colorado 80524

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Purpose of the Report

In its Amended Decree issued March 28, 1988 the Supreme Court of the United States appointed a River Master of the Pecos River and directed him to "...Deliver to the parties a Preliminary Report setting forth the tentative results of the calculations required by Section III.B.1 of this Decree by May 15 of the accounting year..." and to consider "...any written objections to the Preliminary Report submitted by the parties prior to June 15 of the accounting year..." and to deliver "...to the parties a Final Report setting forth the final results of the calculations required by Section III.B.1 of this Decree by July 1 of the accounting year." The Preliminary Report was delivered as required, and written objections from both states were received and considered. This Final Report provides the results of the required calculations for water year 1987 which determine, according to the Amended Decree (Section III.B.1):

"a. The Article III(a) obligation;
b. Any shortfall or overage, which calculation shall disregard deliveries of water pursuant to an Approved Plan;
c. The net shortfall, if any, after subtracting any overages accumulated in previous years, beginning with water year 1987."

Response to States' Objections

A detailed response to each objection is provided in this Final Report. Some of the points objected to or discussed reveal areas where technical discussions are necessary between the States and the River Master; these are summarized at the end of the section describing the reponses to the objections.

Result of Calculations and Statement of Shortfall or Overage

The results of the calculations in this Final Report show that New Mexico is credited with an overage of 15,400 acre-feet for water year 1987.

B.2 GENERAL CALCULATIONS OF ANNUAL DEPARTURES, Thousand Acre-Feet
(Revised 6-20-88)

	1985	1986	1987
Index Inflows			
(1) Annual flood inflow			
(a) Gaged flow Pecos R bel Alamogordo Dam	104.5	105.8	196.7
(b) Flood Inflow Alamogordo - Artesia	47.0	100.9	55.9
(c) Flood Inflow Artesia - Carlsbad	4.8	107.3	31.2
(d) Flood Inflow Carlsbad - State Line	9.7	69.9	7.2
Total (annual flood inflow)	166.0	383.9	291
Index Inflow (3-year avg)			280.3
1947 Condition Delivery Obligation (Index Outflow)			149.1
Average Historical (Gaged) Outflow			
Gaged Flow Pecos River at Red Bluff NM	52.2	268.5	163.5
Gaged Flow Delaware River near Red Bluff NM	3.9	14.6	6.4
Total Annual Historical Outflow	56.1	283.1	169.9
Average Historical Outflow (3-yr average)			169.7
Annual Departure			20.6
Adjustments to Computed Departure			
Depletion due to irrigation	-4.8	-2.5	-2.6
Santa Rosa operations	21.4	35.3	-19.1
Transfer of Water Use to Upstream of AD	0	0	0
Recomputed Index Inflows			
(1) Annual flood inflow			
(a) Gaged flow Pecos R bel Alamogordo Dam	121.1	138.6	175
(b) Flood Inflow Alamogordo - Artesia	47.0	100.9	55.9
(c) Flood Inflow Artesia - Carlsbad	4.8	107.3	31.2
(d) Flood Inflow Carlsbad - State Line	9.7	69.9	7.2
Total (annual flood inflow)	182.6	416.7	269.3
Recomputed Index Inflow (3-year avg)			289.5
Recomputed 1947 Condition Del Outflow (Index Outflow)			156.1
Recomputed Annual Departures			13.5
Credits to New Mexico			
Depletions Due to McMillan Dike			1.9
Salvage Water Analysis			0
Unappropriated Flood Waters			0
Texas Water Stored in NM Reservoirs			0
Beneficial C.U. Delaware River Water			0
Final Calculated Departure, TAF			15.4

B.3 DETERMINATION OF FLOOD INFLOWS, ALAMOGORDO DAM - ARTESIA - 1985

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
Flow bel Alamog Dam	.0	.0	3.9	5.4	5.0	40.5	6.2	35.8	4.9	2.8	.0	.0	104.5
FtSumner Irrig Div	.0	.0	3.4	5.2	4.6	5.6	5.8	6.1	3.8	1.6	.1	.0	36.1
Ft Sumner ID Return	.8	.6	1.3	1.5	2.3	2.3	2.3	2.3	2.1	1.9	1.0	.8	19.2
Flow past FS IDist	.8	.6	1.8	1.7	2.7	37.2	2.7	32.0	3.2	3.1	1.0	.8	87.6
Channel loss	.3	.2	.6	1.3	1.5	7.4	.2	4.8	.9	.9	.3	.3	18.7
Residual Flow	.5	.4	1.2	.4	1.2	29.8	2.5	27.3	2.3	2.2	.7	.5	68.9
Base Inflow	3.1	2.6	2.1	2.0	1.8	1.2	1.3	1.3	1.7	2.0	2.9	3.0	24.9
River Pump Divers	.0	.1	.6	1.1	1.5	1.2	1.6	1.8	.4	.1	.0	.0	8.2
Residual, Artesia	3.6	2.9	2.6	1.2	1.6	29.8	2.2	26.8	3.6	4.2	3.5	3.5	85.5
Pecos Flow Artesia	11.8	7.0	5.6	3.3	4.0	31.3	4.4	27.3	10.5	17.6	5.9	4.0	132.6
Flood Inflow, AD-Art	8.2	4.1	3.0	2.0	2.4	1.5	2.2	.6	6.9	13.3	2.4	.5	47.0

B.3 DETERMINATION OF FLOOD INFLOWS, ALAMOGORDO DAM - ARTESIA - 1986

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
Flow bel Alamog Dam	.1	.1	5.5	6.0	57.9	5.2	6.3	4.5	4.5	8.9	1.1	5.9	105.8
FtSumner Irrig Div	.0	.0	5.1	4.4	6.3	4.5	5.9	4.1	3.2	3.8	.0	.0	37.1
Ft Sumner ID Return	.8	.6	1.4	1.6	2.4	2.4	2.4	2.4	2.2	2.0	1.0	.8	19.7
Flow past FS IDist	.9	.7	1.8	3.2	54.0	3.1	2.8	2.7	3.5	7.0	2.0	6.7	88.3
Channel loss	.3	.2	.6	1.5	7.5	1.5	.3	1.6	.9	1.4	.6	2.7	19.0
Residual Flow	.5	.4	1.1	1.7	46.5	1.5	2.5	1.1	2.6	5.7	1.5	4.0	69.3
Base Inflow	2.8	2.3	2.3	1.5	1.5	2.0	2.1	2.1	3.0	3.7	3.7	4.0	30.9
River Pump Divers	.0	.0	.3	1.2	2.5	.6	.5	1.3	.3	.0	.0	.0	6.9
Residual, Artesia	3.3	2.7	3.1	2.0	45.5	2.9	4.1	1.8	5.3	9.3	5.2	8.0	93.3
Pecos Flow Artesia	3.7	3.9	2.6	.7	38.5	49.0	15.4	4.7	18.2	21.4	19.3	16.8	194.3
Flood Inflow, AD-Art	.4	1.2	-.5	-1.2	-7.0	46.1	11.2	2.8	12.9	12.1	14.1	8.8	100.9

B.3 DETERMINATION OF FLOOD INFLOWS, ALAMOGORDO DAM - ARTESIA - 1987

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
Flow bel Alamog Dam	7.8	8.3	16.0	31.8	43.5	29.9	9.2	22.1	14.8	13.2	.0	.0	196.7
FtSumner Irrig Div	.0	.0	2.6	5.9	4.5	6.1	5.8	5.6	4.8	4.5	.1	.0	39.9
Ft Sumner ID Return	.8	.6	1.5	1.7	2.5	2.5	2.5	2.5	2.3	2.1	1.1	.8	21.1
Flow past FS IDist	8.7	8.9	14.8	27.7	41.5	26.3	5.9	19.0	12.4	10.9	1.1	.9	178.0
Channel loss	3.5	3.6	2.9	4.4	6.0	5.6	.7	3.4	2.1	1.9	.3	.3	34.5
Residual Flow	5.2	5.3	12.0	23.3	35.5	20.8	5.1	15.7	10.3	9.0	.7	.6	143.5
Base Inflow	4.1	3.8	4.1	3.7	3.6	3.1	2.2	1.1	1.0	2.0	3.2	4.2	36.1
River Pump Divers	.0	.1	.7	1.4	.6	.7	1.6	.8	1.5	.5	.2	.0	8.1
Residual, Artesia	9.3	9.1	15.3	25.6	38.6	23.1	5.7	16.0	9.8	10.6	3.8	4.7	171.4
Pecos Flow Artesia	19.2	16.3	26.6	29.9	44.6	32.5	9.3	8.0	20.2	7.8	6.5	6.3	227.3
Flood Inflow, AD-Art	9.9	7.3	11.3	4.3	6.0	9.4	3.6	-8.0	10.4	-2.7	2.8	1.6	55.9

B.4 DETERMINATION OF FLOOD INFLOWS, ARTESIA-CARLSBAD - 1985 (revised 6-20-88)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
Pecos R at Artesia	11.8	7.0	5.6	3.3	4.0	31.3	4.4	27.3	10.5	17.6	5.9	4.0	132.6
Major John Springs	.9	.8	.9	.7	.8	.7	.6	.6	.6	.8	.7	.8	9.0
Carlsbad Springs	-.5	-.5	-.6	-.6	-.6	-.6	-.6	-.6	-.6	-.6	-.6	-.5	-6.9
Total Inflow	12.3	7.3	5.9	3.4	4.1	31.4	4.4	27.3	10.5	17.7	6.0	4.3	134.7
Channel Losses	2.2	1.1	.8	.3	.5	6.4	.6	5.5	1.9	3.4	.9	.5	24.1
Evaporation Losses	.8	1.4	2.5	1.8	1.4	1.1	1.8	1.2	.6	.7	2.6	1.6	17.5
Change in Storage	2.8	-.4	-3.6	-10.0	-7.1	9.9	-10.2	6.4	3.5	6.7	2.1	.8	.9
Carls ID diversions	.0	1.3	6.0	14.0	10.9	10.8	14.2	12.3	5.5	4.9	.1	.0	79.9
93% CID diver	.0	1.2	5.6	13.0	10.2	10.0	13.2	11.4	5.1	4.6	.1	.0	74.3
Other depletions	.1	.1	.1	.1	.1	.1	.2	.2	.1	.1	.1	.1	1.4
Pecos R at Carlsbad	3.5	5.0	1.8	1.5	1.4	1.5	1.1	.8	1.1	1.6	1.1	1.1	21.4
Total Outflow	9.4	8.4	7.2	6.6	6.4	29.0	6.7	25.6	12.3	17.1	6.8	4.1	139.5
Flood Inflow	-2.9	1.1	1.3	3.2	2.3	-2.4	2.3	-1.8	1.8	-.6	.8	-.2	4.8

B.4 DETERMINATION OF FLOOD INFLOWS, ARTESIA-CARLSBAD - 1986

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
Pecos R at Artesia	3.7	3.9	2.6	.7	38.5	49.0	15.4	4.7	18.2	21.4	19.3	16.8	194.3
Major John Springs	.9	.8	.9	.7	.7	.7	.6	.6	.6	.7	.7	.7	8.8
Carlsbad Springs	-.7	-.7	-.7	-.7	-.7	-.8	-.8	-.8	-.7	-.7	-.7	-.7	.0
Total Inflow	3.9	4.0	2.8	.8	38.5	48.9	15.1	4.5	18.0	21.5	19.3	16.9	194.3
Channel Losses	.4	.5	.2	.0	7.9	10.2	2.9	.6	3.5	4.3	3.8	3.3	37.7
Evaporation Losses	1.7	1.5	2.7	1.7	1.3	.1	3.0	1.4	1.2	.8	.1	-.3	15.1
Change in Storage	2.1	-1.9	-5.2	-14.7	14.5	7.0	-7.4	-7.2	7.9	8.5	-10.4	-1.9	-8.7
Carls ID diversions	.0	3.3	4.5	15.5	12.4	6.0	11.2	11.4	5.2	4.8	.0	.1	74.4
93% CID diver	.0	3.1	4.2	14.4	11.5	5.6	10.4	10.6	4.8	4.5	.0	.1	69.2
Other depletions	.1	.1	.1	.1	.1	.1	.2	.2	.1	.1	.1	.1	1.4
Pecos R at Carlsbad	1.4	1.4	1.1	1.1	.7	98.5	21.2	2.2	2.1	5.1	31.4	20.8	187.0
Total Outflow	5.7	4.6	3.1	2.7	36.0	121.5	30.4	7.8	19.6	23.2	25.0	22.1	301.7
Flood Inflow	1.8	.6	.2	1.9	-2.5	72.6	15.3	3.4	1.6	1.7	5.6	5.2	107.3

B.4 DETERMINATION OF FLOOD INFLOWS, ARTESIA-CARLSBAD - 1987

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
Pecos R at Artesia	19.2	16.3	26.6	29.9	44.6	32.5	9.3	8.0	20.2	7.8	6.5	6.3	227.3
Major John Springs	1.1	1.0	1.1	.9	.9	.9	.8	.8	.8	.9	.9	.9	11.1
Carlsbad Springs	.7	.7	.7	.7	.6	.6	.6	.6	.6	.7	.7	.7	7.9
Total Inflow	21.0	18.0	28.4	31.5	46.1	34.0	10.7	9.4	21.6	9.5	8.2	8.0	246.3
Channel Losses	3.8	3.2	5.4	6.1	9.3	6.6	1.6	1.3	4.0	1.3	1.0	1.0	44.6
Evaporation Losses	.7	.7	1.8	2.1	3.0	2.7	3.8	1.1	1.8	.9	.4	.4	19.2
Change in Storage	2.8	-.2	.2	7.9	.9	-2.7	-11.8	-3.8	5.7	-4.1	4.6	4.6	4.1
Carls ID diversions	.0	.1	9.4	12.3	13.6	11.5	15.5	9.5	10.2	9.5	.0	.0	91.6
93% CID diver	.0	.1	8.7	11.4	12.6	10.7	14.4	8.8	9.5	8.8	.0	.0	85.2
Other depletions	.1	.1	.1	.1	.1	.1	.2	.2	.1	.1	.1	.1	1.4
Pecos R at Carlsbad	19.6	17.0	15.3	6.1	23.8	24.2	6.2	2.9	2.4	2.1	1.7	1.7	123.0
Total Outflow	27.0	20.8	31.5	33.7	49.7	41.6	14.4	10.6	23.5	9.2	7.8	7.7	277.5
Flood Inflow	6.0	2.8	3.1	2.2	3.6	7.6	3.8	1.2	1.9	-.3	-.4	-.3	31.2

B.5 DETERMINATION OF FLOOD INFLOWS, CARLSBAD-STATE LINE
(hydrograph scalping of flood flows)

year	1985	1986	1987
Pecos R at Red Bluff, TAF	7.1		
Pecos River at Dark Canyon	.9		
Difference	6.2		
Dark Canyon	0		
Sum, RB-PRDC+DC	6.2	61.5	5.9
Delaware River	2.2	12.1	1.5
Totals, TAF	8.4	73.6	7.4
Accepted corrections by Texas	1.3		
Accepted corrections by NM		-3.7	-.2
Final flood inflows	9.7	69.9	7.2

Computations for 1986, 1987 by USGS, see appendix
Computations for 1985 by River Master, see appendix

C.1 DEPLETIONS DUE TO IRRIGATION ABOVE ALAMOGORDO DAM (revised 6-20-88)

1985	APR	MAY	JUN	JUL	AUG	SEPT	OCT	TOTA
Precip Las Vegas	4.88	3.10	3.39	2.38	3.10	3.57	2.84	
Eff precip Las Vegas	3.78	2.67	2.88	2.12	2.66	3.01	2.49	
Precip Pecos RangerS	2.68	1.61	2.66	3.63	2.17	3.73	2.20	
Eff Precip Pecos RS	2.36	1.51	2.35	3.06	1.95	3.11	1.99	
Precip Santa Rosa	1.89	.66	2.10	2.56	1.51	1.84	3.13	
Eff Precip Santa Ro	1.74	2.54	1.91	2.26	1.41	1.71	2.70	
Average precip, ft	.22	.19	.20	.21	.17	.22	.20	
consumptive use	.19	.36	.36	.30	.27	.18	.11	1.77
CU less eff precip	0	.17	.16	.09	.10	0	0	.53

1986	APR	MAY	JUN	JUL	AUG	SEPT	OCT	
Precip Las Vegas	.39	3.28	3.83	1.79	3.11	3.53	1.85	
Eff precip Las Vegas	.38	2.80	3.20	1.67	2.68	2.99	1.71	
Precip Pecos RangerS	1.53	.40	3.89	1.86	1.54	2.04	1.72	
Eff Precip Pecos RS	1.43	.39	3.19	1.72	1.44	1.86	1.60	
Precip Santa Rosa	1.07	2.20	3.11	.47	2.60	1.06	1.96	
Eff Precip Santa Ro	1.01	1.99	2.68	.46	2.29	1.00	1.80	
Average precip, ft	.08	.14	.25	.11	.18	.16	.14	
consumptive use	.19	.36	.36	.30	.27	.18	.11	1.77
CU less eff precip	.11	.22	.11	.19	.09	.02	0	.74

1987	APR	MAY	JUN	JUL	AUG	SEPT	OCT	
Precip Las Vegas	.61	3.94	3.03	.93	7.55	2.02	.05	
Eff precip Las Vegas	.59	3.27	2.61	.88	4.10	1.82	.05	
Precip Pecos RangerS	.53	2.07	1.44	.57	3.06	.60	.40	
Eff Precip Pecos RS	.51	1.86	1.35	.55	2.62	.58	.39	
Precip Santa Rosa	.72	3.50	2.42	0	6.44	1.13	0	
Eff Precip Santa Ro	.69	2.95	2.14	0	4.10	1.07	0	
Average precip, ft	.05	.22	.17	.04	.30	.10	.01	
consumptive use	.19	.36	.36	.30	.27	.18	.11	1.77
CU less eff precip	.14	.14	.19	.26	0	.08	.10	.91

Calculation of depletions

year	acres	u-depl	depl	adjustm
1947	14600	.74	10804.	
1985	11250	.53	5975.	4829.
1986	11250	.74	8306.	2498.
1987	9057	.91	8224.	2580.

C.1.b. DEPLETIONS DUE TO SANTA ROSA RESERVOIR OPERATIONS (revised 6-19-88)

1985	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
AlagageHt													
Alacontent	35221	40106	43341	42328	42078	37495	31367	20449	9285	17318	31162	35668	
AlaArea	2227	2426	2550	2512	2502	2322	2056	1466	786	1248	2046	2246	
Alaevap	2.31	2.99	8.11	9.07	10.96	12.17	13.33	10.72	8.32	5.83	5.81	3.66	93.28
.77Evap	1.78	2.30	6.24	6.98	8.44	9.37	10.26	8.25	6.41	4.49	4.47	2.82	
AlaPrecip	1.74	.51	1.54	1.40	2.77	2.43	2.97	1.72	2.26	4.58	.30	.08	22.30
NetEvap	.04	1.79	4.70	5.58	5.67	6.94	7.29	6.53	4.15	-.09	4.17	2.74	
AlaEvaploss	.01	.36	1.00	1.17	1.18	1.34	1.25	.80	.27	-.01	.71	.51	
StRosagage													
SRcontent	24138	25076	29066	48186	86292	106399	103411	98832	92667	99451	105599	105865	
SRarea	1282	1322	1503	2221	3336	3821	3747	3634	3488	3649	3801	3807	
SRevap	3.72	5.04	9.49	7.91	9.62	10.80	11.94	10.75	9.53	5.92	5.15	3.72	93.59
.77Evap	2.86	3.88	7.31	6.09	7.41	8.32	9.19	8.28	7.34	4.56	3.97	2.86	
Lake SR precip	.18	.13	1.67	1.93	.66	1.02	1.08	1.70	1.63	3.26	.52	.03	13.81
NetEvap	2.68	3.75	5.64	4.16	6.75	7.30	8.11	6.58	5.71	1.30	3.45	2.83	
SREvaploss	.29	.41	.71	.77	1.88	2.32	2.53	1.99	1.66	.39	1.09	.90	
totalevaploss	.29	.78	1.71	1.94	3.06	3.67	3.78	2.79	1.93	.39	1.80	1.41	
sumcontents	59359	65182	72407	90514	128370	143894	134778	119281	101952	116769	136761	141533	
1947area	2700	2850	3100	3550	4600	4600	4600	4320	3810	4270	4600	4600	
1947loss	.01	.43	1.22	1.65	2.17	2.66	2.80	2.35	1.32	-.03	1.60	1.05	
current-1947	.29	.35	.49	.29	.88	1.01	.99	.44	.61	.42	.20	.36	
									annual	adjustment =		6.32	

1986	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	
AlagageHt													
Alacontent	40839	47272	49180	47813	33902	28200	36574	40106	49734	50852	58495	66780	
AlaArea	2455	2692	2759	2711	2170	1903	2284	2426	2778	2816	3063	3310	
Alaevap	4.30	3.89	8.08	11	11.66	10.33	11.54	10.55	8.67	4.78	3.18	1.52	89.50
.77Evap	3.31	3.00	6.22	8.47	8.98	7.95	8.89	8.12	6.68	3.68	2.45	1.17	
AlaPrecip	0	.92	.64	.18	1.79	3.79	.37	4.05	1.52	3.35	2.15	1.77	20.53
NetEvap	3.31	2.08	5.58	8.29	7.19	4.16	8.52	4.07	5.16	.33	.30	-.60	
AlaEvaploss	.68	.47	1.28	1.87	1.30	.66	1.62	.82	1.19	.08	.08	-.17	
StRosagage													
SRcontent	106475	106399	106514	106475	89733	95308	106399	106475	106246	106094	106666	106514	
SRarea	3822	3821	3823	3822	3419	3550	3821	3822	3817	3813	3827	3823	
SRevap	3.72	5.04	8.68	9.34	10.07	8.01	10.71	9.34	7.39	4.93	4.82	3.72	85.77
.77Evap	2.86	3.88	6.68	7.19	7.75	6.17	8.25	7.19	5.69	3.80	3.71	2.86	
Lake SR precip	.17	2.15	.19	.73	2.29	3.56	.11	2.20	1.93	2.72	3.23	1.16	20.44
NetEvap	2.69	1.73	6.49	6.46	5.46	2.61	8.14	4.99	3.76	1.08	.48	1.70	
SREvaploss	.86	.55	2.07	2.06	1.56	.77	2.59	1.59	1.20	.34	.15	.54	
totalevaploss	1.54	1.02	3.35	3.93	2.86	1.43	4.21	2.41	2.39	.42	.23	.38	
sumcontents	147314	153671	155694	154288	123635	123508	142973	146581	155980	156946	165161	173294	
1947area	4600	4600	4600	4600	4400	4400	4600	4600	4600	4600	4600	4600	
1947loss	1.27	.80	2.14	3.18	2.64	1.53	3.26	1.56	1.98	.13	.11	-.23	
current-1947	.27	.22	1.21	.75	.22	-.10	.95	.85	.41	.29	.12	.61	
										annual	adjustmen	5.81	

1987	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	
AlagageHt													
Alacontent	67111	66780	66120	62557	50291	51418	50012	48357	37263	34338	29952	35444	
AlaArea	3320	3310	3291	3186	2797	2835	2787	2730	2312	2189	1989	2236	
Alaevap	2.68	3.19	6.77	8.74	9.81	11.21	14.96	10.76	8.24	7.21	4.71	2.90	91.18
.77Evap	2.06	2.46	5.21	6.73	7.55	8.63	11.52	8.29	6.34	5.55	3.63	2.23	

AlaPrecip	.86	1.12	.27	.27	1.85	1.69	.14	3.46	1.39	.22	.40	.72	12.39
NetEvap	1.20	1.34	4.94	6.46	5.70	6.94	11.38	4.83	4.95	5.33	3.23	1.51	
AlaEvaploss	.33	.37	1.36	1.72	1.33	1.64	2.64	1.10	.95	.97	.53	.28	
StRosagage													
SRcontent	106514	106666	106666	107548	116550	115742	110653	111596	111596	111320	111557	111557	
SRarea	3823	3827	3827	3849	4059	4041	3924	3946	3946	3939	3945	3945	
SRevap	3.72	5.04	8.68	7.20	7.61	8.41	11.14	8.01	5.90	5.59	4.65	3.72	79.67
.77Evap	2.86	3.88	6.68	5.54	5.86	6.48	8.58	6.17	4.54	4.30	3.58	2.86	
Lake SR precip	.97	1.38	.66	1.20	4.74	1.95	.11	4.57	1.61	.02	.89	.78	18.88
NetEvap	1.89	2.50	6.02	4.34	1.12	4.53	8.47	1.60	2.93	4.28	2.69	2.08	
SREvaploss	.60	.80	1.92	1.39	.38	1.52	2.77	.53	.96	1.41	.88	.69	
totalevaploss	.94	1.17	3.28	3.11	1.71	3.16	5.41	1.62	1.92	2.38	1.42	.97	
sumcontents	173625	173446	172786	170105	166841	167160	160665	159953	148859	145658	141509	147001	
1947area	4600	4600	4600	4600	4600	4600	4600	4600	4600	4600	4600	4600	
1947loss	.46	.51	1.89	2.48	2.19	2.66	4.36	1.85	1.90	2.04	1.24	.58	
current-1947	.48	.65	1.38	.63	-.48	.50	1.05	-.23	.02	.34	.18	.39	
									annual	adjustment =		4.92	

ADJUSTMENT FOR EXCESS STORAGE IN SANTA ROSA RESERVOIR

	1984	1985	1986	1987
EndYear Sumner Sto	32830	38200	67444	38196
EndYear S R Sto	23150	106200	106437	111675
Sum	55980	144400	173881	149871
Sto Adjustment, AF		15100	29481	-24010
Adjustm Ex Evap, TAF		6.32	5.81	4.92
Total Adjustment,TAF		21.42	35.29	-19.09

Response to States' Objections.

This section responds to the written objections received from Texas and New Mexico. The responses are keyed to the numbering systems in each state's written submission of objections. A summary of the need for future technical discussions suggested by these objections is included at the end of this section.

NEW MEXICO'S OBJECTIONS

B. Data and computation errors

1. Value corrected

2. Programming error corrected

3. Values corrected

4. Channel loss value for April 1986 set to zero. I believe the reviewer intended this, rather than to set the value to the flow at Artesia; the River Master's Manual does not specifically require setting values to zero, but this seems to be the practice in past reports, and agreement on this point may be part of the legal history of the case. This matter should be discussed by the parties and the River Master in future technical discussions.

5. Value corrected

6. Values corrected. This oversight, leaving out the values for Carlsbad Irrigation District diversions for an entire year, made a significant difference in the final calculation of the overage.

7. Programming error corrected. Carlsbad Springs New Water calculation redone on an annual basis to respond to Texas' comment number III.B. There is computational logic in New Mexico's comment to vary the monthly distribution to equal the annual total; however, the River Master's Manual requirement for calculations rounded to 100 acre-feet and to "...distribute equally to each month of the year (page 14, item B.4.c.(j)" is in apparent opposition to this procedure. Since Texas apparently follows the same procedure, as shown in Texas' Exhibit 79, I have adopted it, subject to technical discussion for future years.

8. This refers to New Mexico's general objection to USGS' procedure in scalping hydrographs in the Carlsbad-State Line reach. New Mexico's corrections to this calculation are accepted in entirety, and their corrected copy of the calculations is enclosed in the appendix. See C.5. below also.

9. Objection accepted. The May 1985 Santa Rosa precipitation value of 2.94 inches used in the Preliminary Report was estimated by interpolation between measured values at adjacent stations at Lake Sumner and Las Vegas FAA Airport because the NOAA record was missing. Value of 0.66 inches measured at Lake Santa Rosa is judged to be a better estimate.

10. Value corrected.

11. Values corrected.

12. Value corrected.

13. Value corrected.

14. Values corrected.

15 - 20. See comment # 8 above.

21. Value corrected.

22. Values corrected.

23. Value corrected.

C. INCONSISTENCIES WITH THE RIVER MASTER'S MANUAL

1. In a letter to the River Master of April 29, 1988 Texas (V.R. Krishna Murthy) reported that the omission of the 5 PM humidity reading was a clerical error on page 17 of the River Master's Manual. I accepted that report. Because both Texas and New Mexico urge the use of the Brantley Reservoir evaporation records, I have used Texas' calculation based on USBR primary data in the preparation of the Final Report, in spite of USBR's assessment in their letter of transmittal of the data as of poor quality. See also the response to Texas' objection # IV.B.

2. Accepted, see B.7. above.

3. Accepted. Note, the River Master's Manual does not specify that the readings on the last day of the month be used.

4. Accepted, see response to Texas' objection # V.B.

5. Due to the engineering judgement required in the hydrograph scalping procedures, I discussed the procedures by phone with Ronny L. McCracken of the USGS Carlsbad Office who performs the procedures for the Pecos River Commission. I found that USGS procedures and those in the River Master's Manual will yield the same results if the same base flows and flood event durations are selected. The judgement calls are in the selection of base flows and the beginning and end of flood events. These need joint discussion between the States and the River Master. New Mexico's corrections of numerical errors on the USGS 1986 and 1987 hydrograph scalping are accepted (see B.8. above). Also, the River Master agrees with New Mexico that the base flow estimated by USGS for the period August 31 - December 31 is too low, and has revised the scalped flood inflow for the reach downward to 69.9 TAF. This implies a base flow about 15 cfs higher for the period. For information, this results in a credit to New Mexico of about one TAF in the final calculation of the overage.

6. Values have been rechecked with RBD Figure A-7-2 and in some cases revised slightly.

7. Alamogordo Reservoir contents as read from the chart to the nearest 0.1 foot have been retained. If Texas and New Mexico agree in the future that interpolation for greater precision in computation is desirable, it will be accepted. The River Master's Manual does not require this precision and the River Master does not believe it is necessary to interpolate.

8. New Mexico states that their extrapolation to determine 1947 area of Alamogordo Reservoir differs from that of the River Master but does not specify the difference. The River Master agreed anyway with Texas' objection to extrapolation in general (see Texas objection # II.B.1). If the two states do not agree on this procedure, it will be necessary to have a technical discussion about it.

9. Calculation for average depth during 1985 and 1986 to water for Well 20.26.8.1211 was hindered because little data was available. A graph is enclosed behind the last data sheet showing the procedure used by the River Master. This problem seems solved for the future with the advent of monthly sampling by USGS.

10. Due to the shortage of computational time available for the Preliminary Report, areas for Lakes McMillan and Avalon had been rapidly estimated with a programmed equation for the Preliminary Report. For the Final Report, values were read from a detailed table for Lake Avalon (based on USBR 1979 survey) and from a curve for Lake McMillan that was plotted from Table 2 of the River Master's Manual. Recalculation of the evaporation values showed that this refinement made differences of 0.3, 0.5 and 0.7 TAF for the three years.

TEXAS' OBJECTIONS

II.B.1. For accounting year 1988 the River Master accepts the 4600 acre maximum for the calculation of the 1947 condition evaporation loss of Alamogordo Reservoir. Since there may be a difference in opinion on this limitation (see New Mexico objection C.8.) this item needs discussion among the technical advisors and the River Master.

II.B.2. As confirmed by his own calculation, the River Master accepts Texas' calculation of 3.89 inches for the pan evaporation for February 1986 at Alamogordo Reservoir.

III.B.1-2. The Carlsbad Springs New Water has been recalculated using annual records, and the computational errors have been corrected.

IV.B. The River Master accepts Texas' calculation of the pan evaporation at Brantley Reservoir based on USBR primary data. See also response to New Mexico objection C.1. Measures need to be taken to insure that future data and calculations received from USBR for Brantley Reservoir are quality assured.

V.B. The storage changes for McMillan and Avalon Reservoirs have been recalculated using values from Tables 2 and 3 of the River Master's Manual. The River Master notes that these values are significantly different that those published by USGS, and the

reason for the difference should be discussed in a technical meeting.

VIB. The omission of CID diversions for 1986 has been corrected.

VII. The River Master has re-reviewed the hydrograph scalping for 1985. He accepts Texas' assertion that the November 1-5 event should be included, but cannot accept Texas' calculation for the period January - March.

Not much technical guidance is provided for hydrograph scalping calculations, especially how to distinguish operational rises from flood events, or how to judge the amount of base flows for long flood periods (see New Mexico objection C.5.). One limited discussion in in Stipulated Exhibit 8 (Report on Review of Basic Data, page 21-18) which states that:

"The base flows at Carlsbad and Angeles or Red Bluff are generally very apparent, however, they may not fluctuate in exactly the same manner due to operations of the Carlsbad Irrigation District and other water users between the gages. Because in some years the flood peaks in this section of the river are not easily distinguished from operational rises use was made of the precipitation, as plotted on the hydrographs, to help in determining whether a rise was caused from flood inflow or was due to operation. If the peak coincided or was preceded a day or so by precipitation the rise was called flood inflow. If no precipitation occurred or there was no evidence of other streams in the area showing an increase in flow the peak was considered operational."

I do not feel that the rainfall events shown for the January - March period would cause the rises counted by Texas. Note for example the period February 4 - February 19, 1985 where after showing only .01" of rain the flow at Red Bluff remains relatively constant, and even increases. In my opinion this must be operational water, not flooding.

Texas apparently uses Carlsbad rainfall in the hydrograph scalping, whereas USGS uses Carlsbad FAA Airport rainfall. It would be good to standardize the rainfall used.

For the above reasons I feel that a technical discussion is needed between the States and the River Master, perhaps with the participation of USGS. I note that USGS performs hydrograph scalping for the Pecos River Commission, and will in the future accept USGS results for annual reporting if the States agree.

Summary of Points Needing Technical Discussion for the Future

1. Whether to set negative channel loss values to zero for item B.4.e. on page 14 of the River Master's Manual.

2. In the distribution of Carlsbad Springs New Water, whether all monthly values must be zero.

3. Humidity readings at Roswell, four values should be averaged?

4. Change in storage calculations for Lakes Avalon and McMillan use storage at the end of the month?

5. Contents of Alamogordo Reservoir, is it agreeable to use 0.1 foot increments to avoid interpolation?

6. Extrapolation for the 1947 condition area of Alamogordo Reservoir prohibited, with area subject to 4600 acre limit?

7. Brantley Reservoir data is needed for the future, inflows, outflows, and bank storage as well as evaporation.

8. Why USGS published contents for Lakes Avalon and McMillan differ from Tables 2 and 3.

9. A general discussion of hydrograph scalping procedures is needed.

Technical Appendix

Computational Details and Data Listings

MAJOR JOHNSON SPRINGS NEW WATER

1985

month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
well	80.9												
Q, cfs	15.0	15.0	15.0	12.5	12.5	12.5	10.0	10.0	10.0	12.5	12.5	12.5	
acre-ft	.9	.8	.9	.7	.8	.7	.6	.6	.6	.8	.7	.8	9.02

1986

month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
well	83.0											
Q, cfs	14.6	14.6	14.6	12.1	12.1	12.1	9.6	9.6	9.6	12.1	12.1	12.1
acre-ft	.9	.8	.9	.7	.7	.7	.6	.6	.6	.7	.7	.7	8.78

1987

month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
well	62.4											
Q, cfs	17.9	17.9	17.9	15.4	15.4	15.4	12.9	12.9	12.9	15.4	15.4	15.4
acre-ft	1.1	1.0	1.1	.9	.9	.9	.8	.8	.8	.9	.9	.9	11.13

Explanation: well is the calculated average July-August-September depth to water in well number 20.26.8.1211. Q is the calculated discharge in cfs using the equations in the RMM. Acre-feet is the monthly quantity converted to acre-feet

Carlsbad Springs New Water - Annual flow calculation

	1985	1986	1987
Pecos R bel DC, cfs	29.60	290.00	170.00
Dark Canyon, cfs	.00	31.70	.20
Pecos R bel Lake Av, cfs	7.60	238.00	118.00
Depletion, cfs	2.00	2.00	2.00
CID lag seep, cfs	7.80	7.25	8.48
Return flow, cfs	1.00	1.00	1.00
Lake Av seep lag, cfs	21.75	23.03	30.45
PR seepage, cfs	3.00	3.00	3.00
Carls new water, cfs	-9.55	-11.98	10.88
Carls new wat, AF	-6914.	-8670.	7873.
Carls new wat monthly, AF	-576.	-722.	656.

EVAPORATION LOSS AT LAKES McMILLAN AND AVALON (revised 6-20-88)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
1985													
Lake McM gage	26.1	26.1	26.0	23.9	21.6	21.1	22.0	19.8	23.1	24.8	26.0	25.9	
Lake McM area	5550	5550	5450	3450	2200	1950	2390	1450	2960	4020	5400	5110	
Lake Av gage	20.3	20.5	19.1	16.7	16.6	16.2	16.2	16.2	16.7	14.2	16.4	18.9	
Lake Av area	910	928	825	660	651	601	604	595	657	201	627	816	
precipArtesia	.40	.21	.35	2.51	.36	.33	.86	.24	4.23	1.67	.06	.02	11.24
precipCarlsbad	.61	.19	.34	.69	1.70	3	.30	.74	3.10	1.84	.04	.01	12.56
lakeevap (comp)	2.10	2.70	5.07	6.63	6.98	7.00	7.87	7.89	5.44	3.89	5.18	3.28	64.02
netevapMcM	1.59	2.50	4.72	5.03	5.95	5.34	7.29	7.40	1.78	2.13	5.13	3.26	52.12
lossMcM	737.	1156.	2146.	1447.	1091.	867.	1452.	894.	438.	714.	2306.	1390.	14638.
netevapAvalon	1.49	2.51	4.73	5.94	5.28	4.00	7.57	7.15	2.34	2.05	5.14	3.27	51.46
lossAvalon	113.	194.	325.	327.	286.	200.	381.	355.	128.	34.	258.	222.	2834.
Total loss, TAF	.8	1.4	2.5	1.8	1.4	1.1	1.8	1.2	.6	.7	2.6	1.6	17.47
1986													
Lake McM gage	25.9	25.8	25.6	21.0	20.5	25.4	25.7	22.9	24.3	25.5	25.2	23.1	
Lake McM area	5150	5150	4680	1900	1700	4430	4860	2900	3690	4610	4280	3000	
Lake Av gage	19.5	17.9	17.1	16.6	17.0	18.1	19.1	16.8	17.6	18.2	20.8	20.5	
Lake Av area	856	750	696	649	683	758	831	666	726	767	950	931	
precipArtesia	.18	.76	.28	0	1.89	6.09	1.21	2.78	2.31	1.62	2.20	2.30	21.62
precipCarlsbad	.26	.56	.05	0	1.50	5.69	.56	1.10	1.75	1.82	2.51	2.32	18.12
lakeevap (comp)	3.55	3.62	6.10	8.22	8.25	6.08	7.22	6.47	5.21	3.45	2.63	1.31	62.10
netevapMcM	3.33	2.96	5.94	8.22	6.55	.19	6.34	4.53	3.18	1.73	.27	-1.00	42.23
lossMcM	1428.	1270.	2315.	1301.	928.	70.	2567.	1095.	978.	564.	97.	-250.	12463.
netevapAvalon	3.29	3.06	6.05	8.22	6.75	.39	6.66	5.37	3.46	1.63	.12	-1.01	43.98
lossAvalon	235.	191.	351.	444.	384.	25.	461.	298.	209.	104.	9.	-78.	2633.
Total loss, TAF	1.7	1.5	2.7	1.7	1.3	.1	3.0	1.4	1.2	.8	.1	-.3	15.10
1987													
Lake McM gage	22.8	22.9	22.9	23.3	24.8	25.2	23.8	19.7	22.7	21.0	22.3	22.9	
Lake McM area	2800	2840	2830	3120	4000	4320	3380	1410	2750	1890	2500	2860	
Lake Av gage	20.9	20.9	20.8	19.4	20.9	20.9	18.3	17.1	16.7	16.9	16.9	19	
Lake Av area	955	956	947	847	961	960	773	689	657	670	674	825	
precipArtesia	.17	.88	.30	.53	1.44	1.84	1.12	3.10	.77	.54	.75	1.23	12.58
precipCarlsbad	.31	.85	.35	.63	1.30	5.36	.25	3.98	1.57	.63	.45	.90	16.58
lakeevap *	2.51	2.94	6.01	6.82	8.66	10	11.48	9.73	7.69	4.86	2.09	2.21	75.00
netevapMcM	2.27	2.08	5.69	6.24	7.29	6.40	10.80	6.19	6.52	4.28	1.49	1.15	60.37
lossMcM	529.	492.	1341.	1622.	2430	2304	3041.	727.	1494.	673.	309.	273.	15235.
netevapAvalon	2.20	2.09	5.66	6.19	7.36	4.64	11.23	5.75	6.12	4.23	1.64	1.31	58.42
lossAvalon	175.	167.	447.	437.	589.	371.	723.	330.	335.	236.	92.	90.	3993.
Total loss, TAF	.7	.7	1.8	2.1	3.0	2.7	3.8	1.1	1.8	.9	.4	.4	19.23

* = Evaporation estimated with equation for Jan-Feb: Texas calc using Burec data used for Brantley for Mar-Dec

Change in storage in Lakes McMillan and Avalon (6-17-89)
Gage heights from last day of each month
Avalon December 31, 1984 GH = 19.55, Sto = 3590
McMillan December 31, 1984 GH = 25.70 (1-1-85), Sto = 20500

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
1985												
Lake Avalon gage, feet	20.60	20	16.20	18.70	16.10	15.80	16.20	15.80	17.30	12.50	18.05	19.50
Avalon storage, AF	4334	3972	1102	2879	1038	879	1102	879	1824	93	2360	3544
Avalon change storage, AF	744	-362	-2870	1777	-1841	-159	223	-223	945	-1731	2267	1184
Lake McMillan gage, feet	26.15	26.10	25.95	22.85	20.50	24.35	20.35	23.20	24.00	26.00	25.95	25.85
Lake McMillan storage, AF	22550	22550	21800	10000	4700	14800	4400	11000	13600	22000	21800	21400
McMillan change storage, AF	2050	0	-750	-11800	-5300	10100	-10400	6600	2600	8400	-200	-400
Total change storage, AF	2794	-362	-3620	-10023	-7141	9941	-10177	6377	3545	6669	2067	784
1986												
Lake Avalon gage, feet	19.45	16.55	15.10	17.25	17.20	20.80	16.90	17.55	16.10	20.75	17.40	20.90
Avalon Storage, AF	3500	1320	541	1790	1752	4334	1545	2070	1038	4334	1896	4334
Avalon change storage, AF	-44	-2180	-779	1249	-38	2582	-2789	525	-1032	3296	-2438	2438
Lake McMillan gage, feet	25.85	25.90	24.75	17.90	24.60	25.62	24.58	22.05	24.87	25.98	24.10	22.77
Lake McMillan storage, AF	21300	21600	17200	1300	15800	20200	15600	7900	16800	22000	14000	9700
McMillan change storage, AF	-100	300	-4400	-15900	14500	4400	-4600	-7700	8900	5200	-8000	-4300
Total change storage, AF	2094	-1880	-5179	-14651	14462	6982	-7389	-7175	7868	8496	-10438	-1862
1987												
Lake Avalon gage, feet	20.90	21.00	20.80	20.90	21.00	20.65	17.20	16.50	16.80	15.40	17.75	19.70
Avalon Storage, AF	4334	4334	4334	4334	4334	4334	1752	1292	1481	686	2145	3715
Avalon change storage, AF	0	0	0	0	0	0	-2582	-460	189	-795	1459	1570
Lake McMillan gage, feet	22.85	22.80	22.87	25.13	25.34	24.63	21.62	19.79	22.54	21.10	22.51	23.48
Lake McMillan storage, AF	10000	9800	10000	17900	18800	16100	6900	3600	9100	5800	8900	11900
McMillan change storage, AF	300	-200	200	7900	900	-2700	-9200	-3300	5500	-3300	3100	3000
Total change storage, AF	2794	-200	200	7900	900	-2700	-11782	-3760	5689	-4095	4559	4570

CHECK

Sum change sto Av	125
Change last/first	125
Sum change sto McM	-8600
Change last/first	-8600

HYDROGRAPH SCALPING FOR CARLSBAD-STATE LINE

1985 (By River MASTER)

day	PRRB	base	diff	PRbDC	base	diff
427	39	35	4	29	23	6
428	70	35	35	42	23	19
429	46	35	11	21	23	-2
430	39	35	4	23	23	0
431	40	35	5	23	23	0
516	41	26	15	69	18	51
517	36	26	10	25	18	7
518	45	26	19	20	18	2
519	94	26	68	24	18	6
520	74	26	48	24	18	6
521	66	26	40	18	18	0
522	64	26	38			
914	68	70	-2	34	17	17
915	95	70	25	19	17	2
916	169	70	99	17	17	0
917	127	70	57	18	17	1
918	88	70	18	21	17	4
919	762	70	692	38	17	21
920	771	70	701	20	17	3
921	554	70	484	20	17	3
922	275	70	205	18	17	1
923	180	70	110	16	17	-1
924	119	70	49	17	17	0
925	90	70	20	17	17	0
926	79	70	9	16	17	-1
927	74	70	4	18	17	1
1016	80	70	10	20	16	4
1017	127	70	57	33	16	17
1018	153	70	83	19	16	3
1019	136	70	66	19	16	3
1020	136	70	66	20	16	4
1021	126	70	56	19	16	3
1022	143	70	73	19	16	3
1023	128	70	58	208	16	192
1024	108	70	38	68	16	52
1025	181	70	111	20	16	4
1026	186	70	116	19	16	3
1027	123	70	53	19	16	3
1028	97	70	27	19	16	3
			3582			440

difference in cfs-days = 3142 (RB - PRbDC)
thousand acre-feet = 6.2 *
No Dark Canyon runoff in 1985
**from other calculations the flood runoff from Delaware River is 2.2 thousand af.
Thus the total from both sources is 8.4 TAF
* Accept Texas November 1-5 data →
Not accept Texas January-March → A-5

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RESULTS

	RIVER MASTER	TEXAS
PRRB-PR bDC	6232	8329
DELAWARE	2192	2275
	8424	10604
JAN-MARCH		(916)
REVISED FIGURE →		9688

HYDROGRAPH SCALPING FOR DELAWARE RIVER

1985

date	flow	base	diff
517	59	1.9	57.1
518	41	1.9	39.1
519	5.3	1.9	3.4
520	4.1	1.9	2.2
521	2.9	1.9	1
			102.8
604	20	1.3	18.7
605	124	1.3	122.7
606	7.6	1.3	6.3
607	2.8	1.3	1.5
			149.2
618	14	1.1	12.9
619	2.9	1.1	1.8
620	1.5	1.1	.4
621	1.3	1.1	.2
			15.3
626	8.2	1.1	7.1
627	3.7	1.1	2.6
628	2	1.1	.9
629	1.5	1.1	.4
630	1.2	1.1	.1
			11.1
726	101	.5	100.5
727	28	.5	27.5
728	3.4	.5	2.9
729	1.7	.5	1.2
730	1.3	.5	.8
731	.9	.5	.4
801	.8	.5	.3
			133.6

date	flow	base	diff
903	.5	1.0	-.5
904	8	1.0	7.0
905	3.3	1.0	2.3
906	1.4	1.0	.4
907	1	1.0	-.0
			9.2
916	15	3	12
917	24	3	21
918	4.9	3	1.9
919	3.3	3	.3
920	7.3	3	4.3
921	560	3	557
922	45	3	42
923	12	3	9
924	6.8	3	3.8
925	5.2	3	2.2
926	4.5	3	1.5
927	4.1	3	1.1
928	8.9	3	5.9
929	23	3	20
930	4.2	3	1.2
			683.2

Total cfs-days	1104.
Total acre-feet	2191.

TOTAL FLOOD INFLOW FOR DELAWARE RIVER AND PECOS RIVER AT RED BLUFF

1986 CALENDAR YEAR

NOTE: These hydrograph scalping procedures furnished by USGS have been annotated by adding New Mexico's corrections.

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DATE	DELAWARE	plus	RED BLUFF	=	TOTAL
January	0		0		0
February	0		0.1		0.1
March	0		0		0
April	0		0		0
May	0.2		0.1		0.3
June	5.8		42.5		48.3
July	0.4		11.1		11.5
August	0.7		~~0.8~~ 0.9		~~1.5~~ 1.6
September	1.6		2.8		4.4
October	3.3		~~3.2~~ 3.3		~~6.5~~ 6.6
November	0.1		0.1		0.2
December	0		0.8		0.8
	12.1		~~61.5~~ 61.7		~~73.6~~ 73.8

TOTAL = ~~73.6~~ 73.8, 1000 AF

Flood Inflow for Calendar Year 1986

DATE	TOTAL	BASE	DIFF.
Jan.			0
Feb.			0
Mar.			0
Apr.			o
May 30	67	1.0	66
31	33	1.0	32
			98

Total Inflow 98 cfs days or 0.2, 1000 AF

June 1	5.9	1.0	4.9
2	3.0	1.0	2.0
3	5.8	1.0	4.8
4	2.0	1.1	.9
5	1.5	1.2	.3
10	3.8	1.2	2.6
11	1.9	1.2	.7
20	55	.7	54.3
21	87	.7	86.3
22	7.3	.8	6.5
23	486	.9	485.1
24	1450	1.0	1449
25	284	1.1	282.9
26	126	1.1	124.9
27	161	1.2	159.8
28	99	1.3	97.7
29	26	1.4	24.6
30	124	1.5	122.5
			2909.8

Total Inflow 2909.8 cfs days or 5.8, 1000 AF

July 1	63	1.6	61.4
2	72	1.7	70.3
3	47	1.8	45.2
4	12	1.8	10.2
5	8.5	1.9	6.6
6	7.1	2.1	5.0
7	6.1	2.2	3.9
8	5.4	2.2	3.2
9	5.0	2.3	2.7
10	4.9	2.4	2.5
11	4.6	2.5	2.1
12	4.3	2.6	1.7
13	4.0	2.6	1.4
14	3.8	2.7	1.1

DELAWARE continuned

DATE	TOTAL	BASE	DIFF.
July 15	3.7	2.7	1.0
16	3.7	2.8	.9
17	3.5	2.9	.6
18	3.2	2.9	.3
27	3.1	2.7	.4
28	3.9	2.7	1.2
29	3.8	2.8	1.0
30	3.8	2.8	1.0
31	3.5	2.9	.6
			224.3

Total Inflow 224.3 cfs days or 0.4, 1000 AF

Aug. 1	3.3	3.0	.3
15	30	2.9	27.1
16	14	2.7	11.3
17	2.8	2.6	.2
23	3.6	1.7	1.9
24	2.3	1.6	.7
25	2.1	1.6	.5
26	2.1	1.5	.6
27	24	1.5	22.5
28	140	1.4	138.6
29	134	1.4	132.6
30	13	1.3	11.7
			348.0

Total Inflow 348.0 cfs days or 0.7, 1000 AF

Sept. 1	3.1	1.3	1.8
4	7.2	1.1	6.1
5	1.6	1.1	.5
14	297	1.0	296
15	368	1.0	367
16	41	1.0	40
17	23	1.0	22
18	2.9	1.0	1.9
19	2.2	1.0	1.2
20	1.8	1.1	.7
21	1.7	1.1	.6
22	1.6	1.1	.5
29	65	1.1	63.9
30	2.0	1.1	.9
			803.1

Total Inflow 803.1 cfs days or 1.6, 1000 AF

DELAWARE continuned

DATE	TOTAL	BASE	DIFF.
Oct. 9	25	1.4	23.6
10	1460	1.8	1458.2
11	59	2.1	56.9
12	27	2.4	24.6
13	16	2.8	13.2
14	13	3.2	9.8
15	11	3.5	7.5
16	10	3.9	6.1
17	9.7	4.2	5.5
18	9.3	4.6	4.7
19	8.9	4.9	4.0
20	8.5	5.2	3.3
21	8.3	5.5	2.8
22	11	5.9	5.1
23	8.8	6.2	2.6
24	16	6.4	9.6
25	9.9	6.6	3.3
26	7.8	6.8	1.0
27	7.8	7.2	.6
28	7.6	7.6	0
29			0
30			0
31			0
			1642.4

Total Inflow 1642.4 cfs days or 3.3, 1000 AF

Nov. 1	7.6	7.6	0
2	7.8	7.4	.4
3	28	7.3	20.7
4	46	7.2	38.8
5	15	7.1	7.9
6	8.0	7.0	1.0
7	7.2	7.2	0
			68.8

Total Inflow 68.8 cfs days or 0.1, 1000 AF

Dec. 17	6.9	6.4	.5
18	7.6	6.4	1.2
19	7.1	6.4	.7
22	11	7.4	3.6
23	12	7.8	4.2
24	11	8.2	2.8
25	9.5	8.6	.9
			13.9

Total Inflow 13.9 cfs days or 0, 1000 AF

1986 CALENDAR YEAR

Below D.C. = Pecos River blw Dark Canyon
D.C. = Dark Canyon at Carlsbad gage
Carlsbad = Below D.C. minus D.C. (equivalent to pre-1970 gage site)
Red Bluff = Pecos River at Red Bluff gage
Delaware = Delaware River nr Red Bluff, NM gage

Dark Canyon flowed for 7 days in June only.

DATE	BELOW D.C.	D.C.	CARLSBAD TOTAL	CARLSBAD BASE	CARLSBAD DIFF.	RED BLUFF TOTAL	RED BLUFF BASE	RED BLUFF DIFF.
Jan					0			0
Feb 9	26	0	26	23	3	55	50	5
10	30	0	30	23	7	56	50	6
11	27	0	27	22	5	66	50	16
12	27	0	27	22	5	64	50	14
13	28	0	28	21	7	58	50	8
14	28	0	28	21	7	66	50	16
15	29	0	29	20	9	74	50	24
16	28	0	28	20	8	66	50	16
17					0	56	50	6
					51			111
Total Inflow 60 cfs days or 0.1, 1000 AF								
Mar					0			0
Apr					0			0
May 26					0	21	19	2
27					0	26	19	7
28					0	25	19	6
29					0	27	20	7
30					0	29	20	9
31	32	0	32	13	19	78	20	58
					19			89
Total Inflow 70 cfs days or 0.1, 1000 AF								
June 1					0	67	20	47
2					0	67	20	47
3					0	65	21	44
4					0	54	22	32
5					0	49	22	27
6					0	49	22	27
7					0	50	22	28
8					0	49	23	26
9	23	0	23	13	10	55	23	32
10					0	41	23	18
11					0	37	23	14
12					0	38	23	15
13					0	37	23	14
14					0	34	24	10
15					0	30	24	6

FLOOD INFLOW CARLSBAD TO RED BLUFF, NM continined

DATE		BELOW D.C.	D.C.	TOTAL	CARLSBAD BASE	DIFF.	TOTAL	RED BLUFF BASE	DIFF.
June	16					0	29	24	5
	17					0	27	25	2
	18					0	26	26	0
	19					0	26	26	0
	20					0	96	26	70
	21	16	0	16	13	3	51	27	24
	22	26	0	26	13	13	34	28	6
	23	2680	1680	1000	14	986	412	31	381
	24	22800	8360	14440	14	14426	8320	32	8288
	25	10680	1400	9280	15	9265	28400	33	28367
	26	8520	91	8429	16	8413	10900	35	10865
	27	5560	51	5509	16	5493	8940	37	8903
	28	3340	1.9	3338	17	3321	5510	39	5471
	29	3570	.08	3570	18	3552	3740	41	3699
	30	3540	0	3540	18	3522	3970	42	3928
						48994			70396

Total Inflow 21402 cfs days or 42.5, 1000AF

JULY	1	2490	0	2490	20	2470	4070	43	4027
	2	847	0	847	21	826	2900	44	2856
	3	651	0	651	22	629	1290	46	1244
	4	1590	0	1590	23	1567	642	48	594
	5	785	0	785	24	761	1550	49	1501
	6	1390	0	1390	24	1366	847	50	797
	7	657	0	657	25	632	1270	53	1217
	8	656	0	656	26	630	842	56	786
	9	366	0	366	26	340	596	58	538
	10	93	0	93	27	66	536	59	477
	11	132	0	132	28	103	262	60	202
	12	139	0	139	30	109	226	62	164
	13	144	0	144	31	113	230	64	166
	14	138	0	138	32	106	218	65	153
	15	53	0	53	33	20	218	66	152
	16	37	0	37	34	3	207	66	141
	17	36	0	36	36	0	154	66	88
	18	36	0	36	36	0	112	67	45
	19	36	0	36	36	0	93	67	26
	20	39	0	39	36	3	84	67	17
	21	41	0	41	35	6	86	67	19
	22	38	0	38	34	4	84	67	17
	23	34	0	34	34	0	91	68	23
	24					0	92	68	24
	25						82	68	14
	26						80	68	12
	27						92	68	24
	28						83	68	15
	29						71	68	3
	30						68	68	0
						9754			15342

Total Inflow 5588 cfs days or 11.1, 1000 AF

FLOOD INFLOW CARLSBAD TO RED BLUFF, NM continued

DATE		BELOW D.C.	D.C.	TOTAL	CARLSBAD BASE	DIFF.	TOTAL	RED BLUFF BASE	DIFF.
Aug	2					0			0
	3	37	0	37	34	3			0
	4					0	73	66	7
	5						81	66	15
	6						74	65	9
	7						68	64	4
	8						63	63	0
	16						64	64	0
	17						70	62	8
	18						74	60	14
	19						81	58	23
	20						69	57	12
	21						63	54	9
	22						54	52	2
	23						49	49	0
	24						68	49	19
	25						92	49	43
	26						83	49	34
	27						96	49	47
	28						98	49	49
	29						109	49	60
	30	kft				0	105	49	56
	31	← out				3	102	49	411

716 AF

+53

464

Total Inflow ~~408~~ 464 cfs days or ~~0.8~~ 0.9, 1000 AF

Sept	1	44	0	44	34	10	107	49	58
	2	37	0	37	34	3	99	49	50
	3	36	0	36	34	2	98	49	49
	4	36	0	36	34	2	95	49	46
	5	34	0	34	34	0	90	49	41
	6					0	102	49	53
	7						109	49	60
	8						98	49	49
	9						87	49	38
	10						85	49	36
	11						93	49	44
	12						89	49	40
	13						88	49	39
	14						206	49	157
	15						117	49	68
	16						107	49	58
	17						102	49	53
	18						105	49	56
	19						98	49	49
	20	36	0	36	36	0	88	49	39
	21	37	0	37	36	1	89	49	40
	22	36	0	36	35	1	77	49	28
	23	40	0	40	34	6	72	49	23
	24	41	0	41	33	8	80	49	31
	25	37	0	37	32	5	77	49	28
	26	31	0	31	31	0	71	49	22
	27	31	0	31	31	0	68	49	19

This base flow adjusted upward by approximately 15 cfs to result in 3900. AF less scalped flood inflow for period Aug 23 – Dec 31, 1986. See New Mexico objection C5.

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FLOOD INFLOW CARLSBAD TO RED BLUFF, NM continued

DATE		BELOW D.C.	D.C.	CARLSBAD TOTAL	CARLSBAD BASE	CARLSBAD DIFF.	RED BLUFF TOTAL	RED BLUFF BASE	RED BLUFF DIFF.
Sept	28	33	0	33	31	2	105	49	56
	29	38	0	38	31	7	176	49	127
	30	38	0	38	31	7	79	49	30
						54			1487
		Total Inflow 1433 cfs days or 2.8, 1000 AF							
Oct	1	31	0	31	31	0	75	49	26
	2	31	0	31	31	0	70	49	21
	3	37	0	37	31	6	70	49	21
	4	37	0	37	31	6	77	49	28
	5	34	0	34	31	3	85	49	36
	6	31	0	31	31	0	75	49	26
	7	30	0	30	30	0	100	49	51
	8	35	0	35	30	5	86	49	37
	9	32	0	32	30	2	90	49	41
	10	38	0	38	31	7	364	49	315
	11	31	0	31	31	0	152	49	103
	12						129	49	80
	13						112	49	63
	14						104	49	55
	15						104	49	55
	16						100	49	51
	17						109	49	60
	18						100	49	51
	19						100	49	51
	20	31	0	31	31	0	133	49	84
	21	36	0	36	31	5	209	49	160
	22	32	0	32	32	0	166	49	117
	23	51	0	51	32	19	145	49	96
	24	199	0	199	32	167	124	49	75
	25	~~299~~ 229	0	~~299~~ 229	32	~~267~~ 197	121	49	72
	26	232	0	232	32	200	266	49	217
	27	255	0	255	32	223	300	49	251
	28	248	0	248	32	216	305	49	256
	29	233	0	233	32	201	318	49	269
	30	221	0	221	32	189	306	49	257
	31	205	0	205	32	173	303	49	254
						~~1689~~ 1619			3279
		Total Inflow ~~1590~~ 1660 cfs days or ~~3.2~~ 3.3, 1000AF					3279 − 1619 = 1660		
Nov	1	287	0	287	32	255	289	49	240
	2	336	0	336	32	304	317	49	268
	3	398	0	398	32	366	464	49	415
	4	393	0	393	32	361	491	49	442
	5	486	0	486	32	454	464	49	415
						1740			1780
		Total Inflow 40 cfs days or 0.1, 1000 AF							
Dec	6	347	0	347	32	315	147	49	98
	7	536	0	536	32	504	214	49	165

FLOOD INFLOW CARLSBAD TO RED BLUFF, NM continuned

DATE	BELOW D.C.	D.C.	CARLSBAD TOTAL	CARLSBAD BASE	CARLSBAD DIFF.	RED BLUFF TOTAL	RED BLUFF BASE	RED BLUFF DIFF.
Dec 8	559	0	559	32	527	551	49	502
9	554	0	554	32	522	589	49	540
10	506	0	506	32	474	593	49	544
11	450	0	450	32	418	565	49	516
12	304	0	304	32	272	529	49	480
13	340	0	340	32	308	419	49	370
14	239	0	239	32	207	408	49	359
15	151	0	151	32	119	370	49	321
16	147	0	147	32	115	293	49	244
17	210	0	210	32	178	259	49	210
18	257	0	257	32	225	291	49	242
19	322	0	322	32	290	335	49	286
20	431	0	431	32	399	365	49	316
21	479	0	479	32	447	458	49	409
22	532	0	532	32	500	553	49	504
23	504	0	504	32	472	583	49	534
24	479	0	479	32	447	542	49	493
25	471	0	471	32	439	514	49	465
					7178			7598

Total Inflow 420 cfs days or 0.8, 1000 AF

Summary of AUGUST – December 1986

	USGS (Corrected)
AUG	0.7
~~SEPT~~	2.8 TAF
OCT	3.3
NOV	0.1
DEC	0.8
	7.7 TAF

RAISE BASE BY 15 CFS FOR 131 DAYS = 3900 AF

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TOTAL FLOOD INFLOW FOR DELAWARE RIVER AND PECOS RIVER AT RED BLUFF

1987 CALENDAR YEAR

DATE	DELAWARE	plus	RED BLUFF	=	TOTAL
January	0		0		0
February	0.02		0		0.02
March	0		0		0
April	0.01		0		0.01
May	0.10		~~0.22~~ 0.82		~~0.32~~ 0.90
June	0.50		~~2.92~~ 2.13		~~3.42~~ 2.57
July	0.04		0.21		0.25
August	0.62		1.08		1.70
September	0.18		0.60		0.78
October	0		0.53		0.53
November	0		0.15		0.15
December	0		0.20		0.20
	1.47		~~5.91~~ 5.72		~~7.38~~ 7.19

TOTAL = ~~7.38,~~ 7.19 1000 AF

8408500 DELAWARE RIVER NR RED BLUFF, NM

Flood Inflow for Calendar Year 1987

DATE		TOTAL	BASE	DIFF.
Jan.				0
Feb.	16	7.9	7.9	0
	17	8.4	8.0	.4
	18	8.7	8.1	.6
	19	9.4	8.2	1.2
	20	10	8.3	1.7
	21	9.9	8.4	1.5
	22	9.7	8.4	1.3
	23	9.6	8.5	1.1
	24	9.4	8.6	.8
	25	9.4	8.7	.7
	26	9.4	8.7	.7
	27	9.3	8.8	.5
	28	9.1	8.9	.2
				10.7

Total inflow 10.7 cfs days or 0.02, 1000 AF

Mar.				0
Apr.	29	9.4	9.4	0
	30	14	9.4	4.6
				4.6

Total inflow 4.6 cfs days or 0.01, 1000 AF

May	1	9.6	9.3	.3
	2	9.2	9.2	0
	12	7.9	7.9	0
	13	8.6	7.8	.8
	14	11	7.8	3.2
	15	12	7.8	4.2
	16	8.2	7.7	.5
	17	8.1	7.7	.4
	18	7.7	7.7	0
	21	7.4	7.4	0
	22	8.9	7.2	1.7
	23	41	7.0	34
	24	7.1	6.8	.3
	25	8.9	6.6	2.3
	26	8.1	6.4	1.7
	27	6.8	6.2	.6
	28	6.0	6.0	0
	29	6.4	6.0	.4
	30	6.7	6.0	.7
	31	7.0	6.0	1.0
				52.1

Total inflow 52.1 cfs days or 0.10, 1000 AF

DATE		TOTAL	BASE	DIFF.
June	1	6.9	6.0	.9
	2	6.4	6.0	.4
	3	6.0	6.0	0
	4	9.3	6.0	3.3
	5	7.2	5.9	1.3
	6	5.9	5.9	0
	7	12	5.9	6.1
	8	39	5.9	33.1
	9	77	5.9	71.1
	10	14	5.8	8.2
	11	13	5.8	7.2
	12	13	5.8	7.2
	13	11	5.8	5.2
	14	10	5.8	4.2
	15	9.8	5.8	4.0
	16	9.3	5.7	3.6
	17	9.0	5.7	3.3
	18	8.5	5.7	2.8
	19	8.0	5.7	2.3
	20	7.3	5.7	1.6
	21	7.3	5.6	1.6
	22	7.0	5.6	1.4
	23	6.7	5.6	1.1
	24	6.7	5.6	1.1
	25	6.6	5.5	1.1
	26	44	5.5	38.5
	27	12	5.5	6.5
	28	24	5.5	18.5
	29	19	5.4	13.6
	30	9.6	5.4	4.2
				253.4

Total inflow 253.4 cfs days or 0.50, 1000 AF

July	1	8.1	5.4	2.7
	2	7.3	5.4	1.9
	3	7.1	5.4	1.7
	4	6.5	5.4	1.1
	5	6.0	5.3	.7
	6	5.7	5.3	.4
	7	5.5	5.3	.2
	8	5.2	5.2	0
	9	5.3	5.2	.1
	10	5.5	5.1	.4
	11	5.9	5.1	.8
	12	5.5	5.0	.5
	13	5.4	5.0	.4
	14	5.5	4.9	.6
	15	5.4	4.9	.5
	16	5.7	4.8	.9
	17	5.7	4.8	.9

DATE	TOTAL	BASE	DIFF.
July 18	5.6	4.7	.9
19	5.3	4.7	.6
20	5.3	4.6	.7
21	5.2	4.6	.6
22	5.2	4.6	.6
23	4.9	4.5	.4
24	4.5	4.5	0
26	4.4	4.4	0
27	4.6	4.3	.3
28	4.6	4.2	.4
29	4.6	4.2	.4
30	4.4	4.1	.3
31	4.3	4.0	.3
			19.3

Total inflow 19.3 cfs days or 0.04, 1000 AF

Aug. 1	4.1	4.0	.1
2	4.0	3.9	.1
3	3.9	3.9	0
8	3.6	3.6	0
9	4.1	3.5	.6
10	4.6	3.4	1.2
11	4.5	3.4	1.1
12	4.0	3.4	.6
13	3.7	3.4	.3
14	3.6	3.3	.3
15	3.4	3.3	.1
16	3.5	3.3	.2
17	3.4	3.3	.1
18	3.3	3.3	0
22	3.3	3.3	0
23	6.7	3.4	3.3
24	26	3.4	22.6
25	7.0	3.5	3.5
26	5.1	3.5	1.6
27	9.6	3.6	6.0
28	239	3.7	235.3
29	28	3.7	24.3
30	12	3.8	8.2
31	8.9	3.8	5.1
			314.6

Total inflow 314.6 cfs days or 0.62, 1000 AF

Sept. 1	10	3.9	6.1
2	8.9	3.9	5.0
3	7.6	4.0	3.6
4	7.8	4.0	3.8

DATE	TOTAL	BASE	DIFF.
Sept. 5	8.2	4.1	4.1
6	7.8	4.1	3.7
7	7.5	4.2	3.3
8	7.5	4.2	3.3
9	10	4.3	5.7
10	8.7	4.3	4.4
11	8.2	4.4	3.8
12	9.4	4.5	4.9
13	7.8	4.5	3.3
14	11	4.6	6.4
15	7.5	4.6	2.9
16	7.8	4.6	3.2
17	7.5	4.7	2.8
18	7.5	4.7	2.8
19	7.8	4.8	3.0
20	7.8	4.8	3.0
21	7.5	4.9	2.6
22	7.5	4.9	2.6
23	7.5	5.0	2.5
24	6.4	5.0	1.4
25	5.7	5.0	.7
26	5.6	5.1	.5
27	5.5	5.2	.3
28	5.3	5.3	0
			89.7

Total inflow 89.7 cfs days or 0.18, 1000 AF

Oct.			0
Nov.			0
Dec. 13	6.8	6.8	0
14	7.3	6.8	.5
15	7.4	6.9	.5
16	7.0	7.0	0
18	7.1	7.1	0
19	7.5	7.1	.4
20	7.7	7.2	.5
21	7.5	7.2	.3
22	7.3	7.3	0
			2.2

Total inflow 2.2 cfs or 0, 1000 AF

FLOOD INFLOWS CARLSBAD TO RED BLUFF, NM

1987 CALENDAR YEAR

Below D.C. = Pecos River blw Dark Canyon
D.C. = Dark Canyon at Carlsbad gage
Carlsbad = Below D.C. minus D.C. (equivalent to pre-1970 gage site)
Red Bluff = Pecos River at Red Bluff gage
Delaware = Delaware River nr Red Bluff, NM gage

Dark Canyon flowed for only 1 day in May.

DATE	BELOW D.C.	D.C.	CARLSBAD TOTAL	CARLSBAD BASE	CARLSBAD DIFF.	RED BLUFF TOTAL	RED BLUFF BASE	RED BLUFF DIFF.
Jan								0
Feb								0
March								0
Apr								0
May 21			299	42	257	348	89	259
22			344	42	302	341	89	252
23	509	74	435	42	393	504	89	415
24			428	42	386	542	89	453
25			419	42	377	515	89	426
26			421	43	378	522	90	432
27			448	43	405	509	90	419
28			437	43	394	776	90	686
29			451	43	408	518	90	428
30			472	43	429	499	90	409
31			496	43	453	507	90	417
					~~4482~~ 4182			4596
								-4182
								414

414
Total inflow ~~114~~ cfs days or 0.82/~~0.22~~, 1000 AF

June 1			504	43	461	523	90	433
2			523	43	480	537	90	447
3			525	43	482	533	90	443
4			500	43	457	542	90	452
5			465	43	422	555	90	465
6			458	43	415	522	90	432
7			484	43	441	516	90	426
8			513	43	470	621	90	531
9			664	43	621	901	91	810
10			464	43	421	827	91	736
11			443	43	400	595	91	504
12			426	43	383	568	91	477
13			465	43	422	552	91	461
14			482	43	439	551	91	460
15			463	44	419	569	92	477
16			455	44	411	548	92	456
17			443	44	399	523	92	431
26			262	44	218	288	92	196
27			274	44	230	354	92	262

FLOOD INFLOW CARLSBAD TO RED BLUFF, NM continued

DATE	BELOW D.C.	D.C.	CARLSBAD TOTAL	CARLSBAD BASE	CARLSBAD DIFF.	RED BLUFF TOTAL	RED BLUFF BASE	RED BLUFF DIFF.
June 28		0	293	45	248	331	93	238
29		0	228	45	183	354	93	261
30		0	177	45	132	323	93	230
					8554			~~10028~~ 9628 -8554 1074
	Total inflow ~~1474~~ 1074 cfs days or ~~2.92~~ 2.13, 1000 AF							
July 15						93	93	0
16						98	92	6
17						108	91	17
18						102	89	13
19						102	88	14
20						99	87	12
21						99	84	15
22						96	83	13
23						91	81	10
24						84	79	5
25						76	76	0
								105
	Total inflow 105 cfs days or 0.21, 1000 AF							
Aug 8						69	69	0
9			49	49	0	81	71	10
10			68	47	21	115	74	41
11			44	44	0	133	76	57
12			42	42	0	165	77	88
13			50	43	7	131	78	53
14			45	43	2	102	81	21
15			43	43	0	95	83	12
16						99	84	15
17						95	86	9
18						87	87	0
19						97	87	10
20						94	87	7
21						90	88	2
22						88	88	0
23						91	88	3
24						95	88	7
25						135	88	47
26						111	87	24
27						105	87	18
28						160	87	73
29						111	87	24
30						112	87	25
31						116	87	29
					30			575
	Total inflow 545 cfs days or 1.1, 1000 AF							
Sept 1						100	87	13
13			41	41	0	82	82	0
14			45	39	6	103	82	21

FLOOD INFLOW CARLSBAD TO RED BLUFF, NM continued

DATE	BELOW D.C.	D.C.	CARLSBAD TOTAL	CARLSBAD BASE	CARLSBAD DIFF.	RED BLUFF TOTAL	RED BLUFF BASE	RED BLUFF DIFF.
Sept 15			38	38	0	114	83	31
16			38	38	0	116	84	32
17			53	38	15	97	84	13
18			71	38	33	117	85	32
19			52	39	13	126	86	40
20			39	39	0	145	86	59
21						129	86	43
22						118	87	31
23						111	87	24
24						101	88	13
25						105	89	16
26						90	90	0
					67			368

Total inflow 301 cfs days or 0.60, 1000 AF

Oct 13			35	35	0	73	73	0
14			41	35	6	72	72	0
15			41	36	5	77	72	5
16			37	37	0	87	73	14
17						104	74	30
18						97	76	21
19						97	78	19
20						110	80	30
21						104	82	22
22						94	83	11
23						85	84	1
24						122	85	37
25						123	86	37
26						106	88	18
27						93	89	4
28						91	91	0
29						92	92	0
30						111	92	19
31						101	92	9
					11			277

Total inflow 266 cfs days or 0.53, 1000 AF

Nov 1			35	32	3	100	92	8
2			36	32	4	103	92	11
3			33	33	0	110	92	18
4						110	92	18
5						101	92	9
6						97	93	4
7						98	93	5
8						99	93	6
9						97	93	4
10						95	94	1
11						94	94	0
					7			84

Total inflow 77 cfs days or 0.15, 1000 AF

FLOOD INFLOW CARLSBAD TO RED BLUFF, NM continued

DATE	BELOW D.C.	D.C.	CARLSBAD TOTAL	CARLSBAD BASE	CARLSBAD DIFF.	RED BLUFF TOTAL	RED BLUFF BASE	RED BLUFF DIFF.
Dec 11			26	26	0	94	94	0
12			27	26	1	95	95	0
13			30	26	4	97	95	2
14			30	26	4	107	95	12
15			26	26	0	121	95	26
16						113	96	17
17			26	26	0	101	96	5
18			27	26	1	100	97	3
19			32	27	5	109	97	12
20			27	27	0	114	98	16
21						114	98	16
22						103	98	5
23						100	99	1
24						99	99	0
					15			115

Total inflow 100 cfs days or 0.20, 1000 AF

Data and Report Needs for Calculations in River Master's Manual

ALAMOGORADO RESERVOIR RELEASES AND SPILLS

USGS: Pecos River Below Sumner (Alamogordo) Dam

FLOOD INFLOWS, ALAMOGORDO RESERVOIR-ARTESIA

(USGS: Pecos River Below Sumner Dam)*
USGS: Ft Sumner Main Canal near Ft Sumner NM
USGS: Base inflow, Acme to Artesia (computation)
USGS: River pump diversions (compilation)
USGS: Pecos River Near Artesia

FLOOD INFLOWS, ARTESIA-CARLSBAD

(USGS: Pecos River Near Artesia)
<Major Johnson Springs New Water>
USGS: Depth to water surface, well 20.26.8.1211
BUREC: Brantley Reservoir inflow, outflow and bank storage
<Carlsbad Springs New Water>
USGS: Pecos River Below Dark Canyon at Carlsbad NM
USGS: Dark Canyon at Carlsbad
USGS: Pecos River Below Avalon Dam, NM
USGS: Carlsbad Main Canal at Head, Carlsbad NM
USGS: Gage height for Lake Avalon near Carlsbad NM
USGS: Gage height for Lake McMillan nr Lakewood NM
BUREC: Brantley Reservoir evaporation and precipitation
NCDC: Precip data for Carlsbad and Carlsbad FAA Airport
NCDC: Precip data for Artesia
NCDC: Humidity data for Roswell
NCDC: Temperature data for Artesia and Carlsbad
USGS: Brantley reservoir depletions (future determination)

FLOOD INFLOWS, CARLSBAD-NM STATE LINE

(USGS: Pecos River Below Dark Canyon Draw - daily hydrographs)
USGS: Pecos River at Red Bluff NM - daily hydrographs
(USGS: Dark Canyon at Carlsbad)
(NCDC: daily precipitation at Carlsbad FAA Airport)
USGS: Delaware River near Red Bluff NM - daily hydrographs

ADJUSTMENTS TO COMPUTED DEPARTURES

New Mexico: Irrigation Inventory
NCDC: precipitation at Las Vegas FAA Airport
NCDC: precipitation at Pecos Ranger Station
NCDC: precipitation at Santa Rosa

USGS: gage height for Lake Sumner nr Ft Sumner NM
USGS: gage height for Lake Santa Rosa
NM/BUREC: pan evaporation and precip at Lake Sumner
NM/CORPS: pan evaporation and precip at Lake Santa Rosa

New Mexico: Transfer of water use by NM to upper reach

New Mexico: Salvaged water

Texas: Water stored in New Mexico reservoirs

Texas: Beneficial uses of Delaware River water by Texas

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* means the data need was listed before

Data for River Master Manual Calculations. Accounting Year 1988
(Revised 6-21-88) -- * indicates changed data from Preliminary Report

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
1985													
Pecos R bel Sumner Dam, TAF	.026	.036	*3.890	5.390	4.960	40.510	6.180	35.790	4.880	2.820	.043	.028	104.553
Fort Sumner Main C, TAF	.0	.000	3.430	5.230	4.560	5.590	5.750	6.050	3.830	1.640	.054	.000	36.134
Base Acme-Artesia, TAF	3.1	2.550	2.090	1.960	1.780	1.190	1.290	1.290	1.670	2.030	2.920	2.950	24.860
Pump depl Acme-Artesia, TAF	.0	.064	.599	1.064	1.452	1.178	1.569	1.772	.404	.056	.047	.006	8.211
Pecos River nr Artesia, TAF	11.8	7.000	5.620	3.260	3.950	31.290	4.360	27.320	10.460	17.560	5.900	3.990	132.550
Well 20.26.8.1211, feet	68.070							83.200					
Pecos bel Dark Canyon, TAF	3.480	5.000	1.800	1.460	1.400	1.480	1.100	.757	1.090	1.620	1.100	1.100	21.387
Dark Canyon at Csbad, TAF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Pecos bel Lake Avalon, TAF	2.306	2.649	.000	.000	.000	.000	.000	.000	.000	.552	.000	.000	5.507
Carlsbad Main Canl, TAF	.000	1.250	6.040	13.960	10.930	10.770	14.160	12.310	5.460	4.920	.072	.001	79.873
Lake Avalon gage, feet	20.3	20.5	19.1	16.7	16.6	16.2	16.2	16.2	16.7	14.2	16.4	18.9	
Lake McMillan gage, feet	26.110	26.110	26.030	23.900	21.630	21.100	22.010	19.810	23.070	24.830	26.000	25.850	
Precip Carlsbad, inches	.610	.190	.340	.690	1.700	3.000	.300	.740	3.100	1.840	.040	.010	12.560
Precip Artesia, inches	.400	.210	.350	2.510	.360	.330	.860	.240	4.230	1.670	.060	.020	11.240
Humidity avg Roswell, %	62	59	47	43	47	52	48	49	60	64	44	47	51.833
Temp avg Art/Carl, deg F	38.600	42.600	54.700	63.900	70.600	76.500	79.200	80.600	71.700	60.100	53.200	39.800	60.958
Pecos R at Red Bluff, TAF	5.810	7.540	3.510	2.730	2.970	2.390	1.550	1.690	8.460	6.530	4.820	4.230	52.230
Delaware R nr Red B, TAF	.198	.170	.175	.148	.315	.422	.290	.042	1.500	.210	.183	.203	3.856
NM irrigation inv, acres													11250.
Precip L Vegas FAAA, inches				4.880	3.100	3.390	2.380	3.100	3.570	2.640			23.260
Precip Pecos Ranger, inches				2.680	1.610	2.660	3.630	2.170	3.730	2.200			18.680
Precip Santa Rosa, inches				1.890	.660	2.100	2.560	1.510	1.840	3.130			15.970
Precip Sumner lake, inches	1.740	.510	1.540	1.400	2.770	2.430	2.970	1.720	2.260	4.580	.300	.080	22.300
Gage ht Lake Sumner, feet	54.590	56.690	57.970	57.560	57.500	55.600	52.770	46.610	36.520	44.430	52.680	54.830	
Gage ht Lake S Rosa, feet	12.960	13.680	16.500	26.740	40.540	46.170	45.380	44.140	42.410	44.310	45.960	46.030	
PanEvap Lake Sumner, inches	2.310	2.990	8.110	9.070	10.960	12.170	13.330	10.720	8.320	5.830	5.810	3.660	93.280
PanEvap Lake S Rosa, inches	3.720	5.040	9.490	7.910	9.620	10.800	11.940	10.750	9.530	5.920	5.150	3.720	93.590
Precip Lake S Rosa, inches	.180	.130	1.670	1.930	.660	1.020	1.080	1.700	1.630	3.260	.520	.030	13.810
NM Transfer water use, TAF													0
NM salvaged water, TAF													0
Texas, water stored NM, TAF													0
Texas, use Del water, TAF													0
1986													
Pecos R bel Sumner Dam, TAF	.077	.079	5.460	6.000	57.860	5.190	6.290	4.450	4.520	8.870	1.060	5.940	105.796
Fort Sumner Main C, TAF	.000	.000	5.070	4.350	6.260	4.500	5.850	4.120	3.170	3.810	.002	.000	37.132
Base Acme-Artesia, TAF	2.770	2.280	2.280	1.490	1.480	2.020	2.090	2.090	3.035	3.689	3.689	3.997	30.910
Pump depl Acme-Artesia, TAF	.030	.007	.292	1.201	2.510	.604	.507	1.349	.345	.047	.001	.000	6.892
Pecos River nr Artesia, TAF	3.720	3.930	2.640	.748	38.450	49.000	15.350	4.680	18.170	21.430	19.300	16.840	194.258
Well 20.26.8.1211, feet	67.810							87.690			66.670	64.820	
Pecos bel Dark Canyon, TAF	1.440	1.380	1.100	1.100	.716	121.500	21.240	2.190	2.110	5.110	31.360	20.840	210.086
Dark Canyon at Csbad, TAF	.000	.000	.000	.000	.000	22.980	.000	.000	.000	.000	.000	.000	22.980
Pecos bel Lake Avalon, TAF *	.000	.000	.000	.000	.000	109.000	17.830	.000	.000	3.290	26.470	15.470	172.060
Carlsbad Main Canl, TAF	.029	3.270	4.510	15.510	12.370	6.010	11.210	11.380	5.240	4.780	.000	.107	74.416
Lake Avalon gage, feet	19.490	17.940	17.080	16.580	17.020	18.060	19.130	16.800	17.580	18.190	20.700	20.540	
Lake McMillan gage, feet	25.850	25.830	25.580	20.960	20.510	25.390	25.670	22.940	24.330	25.500	25.200	23.120	
Precip Carlsbad, inches	.260	.560	.050	0	1.500	5.690	.560	1.100	1.750	1.820	2.510	2.320	18.120
Precip Artesia, inches	.180	.760	.280	0	1.890	6.090	1.210	2.780	2.310	1.620	2.200	2.300	21.620

Humidity avg Roswell, %	50	55	38	31	36	58	52	57	62	68	65	75	53.917
Temp avg Art/Carl. deg F	44	48.400	55.800	65.300	69.700	75.500	78.500	78	72	60	47	40.200	61.200
Pecos R at Red Bluff, TAF	4.650	3.130	2.800	1.810	1.450	141.200	34.220	4.560	5.870	9.520	33.960	25.270	268.440
Delaware R nr Red B, TAF	.225	.212	.204	.129	.255	5.830	.602	.841	1.660	3.600	.551	.492	14.601
NM irrigation inv, acres													11250.
Precip L Vegas FAAA, inches				.390	3.280	3.830	1.790	3.110	3.530	1.850			17.780
Precip Pecos Ranger, inches				1.530	.400	3.890	1.860	1.540	2.040	1.720			12.980
Precip Santa Rosa, inches				1.070	2.200	3.110	.470	2.600	1.060	1.960			12.470
Precip Sumner lake, inches	0	.920	.640	.180	1.790	3.790	.370	4.050	1.520	3.350	2.150	1.770	20.530
Gage ht Lake Sumner, feet	57.000	59.460	60.160	59.710	54.030	51.180	55.220	56.660	60.400	60.760	63.390	66.040	
Gage ht Lake S Rosa, feet	46.190	46.170	46.200	46.190	41.560	43.160	46.170	46.190	46.130	46.090	46.240	46.200	
PanEvap Lake Sumner, inches	4.300	*3.890	8.080	11	11.660	10.330	11.540	10.550	8.670	4.780	3.180	1.520	87.870
PanEvap Lake S Rosa, inches	3.720	5.040	8.680	9.340	10.070	8.010	10.710	9.340	7.390	4.930	4.320	3.720	85.770
Precip Lake S Rosa, inches	.170	2.150	.190	.730	2.290	3.560	.110	2.200	1.930	2.720	3.230	1.160	20.440
NM Transfer water use, TAF													0
NM salvaged water, TAF													0
Texas, water stored NM, TAF													0
Texas, use Del water, TAF													0

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Pecos R bel Sumner Dam, TAF	7.810	8.280	15.990	31.840	43.510	29.850	9.170	22.110	14.830	13.230	.035	.046	196.701
Fort Sumner Main C, TAF	.000	.000	2.630	5.870	4.520	6.060	5.830	5.610	4.790	4.480	.091	.000	39.881
Base Acme-Artesia, TAF	4.120	3.780	4.060	3.690	3.630	3.090	2.150	1.110	1.010	2.030	3.210	4.180	36.060
Pump depl Acme-Artesia, TAF	.000	.061	.735	1.418	.552	.748	1.653	.806	1.510	.468	.169	.043	8.162
Pecos River nr Artesia, TAF	19.190	16.330	26.610	29.860	44.600	32.480	9.260	8.010	20.230	7.820	6.540	6.340	227.270
Well 20.26.8.1211, feet	63.890	63.510	62.480	62.700	61.010	59.970	60.350	65.150	61.850	62.020	62.640	62.830	
Pecos bel Dark Canyon, TAF	19.610	16.960	15.290	6.120	23.960	24.160	6.190	2.900	2.410	2.120	1.730	1.690	123.140
Dark Canyon at Csbad, TAF	0	0	0	0	.147	0	0	0	0	0	0	0	.147
Pecos bel Lake Avalon, TAF	14.570	14.140	11.560	3.550	19.720	19.200	2.790	0	0	0	0	0	85.530
Carlsbad Main Canl, TAF	.000	.111	9.400	12.330	13.550	11.520	15.490	9.500	10.150	9.470	.000	.000	91.521
Lake Avalon gage, feet	20.850	20.860	20.750	19.360	20.920	20.910	18.280	17.100	16.690	16.850	16.900	19.040	
Lake McMillan gage, feet	22.790	22.870	22.850	23.340	24.790	25.240	23.790	19.680	22.690	20.970	22.260	22.940	
Precip Carlsbad, inches	.310	.850	.350	.630	1.300	5.360	.250	3.980	1.570	.630	.450	.900	16.580
Precip Artesia, inches	.170	.880	.300	.530	1.440	1.840	1.120	3.100	.770	.540	.760	1.230	12.680
Humidity avg Roswell, %	58	60	48	45	51	56	48	59	59	52	52	57	53.750
Temp avg Art/Carl, deg F	39.900	45.900	49.300	57.300	67.700	75.300	79.100	78.800	69.400	63.300	50	39.300	59.608
Pecos R at Red Bluff, TAF	22.760	19.900	17.280	8.230	26.240	29.440	10.220	6.160	5.990	5.290	5.810	6.160	163.480
Delaware R nr Red B, TAF	.527	.487	.580	.585	.570	.844	.334	.841	.452	.344	.357	.431	6.352
NM irrigation inv, acres													*9057.
Precip L Vegas FAAA, inches				.610	3.940	3.030	.930	7.550	2.020	.050			18.130
Precip Pecos Ranger, inches				.530	2.070	1.440	.570	3.060	.600	.400			8.670
Precip Santa Rosa, inches				.720	3.500	2.420	0	6.440	1.130	0			14.210
Precip Sumner lake, inches	.860	1.120	.270	.270	1.850	1.690	.140	3.460	1.390	.220	.400	.720	12.390
Gage ht Lake Sumner, feet	66.050	65.980	65.800	64.650	60.560	60.990	60.470	59.850	55.460	54.210	52.060	54.660	
Gage ht Lake S Rosa, feet	46.200	46.240	46.240	46.470	48.750	48.550	47.270	47.510	47.510	47.440	47.500	47.500	
PanEvap Lake Sumner, inches	2.680	3.190	6.770	8.740	9.810	11.210	14.960	10.760	8.240	7.210	4.710	2.900	91.180
PanEvap Lake S Rosa, inches	3.720	5.040	8.680	7.200	7.610	8.410	11.140	8.010	5.900	5.590	4.650	3.720	79.670
Precip Lake S Rosa, inches	.970	1.380	.660	1.200	4.740	1.950	.110	4.570	1.610	.020	.890	.780	18.880
NM Transfer water use, TAF													0
NM salvaged water, TAF													0
Texas, water stored NM, TAF													0
Texas, use Del water, TAF													0

DEPTH TO WATER, FEET
60
80
90
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1985
1986
1987
1-18-85
8-26-85
1-14-86
8-19-86
11-14-86
12-15-86
1-22-87
Su '85
D̄=80.9'
Su '86
D̄=83.0'
Su 87
D̄=62.4
DEPTH TO WATER
WELL 20S 26E
08.1211