PECOS RIVER COMPACT

Report of the River Master

Water Year 1995

Accounting Year 1996

Final Report

June 20, 1996

Neil S. Grigg

River Master of the Pecos River

749 S. Lemay, #A3-330

Fort Collins, Colorado 80524

PRC-77

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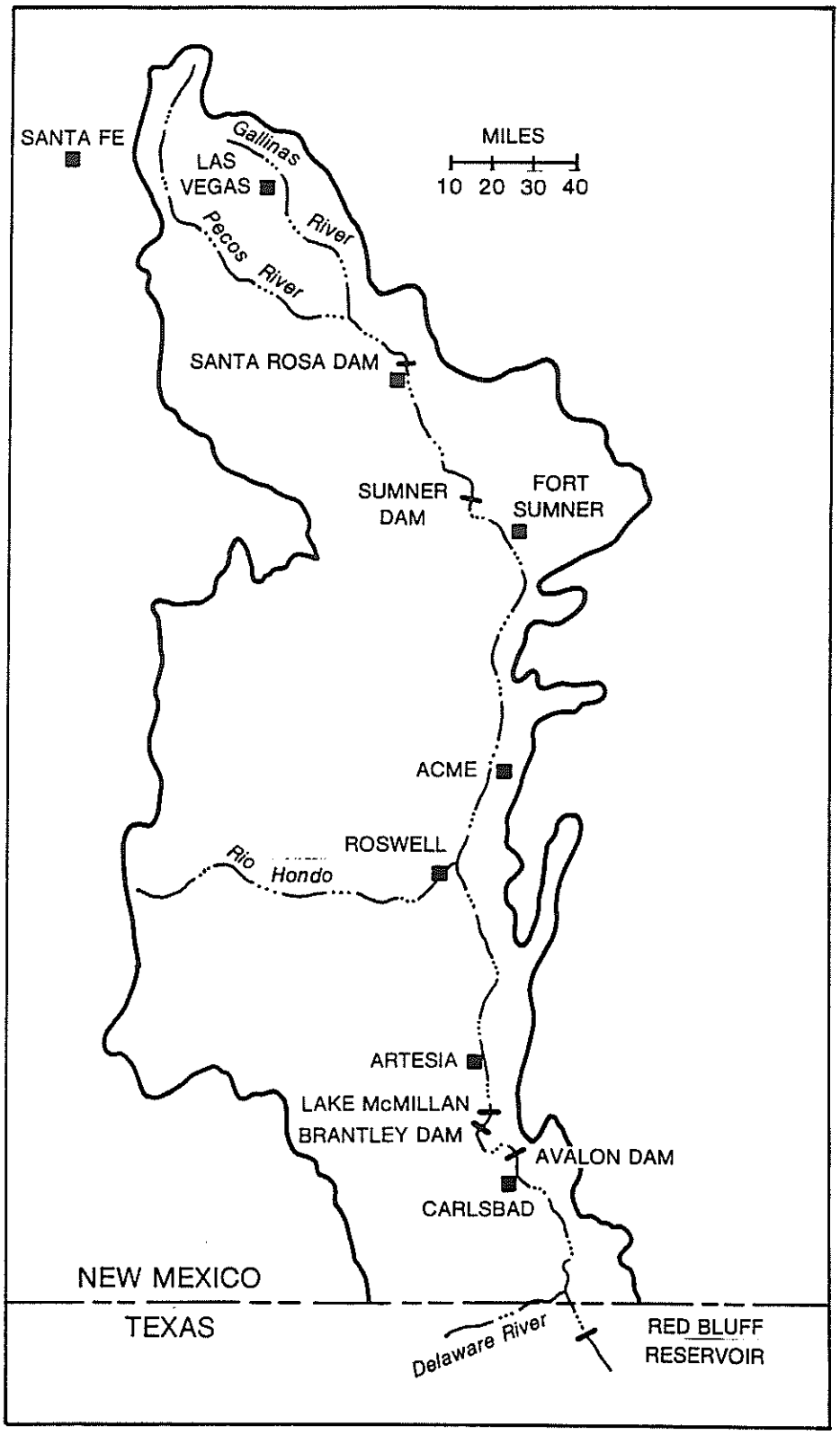
SANTA FE
LAS VEGAS
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ARTESIA
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AVALON DAM
CARLSBAD
NEW MEXICO
TEXAS
Delaware River
RED BLUFF RESERVOIR

PECOS RIVER COMPACT
Supreme Court of the United States
No. 65, Original
Amended Decree

Final Report of the River Master
Water Year 1995 - Accounting Year 1996
June 20, 1996

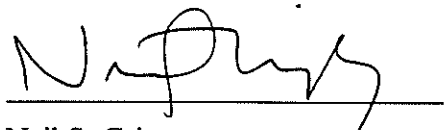
Purpose of the Report. In its Amended Decree issued March 28, 1988 the Supreme Court of the United States appointed a River Master of the Pecos River and directed him to "... Deliver to the parties a Preliminary Report setting forth the tentative results of the calculations required by Section III.B.1 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." This is the required Final Report with the determination of:

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.

Result of Calculations and Statement of Shortfall or Overage. The results of the calculations in this Final Report show that New Mexico's delivery in Water Year 1995 was a shortfall of 14,100 acre-feet. The accumulated overage since the beginning of Water Year 1987 is 20,400 acre-feet.



Neil S. Grigg
River Master of the Pecos River

Pecos River Compact

Accumulated Shortfall or Overage
20-Jun-96

Water Year	Annual Overage or Shortfall, AF	Accumulated Overage or Shortfall, AF
1987	15,400	15,400
1988	23,600	39,000
1989	2,700	41,700
1990	-14,100	27,600
1991	-16,500	11,100
1992	10,900	22,000
1993	6,600	28,600
1994	5,900	34,500
1995	-14,100	20,400

Table 1. General Calculation of Annual Departures, TAF			
6/19/96			
7:05	1993	1994	1995
B.1.a. Index Inflows			
(1) Annual flood inflow			
(a) Gaged flow Pecos R bel Alamogordo Dam	157.2	174.0	197.6
(b) Flood Inflow Alamogordo - Artesia (Table 2)	9.8	1.8	-5.1
(c) Flood Inflow Artesia - Carlsbad (Table 3)	8.6	6.2	-5.8
(d) Flood Inflow Carlsbad - State Line (Table 4)	2.9	4.3	5.1
Total (annual flood inflow)	178.5	186.3	191.8
(2) Index Inflow (3-year avg)			185.5
B.1.b. 1947 Condition Delivery Obligation			82.9
(Index Outflow)			
B.1.c. Average Historical (Gaged) Outflow			
Gaged Flow Pecos River at Red Bluff NM	66.4	66.3	69.2
Gaged Flow Delaware River nr Red Bluff NM	1.0	1.3	1.9
(1) Total Annual Historical Outflow	67.4	67.6	71.1
(2) Average Historical Outflow (3-yr average)			68.7
B.1.d. Annual Departure			-14.2
C. Adjustments to Computed Departure			
1. Adjustments for Depletions above Alam Dam			
a. Depletions Due to Irrigation (Table 5)	0.1	-3.5	-0.2
b. Depl fr Operation of Santa Rosa Reservoir (Table 6)	5.0	3.7	0.5
c. 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	162.3	174.2	197.9
(b) Flood Inflow Alamogordo - Artesia	9.8	1.8	-5.1
(c) Flood Inflow Artesia - Carlsbad	8.6	6.2	-5.8
(d) Flood Inflow Carlsbad - State Line	2.9	4.3	5.1
Total (annual flood inflow)	183.6	186.5	192.1
Recomputed Index Inflow (3-year avg)			187.4
Recomputed 1947 Condition Del Outflow			84.1
(Index Outflow)			
Recomputed Annual Departures			-15.4
Credits to New Mexico			
C.2 Depletions Due to McMillan Dike			1.3
C.3 Salvage Water Analysis			0
C.4 Unappropriated Flood Waters			0
C.5 Texas Water Stored in NM Reservoirs			0
C.6 Beneficial C.U. Delaware River Water			0
Final Calculated Departure, TAF			-14.1

Table 2. Determination of Flood Inflows, Alamogordo Dam to Artesia (B.3)													
Water Year 1995													
6/19/96													
7:01 AM													
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOT
Flow bel Alamog Dam	2.7	15.2	16.2	5.4	11.7	62.1	7.9	41.9	25.3	5.9	0.3	2.9	197.6
FtSumner Irrig Div	0.0	1.5	5.5	5.1	5.8	4.6	5.5	5.6	5.4	4.9	0.0	0.0	43.7
Ft Sumner ID Return	0.9	0.7	1.6	1.9	2.8	2.8	2.8	2.8	2.6	2.3	1.2	0.9	23.2
Flow past FS IDist	3.6	14.5	12.4	2.2	8.7	60.3	5.2	39.1	22.5	3.3	1.5	3.8	177.1
Channel loss	0.3	0.9	2.4	1.4	2.1	10.6	1.3	4.8	3.4	0.9	0.6	0.3	29.1
Residual Flow	3.3	13.5	10.0	0.9	6.6	49.7	3.8	34.3	19.1	2.4	0.8	3.5	147.9
Base Inflow	4.0	3.0	2.9	2.2	1.5	1.4	1.6	2.0	2.4	2.8	3.1	3.7	30.5
River Pump Divers	0.0	0.1	0.7	0.8	0.5	1.1	0.7	0.8	0.2	0.1	0.0	0.0	5.0
Residual, Artesia	7.3	16.5	12.2	2.2	7.6	50.0	4.7	35.5	21.3	5.1	3.9	7.2	173.4
Pecos Flow Artesia	5.2	10.5	18.3	2.9	2.7	45.0	15.7	20.4	32.2	6.1	3.9	5.3	168.3
Flood Inflow, AD-Art	-2.2	-6.0	6.1	0.7	-4.9	-4.9	11.0	-15.1	11.0	1.0	0.0	-1.8	-5.1

Table 3. Determination of Flood Inflows, Artesia to Carsbad, WY 1995 (B.4)													
4/21/96													
5:30 PM	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOT
Rio Penasco at Dayton	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fourmile Draw nr Lakew	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
South Seven Rivers nr	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Rocky Arroyo at Hwy Br	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3
Flood Inflow, Art-DS3	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.3	0.0	0.0	0.0	0.7
Pecos R at Dam Site 3	0.1	4.5	9.1	14.7	14.2	16.7	31.0	19.0	7.8	20.9	1.4	1.5	140.9
CB Sprgs New Water, T7	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-2.4
Total Inflow, DS3 - CB	-0.1	4.3	8.9	14.5	14.0	16.5	30.8	18.8	7.6	20.7	1.2	1.3	138.5
Evap Loss, Lake Avalon, T10	0.0	0.0	0.4	0.5	0.6	0.5	0.7	0.5	0.2	0.4	0.0	0.0	3.8
Storage Chg, Lake Aval, T11	0.0	2.0	-0.9	-0.1	0.4	0.2	-0.2	-0.6	0.4	-0.6	-0.6	0.0	0.0
Carls ID diversions	0.0	0.0	7.9	13.3	13.0	16.1	16.6	17.2	6.7	8.5	1.7	1.2	102.3
93% CID diver	0.0	0.0	7.4	12.4	12.1	15.0	15.4	16.0	6.2	7.9	1.6	1.1	95.1
Other depletions	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	1.4
Dark Canyon at Csbad	0	0	0	0	0	0.2	0.0	0.0	0.2	0	0	0	0.3
Pecos b Dark Canyon	2.6	1.7	0.9	0.1	0.5	0.9	9.8	0.8	0.9	9.5	2.0	2.2	31.9
Pecos R at Carlsbad	2.6	1.7	0.9	0.1	0.5	0.7	9.8	0.8	0.7	9.5	2.0	2.2	31.6
Total Outflow	2.7	3.8	7.8	13.0	13.7	16.6	25.9	16.9	7.6	17.3	3.1	3.3	131.9
Flood Inflow, DS3-CB	2.8	-0.4	-1.0	-1.5	-0.3	0.0	-4.9	-1.9	0.0	-3.3	1.9	2.1	-6.5
Flood Inflow, Art-CB	2.8	-0.4	-1.0	-1.5	-0.3	0.4	-4.9	-1.9	0.3	-3.3	1.9	2.1	-5.8

Table 4. Summary Table of Scalped Hydrographs and Delaware River Flows, Water Year 1995, (B.5.c.)

4/21/96											
5:20 PM											
	Red Bluff	Red Bluff	Below DC	Below DC	RB - BDC	RB - BDC	Dark Cany	Total	(USGS)	Delaware	Total
	cfs-days	Acre-ft	cfs-days	Acre-ft	cfs-days	Acre-ft	Acre-ft	Acre-ft	Acre-ft*	Acre-ft (USGS)	RB-BDC-Delaware
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
Jan	0	0	0	0	0	0	0	0	0	0	0
Feb	20.5	41	0	0	21	41	0	41	0	0	41
Mar	21.1	42	0	0	21	42	0	42	0	0	42
Apr	138	274	0	0	138	274	0	274	397	0	274
May	356	706	145	288	211	419	0	419	595	0	419
Jun	491	974	231	458	260	516	165	681	687	185	866
Jul	461	914	16.6	33	444	881	5	886	751	69	955
Aug	47.1	93	28.8	57	18	36	0	36	67	244	280
Sep	843	1672	96.6	192	746	1480	163	1643	1603	458	2101
Oct	0	0	0	0	0	0	0	0	111	86	86
Nov	0	0	0	0	0	0	0	0	389	0	0
Dec	27	54	9	18	18	36	0	36	0	0	36
	2404.7	4770	527	1045	1878	3724	333	4057	4600	1042	5099

Note: Explanation of columns: (a) is scalped flood inflow for Pecos River at Red Bluff in cfs-days; (b) is same in acre-feet; (c) is scalped flood inflow for Pecos River below Dark Canyon in cfs-days; (d) is same as (c) in acre-feet; (e) is difference between (a) and (c); (f) is difference between (b) and (d); (g) is Dark Canyon gaged flows; (h) is total of (f) and (g); (i) is USGS estimate of same quantities as (h), presented for comparison purposes; (j) is Delaware River flood inflows as estimated by USGS and adopted for use; and (k) is total of (h) and (j).

Table 5. Depletions Due to Irrigation Above Alamogordo Dam - WY 1995 (C.1.a)											
4/21/96											
17:18	APR	MAY	JUN	JUL	AUG	SEPT	OCT	TOTAL			
Precip Las Vegas FAA AP	1.51	1.26	3.45	3.22	3.22	2.19	0.00	14.85			
Eff prec Las Veg FAA AP	1.40	1.18	2.91	2.75	2.75	1.97	0.00	12.96			
Precip Pecos Natl Monument	0.83	1.83	0.95	2.55	2.40	1.88	0.00	10.44			
Eff Precip Pecos RS	0.80	1.67	0.91	2.24	2.13	1.72	0.00	9.47			
Precip Santa Rosa	0.78	1.87	0.98	1.55	1.88	2.28	0.21	9.55			
Eff Precip Santa Ro	0.75	1.71	0.94	1.43	1.72	2.04	0.20	8.79			
Average eff precip, ft	0.08	0.13	0.13	0.18	0.18	0.16	0.01	0.87			
Consumptive use, ft	0.19	0.36	0.36	0.30	0.27	0.18	0.11	1.77			
CU less eff precip, ft	0.11	0.23	0.23	0.12	0.09	0.02	0.10	0.90			
Acres (most recent inventory)	11761										
Streamflow depletion, AF	10618										
1947 depletion, AF	10804										
Difference, TAF	0.2										
Adjustment to Gaged Flow Pecos River below Alamogordo Dam =						-0.2					

Table 6. Depletions Due to Santa Rosa Reservoir Operations - WY 1995 - (C.1.b)													
6/18/96													
10:02													
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
Lk Sumner ga ht, avg	52.25	51.95	54.63	55.03	53.72	52.68	56.01	56.61	53.02	53.26	53.77	55.18	54.01
LS content, AF, avg	23326	22786	28011	28873	26130	24116	31060	32449	24759	25221	26230	29201	
LS area, acres, avg	1811	1788	2128	2181	2006	1866	2283	2346	1912	1944	2012	2197	2040
LS evap, inches	4.3	5.92	8.59	10.58	15.74	16.4	16.09	14.03	9.49	10.16	5.63	3.96	120.89
.77 LS Evap	3.31	4.56	6.61	8.15	12.12	12.63	12.39	10.80	7.31	7.82	4.34	3.05	93.09
LS Precip, inches	0.16	0.03	0.59	0.51	1.86	2.03	0.80	1.42	1.46	0.00	0.08	0.46	9.40
Net LS Evap, inches	3.15	4.53	6.02	7.64	10.26	10.60	11.59	9.38	5.85	7.82	4.26	2.59	83.69
LSum Evaploss, TAF	0.48	0.67	1.07	1.39	1.72	1.65	2.20	1.83	0.93	1.27	0.71	0.47	14.40
L S Rosa ga ht, avg	44.52	44.15	36.91	38.20	42.23	43.60	44.59	41.93	35.07	35.68	35.75	35.98	39.88
LSR content, AF, avg	95322	94001	70441	74338	87345	92060	95573	86335	65143	66858	67057	67716	
LSR area, acres, avg	3586	3557	2971	3072	3380	3506	3592	3356	2764	2848	2858	2889	3198
LSR evap, inches	3.72	4.98	7.75	7.45	10.05	11.15	12.01	10.44	7.35	7.12	4.75	3.76	90.53
.77 LSR Evap	2.86	3.83	5.97	5.74	7.74	8.59	9.25	8.04	5.66	5.48	3.66	2.90	69.71
LSR precip, inches	0.51	0.21	1.17	1.13	1.92	1.97	2.05	1.10	5.92	0.74	0.06	0.82	17.60
Net LSR Evap, inches	2.35	3.62	4.80	4.61	5.82	6.62	7.20	6.94	-0.26	4.74	3.60	2.08	52.11
LSR Evaploss, TAF	0.70	1.07	1.19	1.18	1.64	1.93	2.15	1.94	-0.06	1.13	0.86	0.50	14.23
Total evaploss, TAF	1.18	1.75	2.26	2.57	3.35	3.58	4.36	3.77	0.87	2.39	1.57	0.97	28.63
Sum contents, AF	118648	116787	98452	103211	113475	116176	126633	118784	89902	92079	93287	96917	
1947 area, acres	4269	4221	3757	3881	4139	4205	4505	4273	3522	3586	3619	3715	
1947 evaploss, TAF	1.12	1.59	1.89	2.47	3.54	3.71	4.35	3.34	1.72	2.34	1.28	0.80	28.15
current-1947evaploss	0.06	0.16	0.37	0.10	-0.18	-0.13	0.01	0.43	-0.84	0.06	0.29	0.17	0.48
						Annual adjustment for excess evaporation =							0.5
ADJUSTMENT FOR EXCESSIVE STORAGE IN SANTA ROSA RESERVOIR													
			1994	1994	1995	1995							
			Gage	Storage	Gage	Storage							
EndYear Sumner Sto			4251.22	21501	4255.69	30335							
EndYear S R Sto			4744.34	94677	4736.22	68411							
Sum				116178		98746							
Sto Adjustment, AF						0							
Adjustm Ex Evap, TAF						0.5							
Total Adjustment,TAF						0.5							

Table 7. Carlsbad Springs New Water WY 1995 - (B.4.c)									
4/6/96									
9:30		TAF	cfs	Totals					
Pecos R bel DC, cfs		31.9	44.1	44.1					
Dark Canyon, cfs		0.3	0.4	0.4					
Pecos R bel Lake Av,		16.9	23.3	23.3					
Depletion, cfs				2.0					
CID lag seep, cfs				9.9					
Return flow, cfs				1.0					
Lake Av lagged seep, cfs				11.3					
PR seepage, cfs				3.0					
Carls new water, cfs				-2.9					
Carls new wat, TAF				-2.1					
Carls new wat monthly, TAF				-0.2					

Table 8. Carlsbad Main Canal Seepage Lagged - WY 1995 - [B.4.c.(1)(e)]													
4/21/96													
17:05	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
CB Main	0.0	0.0	7.9	13.3	13.0	16.1	16.6	17.2	6.7	8.5	1.7	1.2	102.3
days/mo	31	28	31	30	31	30	31	31	30	31	30	31	365
cfs	0.4	0.0	128.8	223.3	211.9	271.2	269.2	280.2	112.8	138.9	28.2	18.7	140.3
cfs, qtr avg			44.5			235.2			221.9			62.3	
1994		1Q	2Q	3Q	4Q								
FLOWS, cfs				245.2	56.4								
SEVEN %				17.2	3.9								
1995		1Q	2Q	3Q	4Q								
FLOWS, cfs		44.5	235.2	221.9	62.3								
SEVEN %		3.1	16.5	15.5	4.4								
LAG		5.7	9.9	13.8	10.1	Avg =	9.9	cfs					

Table 9. Lake Avalon Leakage Lagged - WY 1995 - B.4.c.(1)(g)													
6/19/96													
7:03													
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOT
ga ht, avg	0.0	6.25	17.14	16.23	16.25	16.18	17.01	16.05	16.56	16.5	0.5	0	11.6
cfs	0.0	0.0	19.9	15.6	15.7	15.3	19.3	14.7	17.2	16.9	0.0	0.0	
days	31	28	31	30	31	30	31	31	30	31	30	31	365
cfs avg	6.9			15.5			17.1			5.7			11.3
1994		1Q	2Q	3Q	4Q								
cfs				15.9	6.4								
1995		1Q	2Q	3Q	4Q								
cfs		6.9	15.5	17.1	5.7								
lag cfs		8.2	11.1	14.9	11.1	Avg =	11.3	cfs					

Table 10. Evaporation Loss at Lake Avalon - WY 1995													
4/21/96													
17:02	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOT
Avalon ga ht, avg, ft	0.0	6.25	17.14	16.23	16.25	16.18	17.01	16.05	16.56	16.5	0.5	0	11.6
Avg area Avalon, ac.	0	0	692	602	605	595	682	575	647	642	0	0	
Panevap Brantley, in.	4.65	5.60	10	12.85	16.08	16.49	16.63	14.98	9.75	9.7	4.8	4.34	125.87
Lakeevap Brantley, in.	3.58	4.31	7.70	9.89	12.38	12.70	12.81	11.53	7.51	7.47	3.70	3.34	96.92
Precip Brantley, in.	0.27	0.29	0.08	0.06	1.41	1.96	0.66	0.85	3.39	0.07	0.00	0.23	9.27
Netevap, inches	3.31	4.02	7.62	9.83	10.97	10.74	12.15	10.68	4.12	7.40	3.70	3.11	87.65
Evaploss Av, TAF	0.0	0.0	0.4	0.5	0.6	0.5	0.7	0.5	0.2	0.4	0.0	0.0	3.8

Table 11. Change in Storage, Lake Avalon - 1995														
(Gage heights are end of month)														
4/21/96														
17:00														
	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOT
Gage EOM, ft	0	0	17.6	16.2	16.1	16.8	17.1	16.8	15.8	16.4	15.2	0	0	
Storage, AF	0	0	2031	1091	1032	1473	1677	1473	864	1214	573	0	0	
Change sto, TAF		0.0	2.0	-0.9	-0.1	0.4	0.2	-0.2	-0.6	0.4	-0.6	-0.6	0.0	0.0

Table 12. Data Required for River Master Manual Calculations, Water Year 1995													
6/19/96													
6:30 AM	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
STREAMFLOW GAGING RECORDS, TAF													
Pecos R b Sumner Dam	2.7	15.2	16.2	5.4	11.7	62.1	7.9	41.9	25.3	5.9	0.3	2.9	197.6
Fort Sumner Main C	0.0	1.5	5.5	5.1	5.8	4.6	5.5	5.6	5.4	4.9	0.0	0.0	43.7
Pecos R nr Artesia	5.2	10.5	18.3	2.9	2.7	45.0	15.7	20.4	32.2	6.1	3.9	5.3	168.3
Rio Penasco at Dayton	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fourmile Draw nr Lakewood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
South Seven Rivers nr Lkwd	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Rocky Arroyo at Hwy Br nr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3
Pecos R at Dam Site 3	0.1	4.5	9.1	14.7	14.2	16.7	31.0	19.0	7.8	20.9	1.4	1.5	140.9
Pecos bel Avalon Dam	0.0	0.0	0.0	0.0	0.0	0.0	8.7	0.0	0.0	8.2	0.0	0.0	16.9
Carlsbad Main Canal	0.0	0.0	7.9	13.3	13.0	16.1	16.6	17.2	6.7	8.5	1.7	1.2	102.3
Dark Canyon at Carlsbad	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.3
Pecos below Dark Canyon	2.6	1.7	0.9	0.1	0.5	0.9	9.8	0.8	0.9	9.5	2.0	2.2	31.9
Pecos R at Red Bluff	6.0	4.8	4.6	2.2	2.9	3.0	12.9	3.3	5.1	13.0	5.7	5.6	69.2
Delaware R nr Red Bluff	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.5	0.2	0.1	0.1	1.9
GAGE HEIGHTS													
													DEC94
Avalon gage ht, end mo	0.0	17.6	16.2	16.1	16.8	17.1	16.8	15.8	16.4	15.2	0.0	0.0	0.0
Avalon gage ht, avg	0.00	6.25	17.14	16.23	16.25	16.18	17.01	16.05	16.56	16.50	0.50	0.00	11.56
Alamogordo ga ht, end mo	52.37	51.83	55.31	54.60	53.51	53.00	58.29	53.38	53.56	52.71	54.62	55.69	52.15
Alamogordo gage ht, avg	52.25	51.95	54.63	55.03	53.72	52.68	56.01	56.61	53.02	53.26	53.77	55.18	54.0
Lake S Rosa ga ht, end mo	44.68	40.95	37.34	39.21	45.09	44.35	44.23	36.69	35.52	35.74	35.83	36.22	44.41
Lake S Rosa ga ht, avg	44.52	44.15	36.91	38.20	42.23	43.60	44.59	41.93	35.07	35.68	35.75	35.98	39.88
PRECIPITATION, INCHES													
Brantley Lake	0.27	0.29	0.08	0.06	1.41	1.96	0.66	0.85	3.39	0.07	0.00	0.23	9.27
Las Vegas FAA AP				1.51	1.26	3.45	3.22	3.22	2.19	0.00			14.85
Pecos National Monument				0.83	1.83	0.95	2.55	2.40	1.88	0.00			10.44
Santa Rosa				0.78	1.87	0.98	1.55	1.88	2.28	0.21			9.55
Lake Santa Rosa	0.51	0.21	1.17	1.13	1.92	1.97	2.05	1.10	5.92	0.74	0.06	0.82	17.60
Sumner Lake	0.16	0.03	0.59	0.51	1.86	2.03	0.80	1.42	1.46	0.00	0.08	0.46	9.40
PAN EVAPORATION, INCHES													
Lake Santa Rosa	3.72	4.98	7.75	7.45	10.05	11.15	12.01	10.44	7.35	7.12	4.75	3.76	90.53
Lake Sumner	4.30	5.92	8.59	10.58	15.74	16.40	16.09	14.03	9.49	10.16	5.63	3.96	120.89
Brantley Lake	4.65	5.60	10.00	12.85	16.08	16.49	16.63	14.98	9.75	9.70	4.80	4.34	125.87
OTHER REPORTS													
Base Acme-Artesia, TAF	4.0	3.0	2.9	2.2	1.5	1.4	1.6	2.0	2.4	2.8	3.1	3.7	30.5
Pump depl Ac-Artesia, TAF	0.0	0.1	0.7	0.8	0.5	1.1	0.7	0.8	0.2	0.1	0.0	0.0	5.0
NM irrigation inv, acres													11761
NM Transfer water use, TAF													0
NM salvaged water, TAF													0
Texas, water stored NM, TAF													0
Texas, use Del water, TAF													0

APPENDIX

RESPONSE TO STATES' OBJECTIONS

RESPONSE TO STATES' OBJECTIONS
Final Report, Accounting Year 1996

NEW MEXICO'S OBJECTIONS

1. **River Pump Diversion**. New Mexico provided reasonable evidence that the River Pump Diversion data contained in Table 2 (and Table 12) omitted pumping by the Game and Fish Department. Data used by the River Master in the Preliminary Report was furnished by USGS from their compilation of reports on pumping, and New Mexico's addition of this data is accepted. Tables 2 and 12 have been corrected.

2. **Roundoff Error**. New Mexico requested that the River Master maintain an accuracy of 1.0 acre-feet in certain computations. This issue has come up before in the States' objections. New Mexico is correct that, in the circumstance cited, maintaining that level of precision in some numbers would affect the value of Carlsbad Springs New Water. However, the River Master has sought, wherever possible, to adhere to the rule on page 2 of the River Master's Manual (footnote 2) which states: "All computations are to be performed in units of 1,000 acre-feet rounded to the nearest 100 acre-feet." I believe that the 0.1 TAF precision level pre-dates the widespread availability of computers. I have sought to maintain precision in computations by entering USGS and National Weather Service data with the significant figures that are furnished. Then, with the automatic round-off feature of the computer, the numbers can be reported to the nearest 0.1 TAF, but by copying numbers from one table to another, precision in computing is maintained. However, in the case of the Carlsbad Springs New Water on Table 7, the instructions in the RMM say: "Convert the new water in cfs, item (I), above, to units of 1000 acre-feet, and distribute equally to each month of the year." (RMM B.4.c.(1)(j), page 14). I have interpreted this instruction to mean that I should carry the results of Table 7 to Table 3 in units of 1000 acre-feet, even if it loses some of the original precision in decimal places. It seems fair to continue this practice because any deviation resulting from the round-off can go either way and, in the long run, should balance out evenly. The objection is rejected, but the states can propose a RMM modification if they would like to alter the procedure.

3. **Lake Avalon Leakage**. New Mexico's corrections have been posted in the Final Report, Table 9. No change in the final computed value for Lake Avalon Leakage was necessary.

4. **Scale to Plot Hydrographs for Scalping Flood Inflows**. The River Master would like to accept New Mexico's offer to furnish the AutoCad version of the plotted hydrographs. If these could be furnished by March 15 of each year, along with the weather data already being furnished by New Mexico, this would be an aid and cost savings in the annual accounting. The hydrographs should be furnished without the base flow estimate lines plotted so that the River Master can make an independent judgment about scalped flood inflow without being biased by New Mexico's selection of base flows. Then, both states can have an equal opportunity to object. Also, the

River Master requests that Texas concur with New Mexico furnishing the hydrographs.

5. **River Master's Comments on Flood Inflows**. No response required.

6. **Depletion due to Santa Rosa Reservoir Operations**. New Mexico found an error and objected to the 1947-condition area calculations. Texas found the same error which was caused by the River Master's leaving the Water Year 1994 values in the table by mistake. Figures of the States are nearly identical, and the final value arrived at by both states, 0.5 TAF, has been adopted in Table 6 and Table 1.

7. **Baseflow estimates for the Artesia plus River Pumping Hydrograph**. New Mexico and Texas both objected to the baseflow estimates. See the separate discussion "Baseflow Estimates" for a combined response.

8. **Final calculated departure**. (This was numbered as 10 by New Mexico, but there are no items numbered 8 and 9). New Mexico computed a final departure of -13.5 TAF. The River Master's final determination of the departure is -14.1 TAF. For details, see the Final Report.

TEXAS' OBJECTIONS

I. **Base Inflow, Acme to Artesia Reach**. New Mexico and Texas both objected to the baseflow estimates. See the separate discussion "Baseflow Estimates" for a combined response.

II. **Flood Inflow, Alamogordo Dam to Artesia Reach**. Texas recommended a value of -3.0 TAF for this computational item. The River Master's value, given in Table 2, is -5.1 TAF. This results from the reanalysis of the base inflow, Acme to Artesia Reach.

III. **Depletion for Operation of Santa Rosa Reservoir (Table 6)**. Objection accepted. See response to New Mexico objection number 6 for detailed response.

IV. **Final Calculated Departure**. Texas computed a final departure of -14.5 TAF. The River Master's final determination of the departure is -14.1 TAF. For details, see the Final Report.

COMBINED RESPONSE ON BASE INFLOW, ACME TO ARTESIA REACH

New Mexico proposed modifications that would change USGS' estimate from 33.3 to 32.9 TAF. New Mexico's changes would stem from a modification in January when Rio Hondo was contributing base inflow, and in the May-August period when New Mexico would draw the base flow line for Artesia plus pumping lower than USGS drew it. Texas' proposed modifications deal mostly with the period February-October when Texas would

draw the line lower than either New Mexico or USGS. Perhaps the clearest view of this difference is seen from the annual graph furnished by Texas as Attachment 2 (attached).

From Texas' graph you can readily see that the major difference in the estimates is that Texas has drawn the base flow line for Artesia plus pumping to be more or less tangent with the bottoms of the lowest hydrographs (see May and August, for example); and USGS and New Mexico drew them tangent to low points at some times but not others. New Mexico defended this practice in their objections and furnished a diagram from a USGS report that illustrated how hydrograph scalping doesn't always have to pass through the lowest points of a hydrograph. While I agree in principle with that point, it is apparent that the points at which the base flow lines are drawn inherently contain subjective judgments. Texas addressed the point of subjectivity by stating that both gages should be subjected to the same degree of subjectivity.

I could have made an independent analysis, but the subjectivity factor would have remained. In this case, the different philosophies of the scalping exercise are seen clearly from the attached graph prepared by Texas, and the approach I took was as follows.

For the month of January, I agree with New Mexico's contention that USGS' base flow is too high due to some base inflow from Rio Hondo, furnished by New Mexico. However, it appears that the hump generated only lasts about half the month, so I have increased USGS' estimate of base inflow by half the difference between New Mexico and USGS for that month.

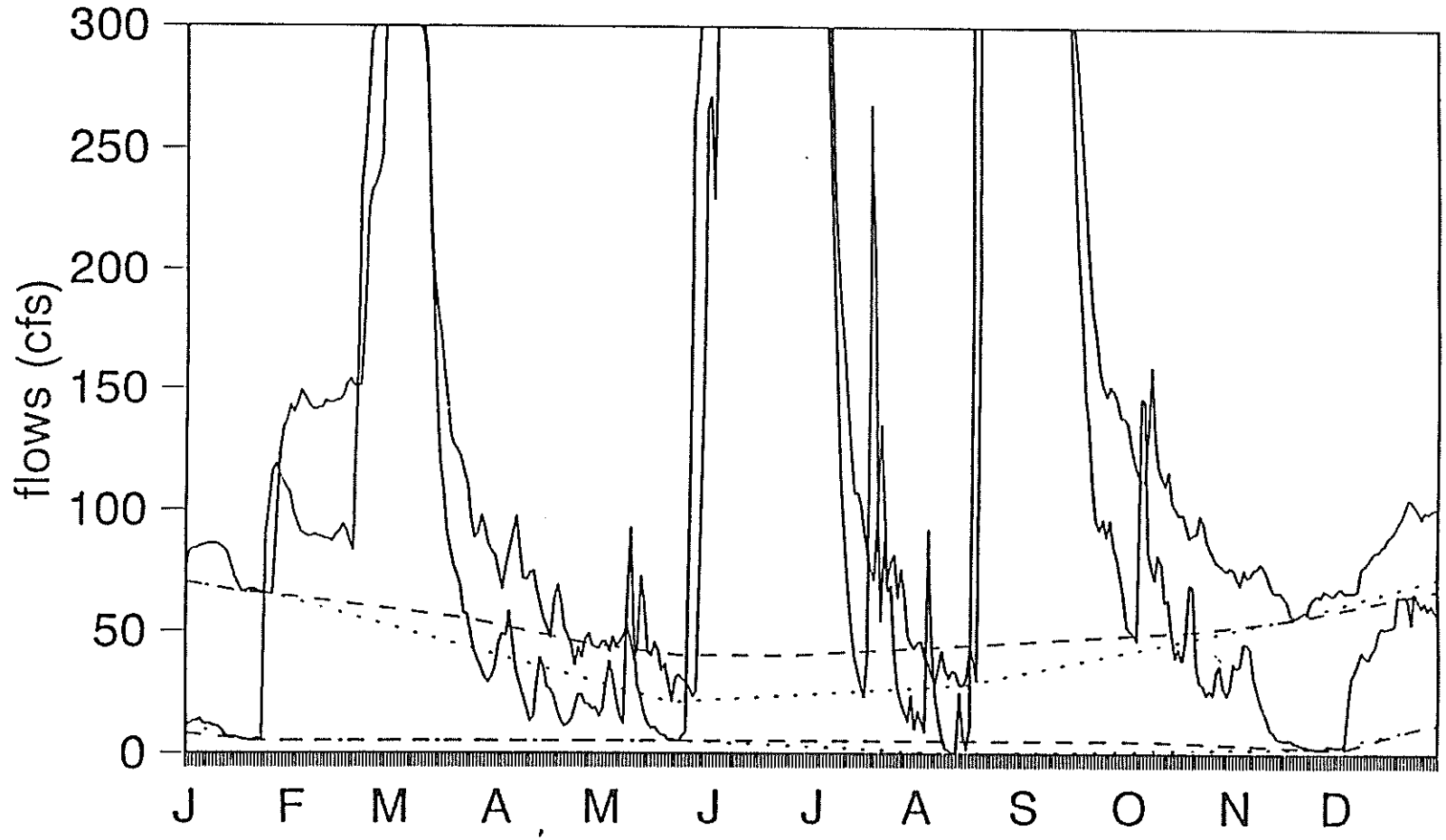
For the rest of the year, the main issue is the difference between New Mexico's philosophy of hydrograph scalping (which is close to USGS') and Texas' philosophy. The computation is driven by the position of the base flow line for Artesia plus pumping at about May 20 and August 20, and I believe that a reasonable case can be made for raising Texas' line slightly or lowering the New Mexico line slightly at these two points. Following this reasoning, I have computed the base inflow for the months of February-December as the average of the two states' values. This results in Table 1 which indicates a yearly value of 30,490 acre-feet for base inflow.

The data furnished by Texas on a floppy disk was useful in this analysis. One use, for example, was to reconcile an error in Texas' table on page 3 of their objections. The value for August should be 1762 rather than 1458 acre-feet. The total remains the same. The electronic data facilitated rapid summing to determine the source of the error.

Table 1. SUMMARY OF BASE INFLOW ESTIMATES								
Month	USGS	NM	Texas	RM				
Jan	3690	4300	3661	3995		Add half difference NM-USGS to USGS value		
Feb	3170	3170	2916	3043		Split between NM-TX value		
Mar	3200	3200	2531	2866		Split between NM-TX value		
Apr	2560	2560	1752	2156		Split between NM-TX value		
May	2210	1910	1146	1528		Split between NM-TX value		
Jun	2080	1670	1152	1411		Split between NM-TX value		
Jul	2210	1720	1458	1589		Split between NM-TX value		
Aug	2400	2150	1762	1956		Split between NM-TX value		
Sep	2560	2560	2168	2364		Split between NM-TX value		
Oct	2830	2830	2747	2789		Split between NM-TX value		
Nov	3030	3030	3154	3092		Split between NM-TX value		
Dec	3380	3810	3593	3702		Split between NM-TX value		
	33320	32910	28040	30490				

1995 Base Flow Seperation Analysis

Texas and USGS techniques



— acme sf — artesia pp sf ··· tx acme bf

··· texas artesia pp bf – – usgs acme bf – – usgs artesia pp bf