PECOS RIVER COMPACT

Report of the River Master
Water Year 1993
Accounting Year 1994

Final Report

June 20, 1994

Neil S. Grigg
River Master of the Pecos River
1009 S. Lemay, #103
Ft Collins, Colorado 80524

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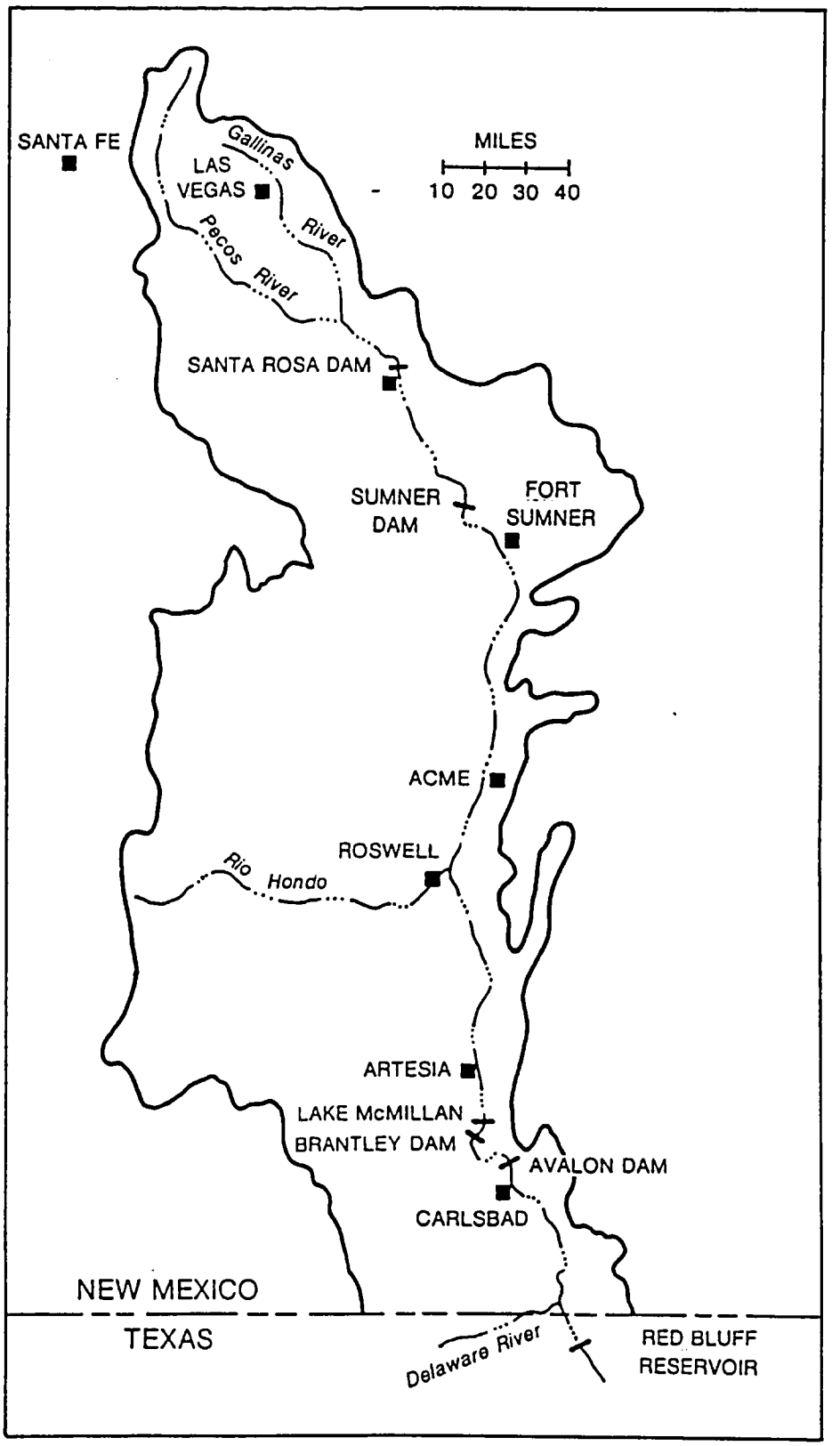

SANTA FE
LAS VEGAS
Gallinas River
Pecos River
MILES
10 20 30 40
SANTA ROSA DAM
SUMNER DAM
FORT SUMNER
ACME
ROSWELL
Rio Hondo
ARTESIA
LAKE McMILLAN
BRANTLEY DAM
AVALON DAM
CARLSBAD
NEW MEXICO
TEXAS
Delaware River
RED BLUFF RESERVOIR

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

Preliminary Report of the River Master
Water Year 1993 - Accounting Year 1994
June 20, 1994

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 1993 was an overage 6,600 acre-feet. The accumulated overage since the beginning of Water Year 1987 is 28,600 acre-feet.

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

Neil S. Grigg
River Master of the Pecos River

Table 1. General Calculation of Annual Departures, Thousand Acre-Feet
(6-18-94)

	1991	1992	1993
B.1.a. Index Inflows			
(1) Annual flood inflow			
(a) Gaged flow Pecos R bel Alamogordo Dam	122.7	143.9	157.2
(b) Flood Inflow Alamogordo - Artesia	87.3	39.1	9.8
(c) Flood Inflow Artesia - Carlsbad	13.1	8.3	8.6
(d) Flood Inflow Carlsbad - State Line	8.5	7.4	2.9
Total (annual flood inflow)	231.6	198.7	178.5
(2) Index Inflow (3-year avg)			202.9
B.1.b. 1947 Condition Delivery Obligation (Index Outflow)			94.2
B.1.c. Average Historical (Gaged) Outflow			
Gaged Flow Pecos River at Red Bluff NM	107.3	121.6	66.4
Gaged Flow Delaware River nr Red Bluff NM	3.5	3.7	1.0
(1) Total Annual Historical Outflow	110.8	125.3	67.4
(2) Average Historical Outflow (3-yr average)			101.2
B.1.d. Annual Departure			7.0
C. Adjustments to Computed Departure			
1. Adjustments for Depletions above Alam Dam			
a. Depletions Due to Irrigation	-4.4	-2.4	.1
b. Depl fr Operation of Santa Rosa Reservoir	23.3	-13.4	5.0
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	141.6	128.1	162.3
(b) Flood Inflow Alamogordo - Artesia	87.3	39.1	9.8
(c) Flood Inflow Artesia - Carlsbad	13.1	8.3	8.6
(d) Flood Inflow Carlsbad - State Line	8.5	7.4	2.9
Total (annual flood inflow)	250.5	182.9	183.6
Recomputed Index Inflow (3-year avg)			205.7
Recomputed 1947 Condition Del Outflow (Index Outflow)			96.0
Recomputed Annual Departures			5.2
Credits to New Mexico			
C.2 Depletions Due to McMillan Dike			1.4
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			6.6

* Note that as a result of the Third Motion Modification Determination, values for FIF, Artesia to Carlsbad, were adjusted for Water Years 1990, 1991, beginning with AY 1993.

Table 2. Determination of Flood Inflows, Alamogordo Dam to Artesia - 1993 (B.3)
(6-17-94)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
Flow bel Alamog Dam	.0	.0	4.8	32.8	15.0	18.1	45.3	7.5	9.2	24.3	.1	.0	157.2
FtSumner Irrig Div	.0	.0	4.1	4.8	6.1	5.7	4.7	5.4	4.9	5.4	.1	.0	41.1
Ft Sumner ID Return	.9	.7	1.5	1.7	2.6	2.6	2.6	2.6	2.4	2.2	1.1	.9	21.8
Flow past FS IDist	.9	.7	2.2	29.8	11.6	15.0	43.2	4.8	6.7	21.0	1.1	.9	137.9
Channel loss	.1	.1	.6	4.6	2.5	3.2	6.6	1.8	1.4	3.2	.6	.1	24.8
Residual Flow	.7	.5	1.6	25.2	9.1	11.8	36.7	3.0	5.4	17.9	.5	.8	113.1
Base Inflow	5.8	5.0	3.1	2.1	3.3	3.2	2.2	2.3	1.0	2.6	3.1	3.7	37.5
River Pump Divers	.0	.0	.2	.9	.7	1.4	1.2	1.0	.4	.2	.0	.0	6.0
Residual, Artesia	6.5	5.5	4.6	26.4	11.7	13.6	37.7	4.4	5.9	20.3	3.6	4.4	144.5
Pecos Flow Artesia	7.8	5.6	4.2	26.2	8.4	9.7	39.0	12.6	7.0	22.2	6.1	5.5	154.3
Flood Inflow, AD-Art	1.4	.1	-.3	-.2	-3.3	-3.9	1.4	8.2	1.1	1.9	2.5	1.1	9.8

Table 3. Determination of Flood Inflows, Artesia to Carlsbad - 1994 (B.4)
(6-17-94)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
Rio Penasco at Dayton	.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
South Seven Rivers nr Lk	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Rocky Arroyo at Hwy Br	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Flood Inflow, Art-DS3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Pecos R at Dam Site 3	1.2	1.1	6.7	13.3	13.8	15.8	24.0	18.1	11.7	16.8	1.3	2.1	125.8
Clsbd Sprgs New Water	-.4	-.4	-.4	-.4	-.4	-.4	-.4	-.4	-.4	-.4	-.4	-.4	-4.9
Total Inflow, DS3 - CB	.8	.7	6.3	12.9	13.4	15.3	23.6	17.7	11.2	16.4	.9	1.7	120.9
Evap Loss, Lake Avalon	.1	.2	.4	.4	.5	.6	.6	.4	.4	.2	.1	.2	4.0
Storage Chg, Lake Aval	.5	-.8	-.6	.2	-.1	-.1	.1	.4	-.4	-.6	.7	.1	-.5
Carls ID diversions	.0	1.1	6.7	13.0	12.8	15.0	13.1	16.2	11.4	8.6	.0	.0	97.8
93% CID diver	.0	1.1	6.2	12.1	11.9	14.0	12.1	15.0	10.6	8.0	.0	.0	91.0
Other depletions	.1	.1	.1	.1	.1	.1	.2	.2	.1	.1	.1	.1	1.4
Dark Canyon at Csbad	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Pecos b Dark Canyon	3.0	2.0	.6	1.1	1.1	1.1	9.2	1.1	1.0	10.3	1.3	1.8	33.6
Pecos R at Carlsbad	3.0	2.0	.6	1.1	1.1	1.1	9.2	1.1	1.0	10.3	1.3	1.8	33.6
Total Outflow	3.7	2.6	6.7	13.9	13.5	15.6	22.2	17.2	11.6	18.0	2.2	2.2	129.5
Flood Inflow, DS3-CB	2.9	1.9	.4	1.0	.1	.3	-1.4	-.5	.4	1.6	1.3	.5	8.6
Flood Inflow, Art-CB	2.9	1.9	.4	1.0	.1	.3	-1.4	-.5	.4	1.6	1.3	.5	8.6

Table 4. Determination of Flood Inflows, Carlsbad to State Line (B.5)
(6-17-94)

Carlsbad to Red Bluff	2.6 TAF
Delaware River	.3
Flood Inflows, TAF	2.9 TAF

Table 5. Depletions Due to Irrigation Above Alamogordo Dam - 1993
(6-18-94)

	APR	MAY	JUN	JUL	AUG	SEPT	OCT	TOTAL
Precip Las Vegas FAA AP	.43	2.16	1.11	5.15	6.05	1.14	.37	16.41
Eff prec Las Veg FAA AP	.41	1.94	1.05	3.85	4.06	1.08	.36	12.75
Precip Pecos Ranger Sta	.00	1.20	1.50	2.87	6.92	.10	.90	13.49
Eff Precip Pecos RS	.00	1.13	1.39	2.49	4.10	.10	.86	10.07
Precip Santa Rosa	.08	.92	3.00	2.06	2.74	.49	.09	9.38
Eff Precip Santa Ro	.08	.88	2.59	1.87	2.39	.47	.09	8.37
Average eff precip, ft	.01	.11	.14	.23	.29	.05	.04	.87
consumptive use, ft	.19	.36	.36	.30	.27	.18	.11	1.77
CU less eff precip, ft	.18	.25	.22	.07	.00	.13	.07	.93
Acres (most recent inventory)		11761.						
Streamflow depletion, AF		10899.						
1947 depletion, AF		10804.						
Difference, TAF		-.1						

Table 6. Depletions Due to Santa Rosa Reservoir Operations - 1993
(June 15, 1994)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
Lk Sumner ga ht, avg	53.71	55.84	56.55	56.72	57.27	60.05	58.74	57.13	58.35	50.63	47.88	50.88	
LS content, AF, avg	26110	30673	32308	32708	34020	41139	37684	33683	36690	20493	16169	20917	
LS area, acres, avg	2004	2266	2340	2359	2415	2707	2569	2401	2528	1687	1451	1706	
LS evap, inches	2.42	3.77	8.35	11.44	12.26	16.12	15.43	12.23	10.24	7.69	3.87	4.74	108.56
.77 LS Evap	1.86	2.90	6.43	8.81	9.44	12.41	11.88	9.42	7.88	5.92	2.98	3.65	83.59
LS Precip, inches	.81	.35	1.05	.01	1.12	1.98	2.98	2.33	1.19	.54	.56	.00	12.92
Net LS Evap, inches	1.05	2.55	5.38	8.80	8.32	10.43	8.90	7.09	6.69	5.38	2.42	3.65	70.67
LSum Evaploss, TAF	.18	.48	1.05	1.73	1.67	2.35	1.91	1.42	1.41	.76	.29	.52	13.77
L S Rosa ga ht, avg	43.56	43.88	44.74	42.25	41.53	44.89	42.54	44.02	44.52	44.08	44.13	44.33	
LSR content, AF, avg	91920	93044	96115	87413	84998	96657	88397	93540	95322	93753	93930	94642	
LSR area, acres, avg	3502	3533	3605	3382	3324	3618	3406	3546	3586	3551	3555	3571	
LSR evap, inches	3.72	5.04	8.68	9.12	9.72	11.66	12.27	9.40	8.51	6.53	4.48	3.72	92.85
.77 LSR Evap	2.86	3.88	6.68	7.02	7.48	8.98	9.45	7.24	6.55	5.03	3.45	2.86	71.49
LSR precip, inches	.95	.64	1.95	.07	.64	1.34	2.64	1.71	1.43	.28	.77	.06	12.48
Net LSR Evap, inches	1.91	3.24	4.73	6.95	6.84	7.64	6.81	5.53	5.12	4.75	2.68	2.80	59.01
LSR Evaploss, TAF	.56	.95	1.42	1.96	1.90	2.30	1.93	1.63	1.53	1.41	.79	.83	17.22
Total evaploss, TAF	.73	1.44	2.47	3.69	3.57	4.66	3.84	3.05	2.94	2.16	1.09	1.35	30.99
Sum contents, AF	118030	123717	128423	120121	119018	137796	126081	127223	132012	114246	110099	115559	
1947 area, acres	4390	4400	4580	4310	4280	4600	4490	4520	4600	4180	4050	4190	
1947 evaploss, TAF	.39	.94	2.05	3.16	2.97	4.00	3.33	2.67	2.57	1.87	.82	1.27	26.03
current-1947evaploss	.35	.50	.42	.53	.60	.66	.51	.38	.37	.29	.27	.08	4.96
							Annual adjustment for excess evaporation				=		5.0

ADJUSTMENT FOR EXCESS STORAGE IN SANTA ROSA RESERVOIR

	1992	1993
EndYear Sumner Sto	23727	23150
EndYear S R Sto	91291	95000
Sum	115018	118150
Sto Adjustment, AF		0
Adjustm Ex Evap, TAF		5.0
Total Adjustment,TAF		5.0

Table 7. Carlsbad Springs New Water 1993
(6-17-94)

	TAF	cfs	Totals
Pecos R bel DC, cfs	33.6	46.4	46.4
Dark Canyon, cfs	0	0	0
Pecos R bel Lake Av, cfs	18.0	24.9	24.9
Depletion, cfs			2.0
CID lag seep, cfs			9.6
Return flow, cfs			1.0
Lake Av lagged seep, cfs			16.7
PR seepage, cfs			3.0
Carls new water, cfs			-6.7
Carls new wat, TAF			-4.9
Carls new wat monthly, TAF		723.8	-.4

Table 8. Carlsbad Main Canal Seepage lagged [B.4.c.(1)(e)] - 1993
(4-16-94)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTA
CB Main Canl, TAF	.0	1.1	6.7	13.0	12.8	15.0	13.1	16.2	11.4	8.6	.0	.0	97.8
days in month	31	28	31	30	31	30	31	31	30	31	30	31	365
cfs	.0	20.4	108.3	218.0	208.4	252.5	212.3	262.9	191.8	140.2	.0	.0	134.6
cfs, qtr avg	43.6			226.1			222.7			47.2			134.9

1992	1Q	2Q	3Q	4Q
FLOWS, cfs			242.4	58.3
SEVEN %			17.0	4.1
1993	1Q	2Q	3Q	4Q
FLOWS, cfs	43.6	226.1	222.7	47.2
SEVEN %	3.1	15.8	15.6	3.3
LAG	5.7	9.6	13.6	9.5 Avg = 9.6 cfs

Table 9. Lake Avalon leakage lagged [B.4.c.(1)(g)] - 1993
(revised 6-16-94)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOT
ga ht, avg	17.65	17.59	16.69	16.11	15.95	15.90	16.47	16.37	16.37	15.70	15.50	16.13	16.4
cfs	22.4	22.1	17.8	15.0	14.2	14.0	16.7	16.2	16.2	13.0	12.1	15.1	
days	31	28	31	30	31	30	31	31	30	31	30	31	365
cfs avg	20.7			14.4			16.4			13.4			16.2
ga ht avg, qtr	17.3			16.0			16.4			15.8			
cfs avg (check)	20.7			14.4			16.4			13.4			16.2

1992	1Q	2Q	3Q	4Q
gage			16.4	16.5
cfs			16.4	16.9
1993	1Q	2Q	3Q	4Q
gage ht, qtr avg	17.3	16.0	16.4	15.8
cfs	20.7	14.4	16.4	13.4
lag cfs	18.7	16.9	16.5	14.6 Avg = 16.7 cfs

Table 10. Evaporation Loss at Lake Avalon - 1993
(6-15-94)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOT
Avalon gage ht, avg	17.65	17.59	16.69	16.11	15.95	16.06	16.41	16.22	16.23	16.28	15.53	16.00	
Avg area Avalon	731	727	657	584	560	576	630	601	602	610	496	567	
Panevap Brantley	2.77	4.21	8.47	12.08	13.86	17.05	14.58	13.42	10.53	7.52	3.72	4.67	112.88
Lakeevap Brantley	2.13	3.24	6.52	9.30	10.67	13.13	11.23	10.33	8.11	5.79	2.86	3.60	86.92
precipBrantley	.85	.34	.02	.50	.67	.76	.71	1.73	.58	.92	.41	.02	7.51
Netevap	1.28	2.90	6.50	8.80	10.00	12.37	10.52	8.60	7.53	4.87	2.45	3.58	79.41
Evaploss Av, TAF	.1	.2	.4	.4	.5	.6	.6	.4	.4	.2	.1	.2	3.98

Table 11. Change in storage, Lake Avalon 1993
(Gage heights from last day of each month)
(6-15-94)

	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOT
Av gage EOM, ft	17.30	18.00	16.90	15.90	16.20	16.10	15.90	16.10	16.80	16.10	14.80	16.30	16.50	
Av sto, AF	1818	2327	1540	919	1091	1032	919	1032	1473	1032	423	1152	1277	
Av chg sto, TAF		.5	-.8	-.6	.2	-.1	-.1	.1	.4	-.4	-.6	.7	.1	-.5

Table 12. Data Required for River Master Manual Calculations, Water Year 1993
(6-17-94)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL/ AVG
STREAMFLOW GAGE RECORDS, TAF													
Pecos R b Sumner Dam	.0	.0	4.8	32.8	15.0	18.1	45.3	7.5	9.2	24.3	.1	.0	157.2
Fort Sumner Main C	.0	.0	4.1	4.8	6.1	5.7	4.7	5.4	4.9	5.4	.1	.0	41.1
Pecos R nr Artesia	7.8	5.6	4.2	26.2	8.4	9.7	39.0	12.6	7.0	22.2	6.1	5.5	154.3
Rio Penasco at Dayton	.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
South Seven Rivers nr Lkwd	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Rocky Arroyo at Hwy Br nr C	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Pecos R b Brantley Reserv	1.3	1.2	7.1	14.0	13.8	15.8	24.2	18.4	12.6	18.2	1.3	2.1	130.1
Pecos R at Dam Site 3	1.2	1.1	6.7	13.3	13.8	15.8	24.0	18.1	11.7	16.8	1.3	2.1	125.8
Pecos bel Avalon Dam	.0	.0	.0	.0	.0	.0	8.3	.0	.0	9.0	.0	.7	18.0
Carlsbad Main Canal	.0	1.1	6.7	13.0	12.8	15.0	13.1	16.2	11.4	8.6	.0	.0	97.8
Dark Canyon at Carlsbad	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Pecos below Dark Canyon	3.0	2.0	.6	1.1	1.1	1.1	9.2	1.1	1.0	10.3	1.3	1.8	33.6
Pecos R at Red Bluff	6.6	5.2	3.3	3.3	3	2.7	11.5	3.2	3.7	14.0	4.7	5.2	66.4
GAGE HEIGHTS													end mo Dec 92
Avalon gage ht, end mo	18.00	16.90	15.90	16.20	16.10	15.90	16.10	16.80	16.10	14.80	16.30	16.50	16.60
Avalon gage ht, avg	17.65	17.59	16.69	16.11	15.95	16.06	16.41	16.22	16.23	16.28	15.53	16.00	
Alamogordo ga ht, end mo	54.84	56.73	56.86	55.55	59.27	60.75	56.53	57.56	57.83	46.21	49.44	52.15	65.20
Alamogordo gage ht, avg	53.71	55.84	56.55	56.72	57.27	60.05	58.74	57.13	58.35	50.63	47.88	50.88	
Lake S Rosa ga ht, end mo	43.69	44.10	45.69	40.68	43.24	45.44	40.27	45.18	44.11	44.05	44.26	44.41	43.75
Lake S Rosa ga ht, avg	43.56	43.88	44.74	42.25	41.53	44.89	42.54	44.02	44.52	44.08	44.13	44.33	
PRECIPITATION, INCHES													
Brantley Lake	.85	.34	.02	.50	.67	.76	.71	1.73	.58	.92	.41	.02	7.51
Las Vegas FAA AP				.43	2.16	1.11	5.15	6.05	1.14	.37			16.41
Pecos Ranger Station				.00	1.20	1.50	2.87	6.92	.10	.90			13.49
Santa Rosa				.08	.92	3.00	2.06	2.74	.49	.09			9.38
Lake Santa Rosa	.95	.64	1.95	.07	.64	1.34	2.64	1.71	1.43	.28	.77	.06	12.48
Sumner lake	.81	.35	1.05	.01	1.12	1.98	2.98	2.33	1.19	.54	.56	.00	12.92
PAN EVAPORATION, INCHES													
Lake Santa Rosa	3.72	5.04	8.68	9.12	9.72	11.66	12.27	9.40	8.51	6.53	4.48	3.72	92.85
Lake Sumner	2.42	3.77	8.35	11.44	12.26	16.12	15.43	12.23	10.24	7.69	3.87	4.74	108.56
Brantley Lake	2.77	4.21	8.47	12.08	13.86	17.05	14.58	13.42	10.53	7.52	3.72	4.67	112.88
OTHER REPORTS													
Base Acme-Artesia, TAF	5.8	5.0	3.1	2.1	3.3	3.2	2.2	2.3	1.0	2.6	3.1	3.7	37.5
Pump depl Ac-Artesia, TAF	.0	.0	.2	.9	.7	1.4	1.2	1.0	.4	.2	.0	.0	6.0
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

NEW MEXICO'S OBJECTIONS

Correction of Errors

1. Adjustment for depletions due to irrigation, Table 1, item C.1.a., the arithmetic calculation has been corrected. New Mexico's recommendation for new irrigated acreage figures has been accepted. The States may want to exchange comments about the estimate. Mr. Kraai's letter dated June 14, 1994 states: "We look forward to further communication on this subject." This provides an opportunity for Texas to respond to New Mexico's method and new estimate, and if Texas has comments please provide them to New Mexico.

2. Table 3 and Table 11, the error in Avalon change-in-storage has been corrected (noted by Texas as item III).

3. Blank values for CID diversions were changed to zeros; there was no effect on the calculation.

4. Preliminary precipitation and evaporation values were revised in accordance with New Mexico's June 9, 1994 letter.

5. Table 6, New Mexico's revised average gage heights have been used in Table 6. For the future, New Mexico noted they will provide a worksheet for average gage heights to use in the Preliminary Report.

6. In Tables 9 and 10, average gage heights have been changed to correspond to New Mexico's calculations. (They also check with Texas' computations except for small differences, see Texas item III).

7. Lake Avalon end-of-month gage heights have been reviewed. New Mexico's report of 15.4 feet for February is different from the report received from USGS and reported by Texas, so the value of 16.9 feet is retained for February. Also, 16.3 feet is retained for November, for the same reason. New Mexico's revised value of 14.8 for October is accepted. These changes would not affect the final result, in any case.

Hydrograph Scalping

1. Base Inflow - see joint response to states.

2. Carlsbad to Stateline

New Mexico did not object to the estimate.

TEXAS' OBJECTIONS

I. Base Inflow, Acme-Artesia

See joint response to states.

II. Flood Inflow, Alamogordo Dam to Artesia

Texas' objection has been incorporated into the joint response.

III. Avalon, Alamogordo and Brantley Gage Heights

Gage heights have been corrected, see response to New Mexico above.

IV. Flood Inflow, Dam Site #3 to Carlsbad

After making changes in gage height data and correcting the error in Avalon Storage, the River Master's computation for flood inflow in this reach agrees with Texas, 8.6 TAF.

V. Flood Inflow, Carlsbad to Stateline

Based on Texas' objection, I reevaluated the flood inflow for October and November, and found that there was 0.9 TAF of flood inflow, similar to Texas' estimate. My worksheet is attached as Table A-4 The quantity of 0.9 TAF has been added on Tables 1 and 4 to the flood inflow for October.

VI. Annual Streamflow, Delaware River, 1993

Texas' objection has been accepted and the quantity 1.0 TAF is used for Delaware River flow.

VII. Final Computed Departure

Texas' computation for the final departure is an over-delivery of 7.0 TAF. After making the adjustments noted above, the River Master's final determination is an over-delivery of 6.6 TAF.

JOINT RESPONSE ON BASE INFLOW

Both states objected to the use of USGS' estimate of 37.5 TAF for the base inflow. This is a joint response to the objections of the states.

New Mexico's Objections

I interpret New Mexico's objections as follows (see NM Objections, pages 2-3):

- NM computed a base inflow of 43,743 AF

- New Mexico observed that the pattern of water releases from Sumner Reservoir to Brantley has changed due to low flow releases to sustain the fishery.

- New Mexico believes that the changed low flow releases obscure the historical seasonal pattern of base flow fluctuations.

- Streamflow records are missing for the Acme gage for the August 22 to September 6 period, and NM believes the USGS low flow estimate for the period is least twice the expected flow, based on correlations with other gages. New Mexico estimates the low flow for the period to be about 20 cfs, and that the only period between April 1 and November where USGS estimates represent low flow conditions is the end of June. (I assume this is the meaning of NM's sentence at the top of page 3, which says "The only period between the first of April and the first part of November that may reasonably represent base flow conditions is the low flow period near the end of June." This is a key point because New Mexico's base flow line for the Acme gage between June 26 and November 5 is drawn as if they postulated a low flow of about 20 cfs for the August 22 to September 6 period.)

- New Mexico furnished an analysis that shows a "gradual variation in base inflow between irrigation and non-irrigation seasons." According to New Mexico, this is "consistent with previous years' analyses...", and "...the scalping performed by the Survey for 1993 is very different..." New Mexico concluded that "...a comparison of the gaged flow... indicates a major change in the flow regime of this reach", and that "New Mexico believes that records showing such losses result from gaging inaccuracies, probably at the Acme gage, rather than a new, as yet unidentified, physical phenomenon...", and "If this problem continues, it should be resolved by a joint effort of New Mexico, Texas, and the Survey."

Texas' Objections

Texas' estimate of base inflow was 35.7 TAF. Texas stated that the "USGS calculation is in error because the USGS was not consistent in their determination of base inflow, particularly during ... April through November 1993", and "There is no basis for the upward baseflow separations ... during ... July, August and September."

Comparison of Objections

Figure A-1 shows USGS' base inflow graphs with Texas' and New Mexico's estimates plotted as overlays. Texas' estimates were taken from their numerical data, and New Mexico's figures were estimated from their graph which was too small to read precise numbers, although order-of-magnitude estimates could be read. Figure A-2 shows New Mexico's base inflow estimates as submitted by New Mexico with their Objections.

Texas' differences with USGS can be seen from the periods July-August and October on Figure A-1. For that period, as seen on Table A-1, the total differences between USGS and Texas are 1991 acre-feet versus a difference for the year of 1827 acre-feet. I conclude from this that the entire difference between Texas and USGS can be attributed to these three months.

New Mexico's objections are of a different character. As seen from Table A-1, there is little cumulative difference between the estimates of New Mexico, Texas and USGS from January through July (USGS - 24780; NM - 25110; TX - 25448). In fact, the states' estimates only differ by 338 acre-feet for this seven- month period. However, from August through December, New Mexico's estimate differs considerably from that of USGS and Texas.

The key to New Mexico's estimate seems to be their assessment that the low flow for the August 22 to September 6 period should be about 20 cfs (see discussion above about New Mexico's Objections). If this was, in fact, the low flow for that period, it seems that the estimates of all parties would have been different. Texas' practice for scalping the hydrographs, for example, is to make the base flow line tangent to the low flow periods. If a low flow of 20 cfs was used for, say, September 1, I would have expected Texas' base flow line for the Acme gage to be much lower. If it had been, then the Texas' estimate of base flow at the Acme gage might have corresponded with that of New Mexico, and Texas' estimate of inflow might have been about 5000 to 6000 acre-feet higher.

This estimate of low flow for the August 22-September 6 period is a critical issue in the different estimates of the parties and of USGS.

River Master's Analysis

I noted New Mexico's comments about the questionable nature of the gaging records for Acme. Mr. Scott Waltemeyer of USGS called on June 15 and informed me that the gaging record at Acme might need to be adjusted. He sent by fax a revised record on June 17 (included as Table A-2). The original monthly flows are shown on Table A-2 for comparison, and it is seen that the annual total for the Acme gage has been revised downward by 4.8 TAF. A significant part of the downward revision is accounted for by a revision from 10,160 to 8,460 AF in September. However, USGS increased the estimate for August from 11,910 to 13,690 AF. Also, USGS did not revise the low flow figure downward to the 20 cfs level envisioned by New Mexico. In fact, the minimum flows for the period August 22 - September 6 were not revised downward at all (September 5-6).

USGS indicated that they would be furnishing a revised base inflow estimate (see June 17 cover sheet of fax from Scott Waltemeyer). However, the River Master's Final Report must be sent to the States on June 18 because I will leave for travel on June 22 and not return until July 12, 1994.

Current provisions for determining the Base Inflow, Acme to Artesia, are:

For the River Master's Preliminary Report use the monthly base inflow quantities determined and furnished by the USGS. USGS will utilize the best available data and methods to estimate the total monthly base inflows accruing to the Acme to Artesia reach. In their report USGS will describe the data and methods used to estimate the base inflows and describe any unusual hydrologic events that occurred during the water year. After review of any objections to the USGS estimates by the states the River Master will make any adjustments deemed necessary to the base inflow estimates and determine the base inflow quantities for the Final Report. If no monthly base inflow quantities are determined and furnished by USGS the River Master will prepare the estimates for the Preliminary Report.

For the Water Year 1993 estimates, we have two principal areas of disagreement. In the first area, Texas' objections to USGS' base inflow estimates amount to a difference of 1.8 TAF due to a difference in procedure for the three months of July, August and October. In the second area of disagreement, New Mexico estimated base inflow at 43743 AF, some 6251 AF greater than USGS and 8078 AF greater than Texas.

The principal issue that underlies the large difference between New Mexico's and USGS' estimates is the low flows at the Acme gage. I take as the official estimate of the Acme flows the revised figures furnished by USGS and shown on Table A-2. If correct, these do not bear out New Mexico's contention of a much lower base flow for the critical August 22 - September 6 period. However, New Mexico's basic concerns about an implied hydrologic change in the reach remain unanswered. I believe that New Mexico's comment should be implemented: "If this problem continues, it should be resolved by a joint effort of New Mexico, Texas, and the Survey."

In particular, the small difference between the gaged flows for the period in early September seems to need further study. To shed light on this, Table A-3 and Figure A-3 are presented. They show that, for water years from 1985 through 1992, the base inflows usually peak in January, and decline to a minimum in July, August or September. The 1993 estimate by USGS is the only one that shows a sharp dip for August. This seems to confirm New Mexico's comment that raises a question about the gaging records for August.

The dip in August is on the order of 2000 acre-feet. This is balanced, more or less, by the Texas 1800 acre-feet question related to USGS' estimate for July, August and October. Given that the basic question at hand is about data it is my decision not to re-compute the estimate for the entire year, but to accept USGS' first estimate of 37.5 TAF as a compromise between Texas' 35.7 TAF estimate and an estimate that might be justified as about 2 TAF higher on the basis of the sharp decline for August, as shown on Figure A-3. This leaves in question some 3 to 4 TAF in additional base inflow claimed by New Mexico, but it is my decision that this cannot be accepted due to the only available gaging records not agreeing with New Mexico's anticipated low flows.

Thus, the final determination for Base Inflow, Acme to Artesia, is 37.5 TAF. I encourage the States to work together and with USGS to investigate the questions and issues that have arisen as a result of the accounting this year for the reach in question.

REVISED ARTESIA FLOWS

USGS revised the gaged flows at Artesia also, and the revised records have been incorporated into Table 12 and into the River Master's Final Report computations as shown on Tables 1 and 2.

Table A-1. Comparison of Base Inflow Estimates, USGS, New Mexico, Texas, Water Year 1993, Acre-feet.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	Total
Base inflow, USGS	5770	5000	3130	2140	3310	3210	2220	2340	952	2640	3090	3690	37492
Base inflow, NM	5534	4998	3505	2737	2705	2618	3013	3504	3451	3566	3808	4304	43743
Base inflow, TX	5841	4772	3218	2689	3617	3098	2213	1164	799	1832	2777	3645	35665
diffusgs-nm	236	2	-375	-597	605	592	-793	-1164	-2499	-926	-718	-614	
diffusgs-tx	-71	228	-88	-549	-307	112	7	1176	153	808	313	45	
diffnm-tx	-307	226	287	48	-912	-480	800	2340	2652	1734	1031	659	
cumul usgs	5770	10770	13900	16040	19350	22560	24780	27120	28072	30712	33802	37492	
cumul nm	5534	10532	14037	16774	19479	22097	25110	28614	32065	35631	39439	43743	
cumul tx	5841	10613	13831	16520	20137	23235	25448	26612	27411	29243	32020	35665	
cumdiffusgs-nm	236	238	-137	-734	-129	463	-330	-1494	-3993	-4919	-5637	-6251	
cumdiffusgs-tx	-71	157	69	-480	-787	-675	-668	508	661	1469	1782	1827	
cumdiffnm-tx	-307	-81	206	254	-658	-1138	-338	2002	4654	6388	7419	8078	

U.S. Geological Survey
Water Resources Division
Facsimile Transmission Cover Sheet

Transmitting Station Number:	Total Pages (including lead):	Date:
(505) 988-6314	34	6-17-94

From: Scott Waltemeyer
U.S. Geological Survey - WRD
1939 Warner Circle
Santa Fe, New Mexico 87505
(505) 988-6307

Table A-2. Revised Gaging Records Furnished by USGS

To:
Name: Neil Stigg
Organization: CSU
Location: Fort Collins, Co

Office/FAX Phone: 303-491-7727

Remarks: Variable shifting was used to revise the records of:

Pecos – Acme
Pecos – Artesia
Pecos – 44444444 Artesia + pumping

for 1993 calendar year.

The baseflow will also be recomputed and distributed to all portions.

Added
Notes by
River Master
6-18-94

UNITED STATES DEPARTMENT OF THE INTERIOR - GEOLOGICAL SURVEY - NEW MEXICO 06/16/94

STATION NUMBER 08386000 PECOS RIVER NEAR ACME, NM STREAM SOURCE AGENCY USGS
LATITUDE 333210 LONGITUDE 1042234 DRAINAGE AREA 11380.00 DATUM 3507.00 STATE 35 COUNTY 005
PROVISIONAL DATA FROM ADR SUBJECT TO REVISION

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1993
DAILY MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
									same			
1	23	14	12	44	184	299	149	185	e70	102	126	26
2	26	14	11	83	190	280	75 73	174	e66	87	123	25
3	27	13	6.9	84	195	288	46 46	125	e63	186	118	24
4	26	11	6.6	18	183	807	37 37	1250	e60	209	123	23
5	25	11	5.4	14	158	333	28 29	559	e57	902	80	23
6	22	11	4.0	138	180	836	86 93	636	e56	308	67	21
7	20	11	7.1	820	282	288	158	449	188 149	317	e65	21
8	19	10	21	448	246	204	194	476	186 125	398	e55	21
9	20	11	21	486	166	175	205	317	115	336	46	21
10	18	11	14	734	147	167	640	837	175	393	44	20
11	17	9.7	16	807	122	125	653	205	141	610	42	19
12	18	9.6	19	898	104	112	762	197	92	539	41	20
13	18	9.4	23	922	103	69 60	841	160	87	486	41	21
14	17	8.7	25	949	70 81	46 44	1060	146	119	718	43	19
15	18	11	24	931	53 65	89 37	2060	144	144	777	40	19
16	19	11	22	920	48 56	24 35	1350	144	148	801	41	18
17	17	12	23	930	51 63	89 91	1140	140	119	798	39	17
18	16	13	27	963	47 53	20 28	1070	134	100	659	37	17
19	23	14	80	980	48 60	27 25	1050	147	83 98	472	36	17
20	28	12	31	724	47 60	23 20	1730	136	71 83	411	34	17
21	24	7.7	29	518	45 57	27 24	1410	136 99	57 63	293	32	17
22	22	5.5	28	357	49 75	25 32	1000	120 97	58 69	240	32	17
23	20	4.9	27	278	128	28 25	1010	103 95	58 69	234	31	16
24	16	2.4	29	238	186	23 20	999	93 93	49 53	196	30	13
25	14	2.4	92	224	189	18 13	933	e90 90	602	182	29	14
26	14	1.9	39	176	126	14 10	916	e80 80	485	169	27	18
27	14	2.6	48	158	118	531	911	e75 75	302	160	28	16
28	14	4.9	65	193	109	611	786	e65 65	215	148	26	19
29	14	---	61	150	169	378	669	e67 67	180	137	27	21
30	15	---	49	160	299	234	392	e70 70	118	189	27	20
31	15	---	55	---	307	---	249	e60 60	---	152	---	19
TOTAL	599	259.1	805.0	13660	4343	5109	22610	6904	4264	10942	1530	599
MEAN	19.3	9.25	26.0	455	140	170	729	223	142	353	51.0	19.3
MAX	28	14	65	980	307	611	2060	1250	602	801	126	26
MIN	14	1.9	4.0	14	45	14	28	60	49	87	26	13
AC-FT	1190	514	1600	27090	8610	10130	44850	13690	8460	21710	3030	1190
	1190	514	1600	28650	9520	9610	47340	11910	10160	22080	3160	1190

CAL YR 1993 TOTAL 71625.1 MEAN 196 MAX 2060 MIN 1.9 AC-FT 142100

e Estimated

146,900 (orig total)

ORIGINAL MONTHLY VALUES

COMPARABLE LOW FLOW PERIODS

JUN 17 '94 9:37 FROM US GEO SUR PAGE.002

UNITED STATES DEPARTMENT OF THE INTERIOR - GEOLOGICAL SURVEY - NEW MEXICO 06/17/94

STATION NUMBER 08396500 PECOS RIVER NEAR ARTESIA, NM STREAM SOURCE AGENCY USGS
LATITUDE 325025 LONGITUDE 1041923 DRAINAGE AREA 15300.00 DATUM 3291.92 STATE 35 COUNTY 015
PROVISIONAL DATA FROM ADR SUBJECT TO REVISION

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1993
DAILY MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	105	117	85	78	148	201	306	289	58	152	143	89
2	104	118	83	65	163	210	191	231	60	126	141	84
3	112	118	85	68	157	207	143	181	65	112	139	84
4	117	108	86	56	157	194	109	166	60	110	139	84
5	119	110	81	54	155	195	95	870	54	130	126	83
6	119	109	76	48	150	195	e64	709	55	207	136	82
7	123	108	71	41	145	211	49	487	58	216	121	82
8	124	108	65	44	146	212	40	480	55	239	107	81
9	119	108	e62	140	174	202	97	366	119	248	97	80
10	108	106	e61	e870	187	170	113	257	125	266	93	85
11	110	104	64	e678	145	165	299	253	101	280	88	94
12	126	101	66	e790	130	157	521	180	117	548	86	95
13	129	100	62	e870	129	133	570	157	114	545	91	93
14	128	100	62	e925	126	125	590	140	90	529	91	93
15	134	100	65	e985	129	110	769	128	83	721	91	92
16	132	98	68	e975	120	95	1240	120	82	783	93	92
17	130	99	67	e935	114	87	1300	107	106	832	94	92
18	128	96	68	e970	110	77	1040	104	110	849	94	94
19	140	99	68	e965	106	e64	927	98	98	792	94	92
20	141	98	64	e955	105	e67	913	84	95	643	94	92
21	159	95	66	737	103	e68	1140	88	84	568	94	92
22	156	92	68	608	104	e67	1430	100	76	471	94	95
23	156	86	68	439	102	e56	1110	98	71	342	93	96
24	149	89	64	310	112	e57	969	95	66	251	91	95
25	143	91	64	259	186	e61	937	78	65	214	89	94
26	127	89	60	227	161	e50	950	70	282	190	87	89
27	126	86	60	195	165	e45	930	63	462	195	86	90
28	124	85	59	174	151	e330	931	57	348	178	85	90
29	120	---	65	163	135	358	841	53	202	162	84	95
30	118	---	67	151	141	506	641	61	165	155	83	95
31	117	---	76	---	150	---	427	63	---	149	---	95
TOTAL	3943	2818	2126	13190	4256	4870	19682	6533	3536	11198	3054	2783
MEAN	127	100	68.6	440	137	162	635	204	118	361	102	89.8
MAX	159	118	86	985	187	558	1430	870	462	849	143	96
MIN	104	85	59	41	102	45	40	53	54	110	83	80
AC-FT	7820	5580	4220	26160	8440	9660	39040	12960	7010	22210	6060	5520
	7820	5580	4220	26200	8450	9600	39670	13260	6970	20440	6000	5470

e Estimated

Total Revised Values 154,300 AF
Total original Values 153,700 AF

ORIGINAL MONTHLY VALUES

UNITED STATES DEPARTMENT OF THE INTERIOR - GEOLOGICAL SURVEY - NEW MEXICO 06/17/94

STATION NUMBER 44444444 PECOS R NR ARTESIA PLUS PECOS PUMPAGE STREAM SOURCE AGENCY USGS
LATITUDE 325025 LONGITUDE 1041924 DRAINAGE AREA 0.00 DATUM STATE 35 COUNTY 015
PROVISIONAL DATA SUBJECT TO REVISION

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1993
DAILY MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	106	117	85	92	159	220	326	299	62	154	143	83
2	105	118	83	82	172	231	214	244	69	128	142	84
3	113	113	86	90	172	234	162	194	73	118	139	84
4	118	108	87	75	172	220	117	181	66	111	139	84
5	120	110	85	66	170	224	122	887	58	120	136	83
6	120	109	77	57	158	221	90	729	60	209	136	82
7	124	108	71	53	152	239	78	496	68	225	131	82
8	125	108	65	55	154	248	71	489	63	245	107	81
9	120	108	62	149	176	239	131	381	123	253	97	80
10	109	106	61	281	200	195	139	370	147	268	95	85
11	111	104	67	686	165	190	317	269	111	287	88	94
12	127	101	68	903	142	187	553	197	122	553	86	95
13	130	100	63	889	135	161	606	178	126	558	91	93
14	129	100	62	937	133	154	610	154	100	537	91	93
15	135	100	65	1010	133	131	790	135	98	729	91	92
16	138	98	70	1000	120	111	1260	137	93	786	93	92
17	131	99	67	977	118	106	1320	120	118	834	94	92
18	129	96	69	989	116	98	1030	128	119	852	94	94
19	141	99	71	986	116	79	946	122	98	794	94	92
20	142	98	66	980	119	78	930	113	102	645	94	92
21	139	95	66	754	122	82	1160	101	91	571	94	92
22	156	93	72	626	117	90	1450	110	84	471	94	93
23	156	88	71	459	112	74	1120	120	80	342	93	96
24	149	90	69	328	124	88	984	116	77	251	91	93
25	143	93	70	268	151	97	948	99	76	214	89	94
26	127	91	65	238	174	76	961	90	285	190	87	89
27	126	86	63	206	177	57	950	91	465	195	86	90
28	124	85	61	186	168	249	944	69	351	178	85	90
29	120	---	71	172	152	577	854	59	204	162	84	95
30	118	---	75	166	151	524	655	74	165	155	83	95
31	117	---	91	---	165	---	448	73	---	149	---	93
TOTAL	3963	2821	2202	13654	4596	5574	20300	6823	3756	11289	3057	2783
MEAN	128	101	71.0	455	148	186	655	220	125	364	102	89.8
MAX	159	118	91	1010	200	577	1450	887	465	853	143	96
MIN	105	85	61	53	112	57	71	59	58	111	83	80
AC-FT	7860	5600	4370	27080	9120	11060	40270	13530	7450	22390	6060	5520

CAL YR 1993 TOTAL 80818 MEAN 221 MAX 1450 MIN 53 AC-FT 160300

Table A-3. Base Inflow, Acme to Artesia, by Years

Water Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
1993	5.8	5.0	3.1	2.1	3.3	3.2	2.2	2.3	1.0	2.6	3.1	3.7	37.5
1992	5.2	5.0	4.9	4.0	3.7	3.1	2.8	2.7	2.6	2.8	2.8	3.2	42.9
1991	3.1	2.7	2.6	1.4	1.0	1.0	.7	1.5	3.4	4.2	4.2	4.6	30.4
1990	2.3	1.9	2.4	1.8	1.0	.6	.6	.7	1.2	2.2	3.0	3.3	21.1
1989	2.6	2.4	2.5	1.7	1.6	1.4	.9	.7	.8	1.3	1.8	2.0	19.8
1988	4.7	3.8	3.0	1.8	1.6	1.6	1.8	2.0	2.0	2.3	2.5	2.6	29.7
1987	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
1986	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
1985	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

Table A-4. Hydrograph Computations, Water Year 1993
(All quantities in cfs or cfs-days)

	Date	QB	Base	Diff	QA	Base	Diff	
Oct	15	13			55			
	16	13	13	0	63			
	17	16	13	3	67			
	18	269	14	255	66			
	19	672	14	658	58	58	0	
	20	658	15	643	562	60	502	
	21	655	15	640	771	61	710	
	22	654	15	639	762	63	699	
	23	654	16	638	766	64	702	
	24	648	16	632	768	66	702	
	25	566	17	550	769	67	702	
	26	48	17	31	749	69	680	
	27	28	17	11	388	70	318	
	28	27	18	9	162	72	90	
	29	27	18	9	110	73	37	
	30	23	18	5	92	75	17	
	31	23	19	4	86	76	10	
Nov	1	22	19	3	85	78	7	
	2	21	20	1	84	79	5	
	3	20	20	0	81	81	0	
	4	21			76			
	5	20		4731	80		5181	
	6	19			82			
	7	19			79		450	diff cfs-d
	8	20			79		893	diff AF
	9	20			80			
	10	20			80			
	11	19			80			
	12	20			80			
	13	22			81			
	14	22			80			
	15	21			79			

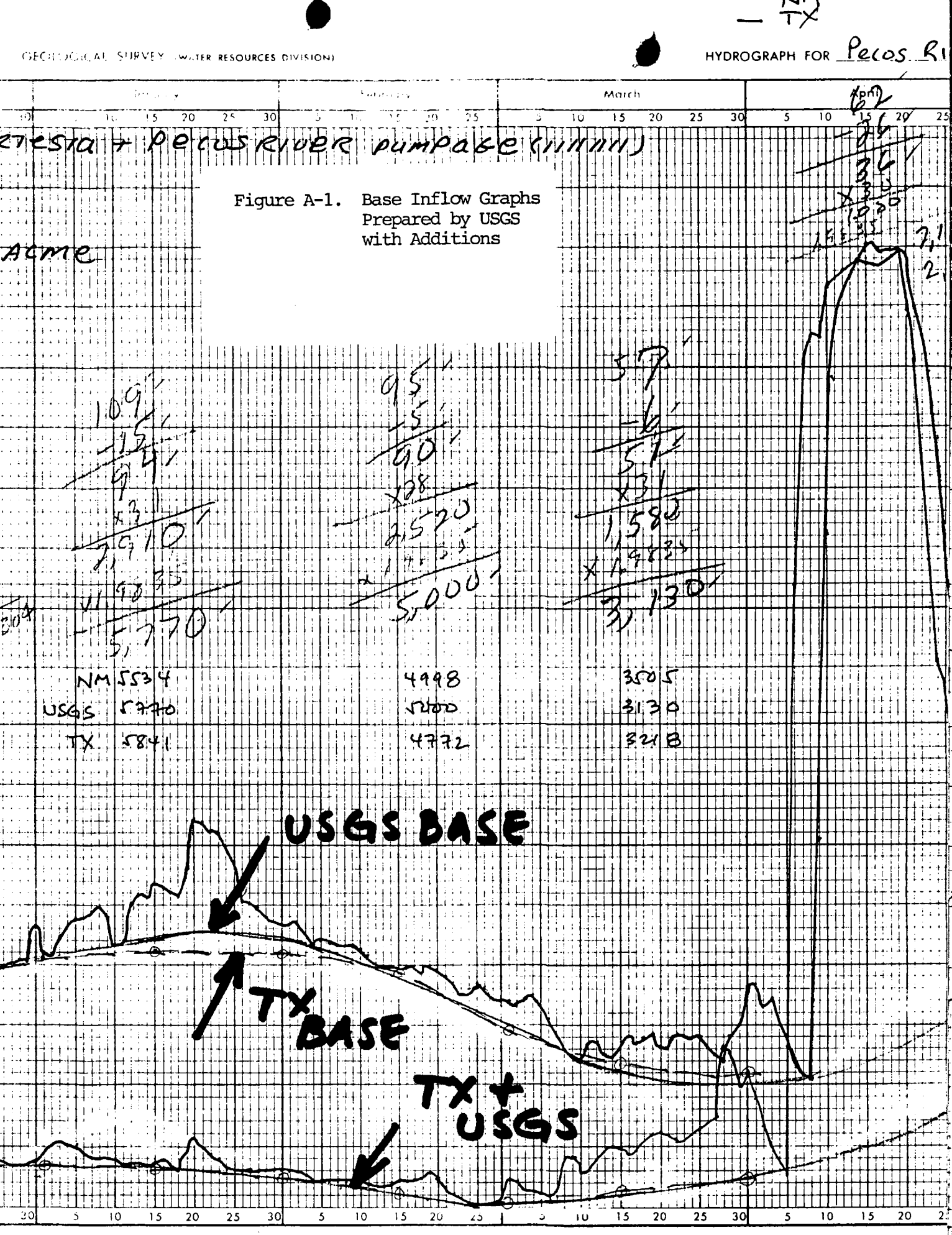
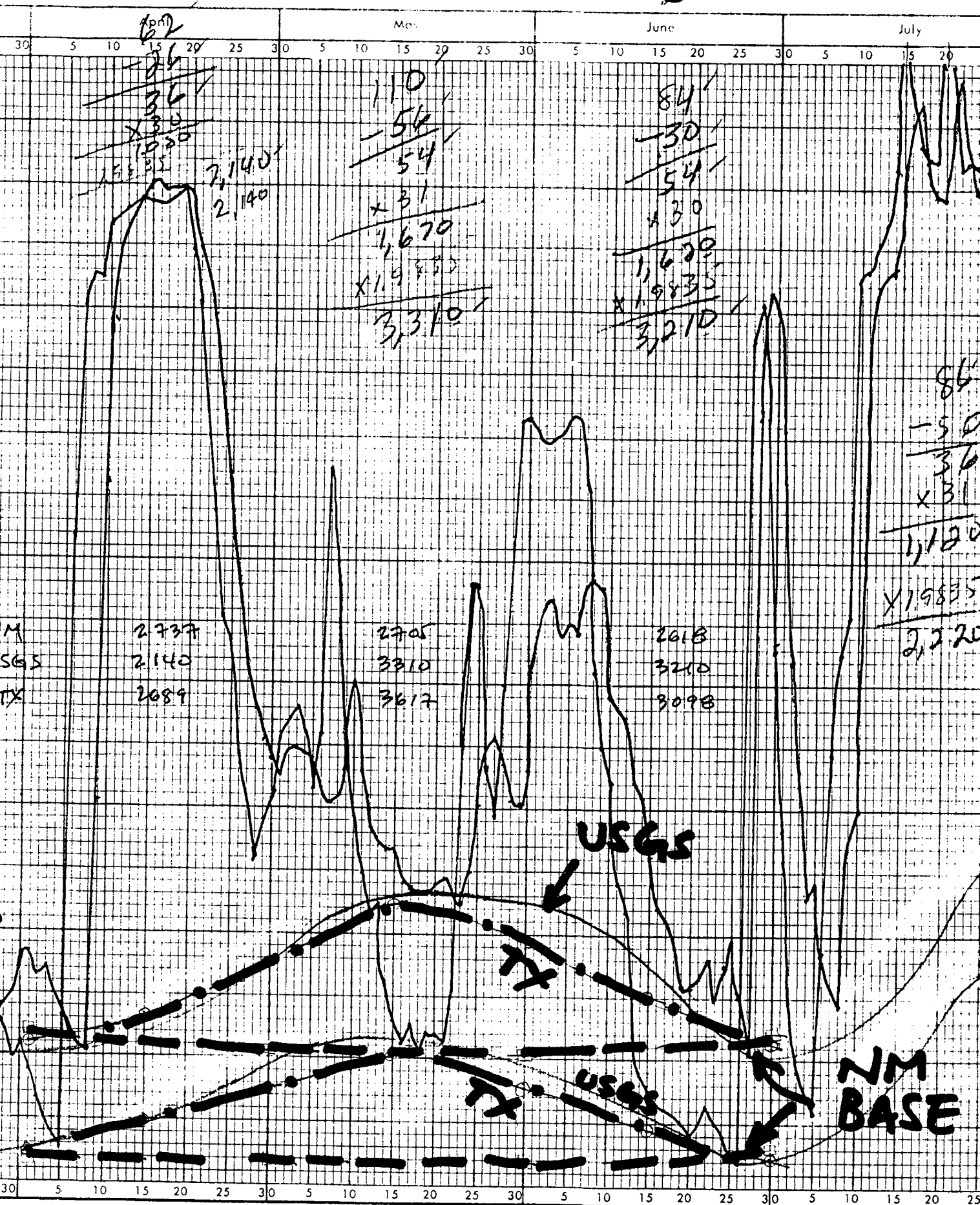
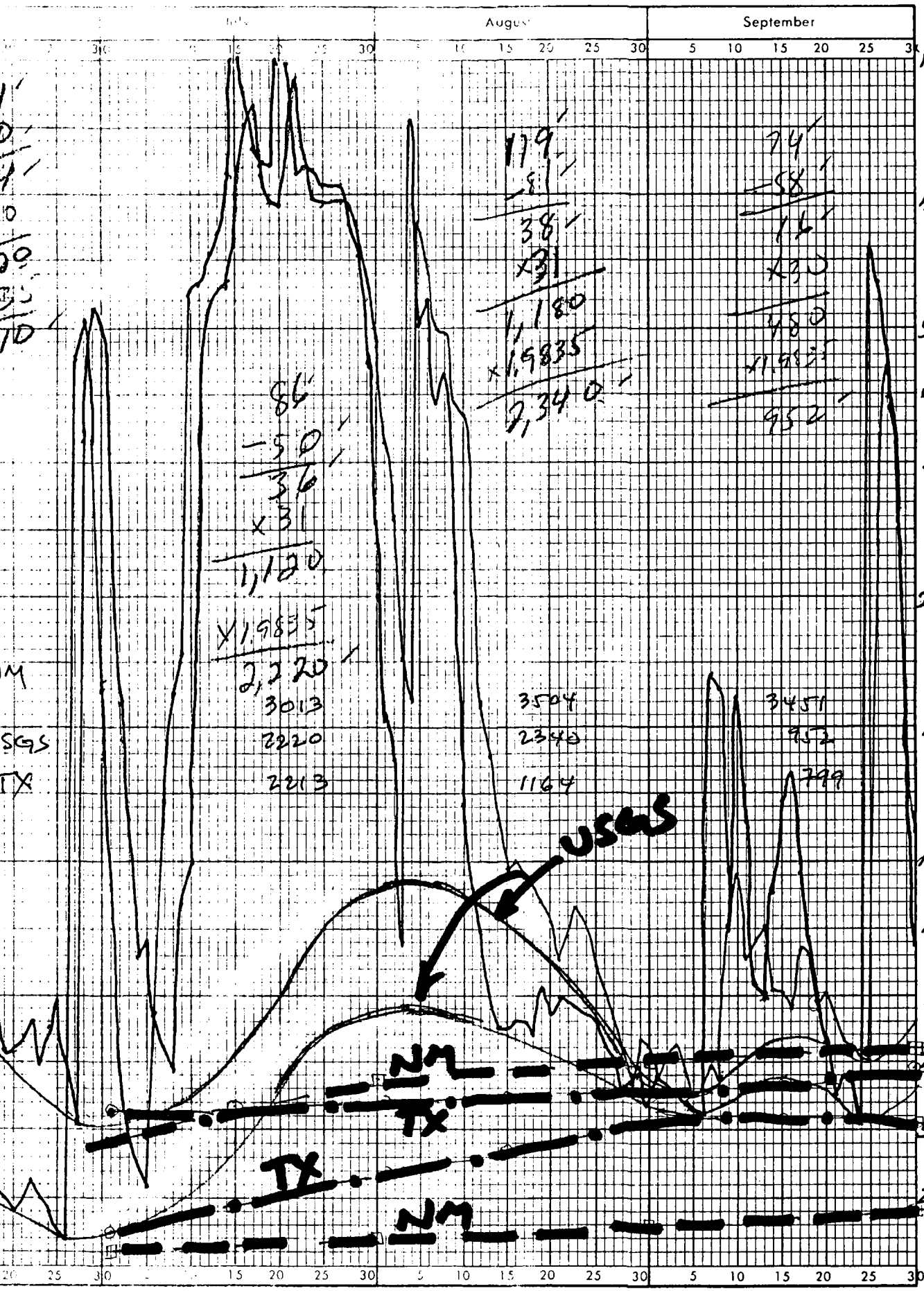


Figure A-1. Base Inflow Graphs Prepared by USGS with Additions

GRAPH FOR Pecos River: Acme to Artesia base flow determination



low determination 1993wy STATION NO.



GPO 1976 - 224-029

UNITED STATES DEPARTMENT OF THE INTERIOR — GEOLOGICAL SURVEY (WA

October — December — January

1,500
1,000
500
300
250
200
150
125
100
75
50
25
0

5 10 15 20 25 30

44444444 Pecos River near Artesia +

08386000 Pecos River near Acme

NM 3566
2440
1111 USGS
1832 TX
-71
1040
x31
1,330
x1.45
2,410

88'
-36'
52'
x30
1,560'
x1.45
3,040'

NM 3808
USGS 3090
TX 2777

76'
-16'
60'
x31
1,860'
x1.45
3,640'

4304
3490
3445

43743
37500
35670

NM
TX
TX
NM

Plotted by SOW Checked by _____ Date 2-18-94

NEW MEXICO'S ANALYSIS

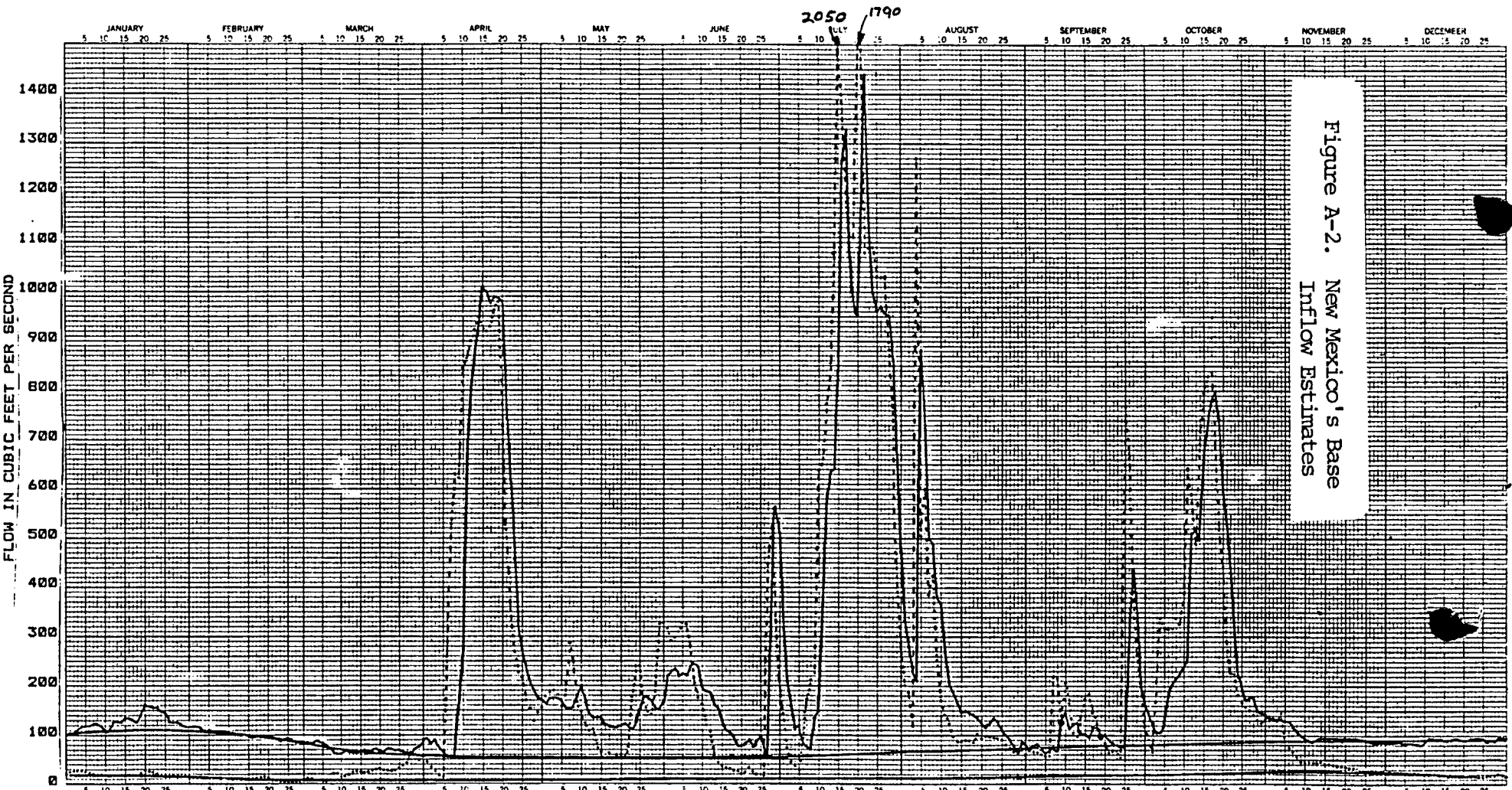


Figure A-2. New Mexico's Base Inflow Estimates

JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
110	100	65	53	53	54	60	70	77	82	90	90
-20	-10	-8	-7	-9	-18	-16	-13	-19	-20	-26	-20
90	90	57	46	44	36	44	57	58	58	64	70
5,534	4,998	3,505	2,737	2,705	2618	3,013	3,504	3,451	3,566	3,808	4,304

1993 DAILY HYDROGRAPH
PECOS RIVER NEAR ACME ....
PECOS RIVER NEAR ARTESIA + PUMPING ____

Total 43,743 AF

ATTACHMENT 4

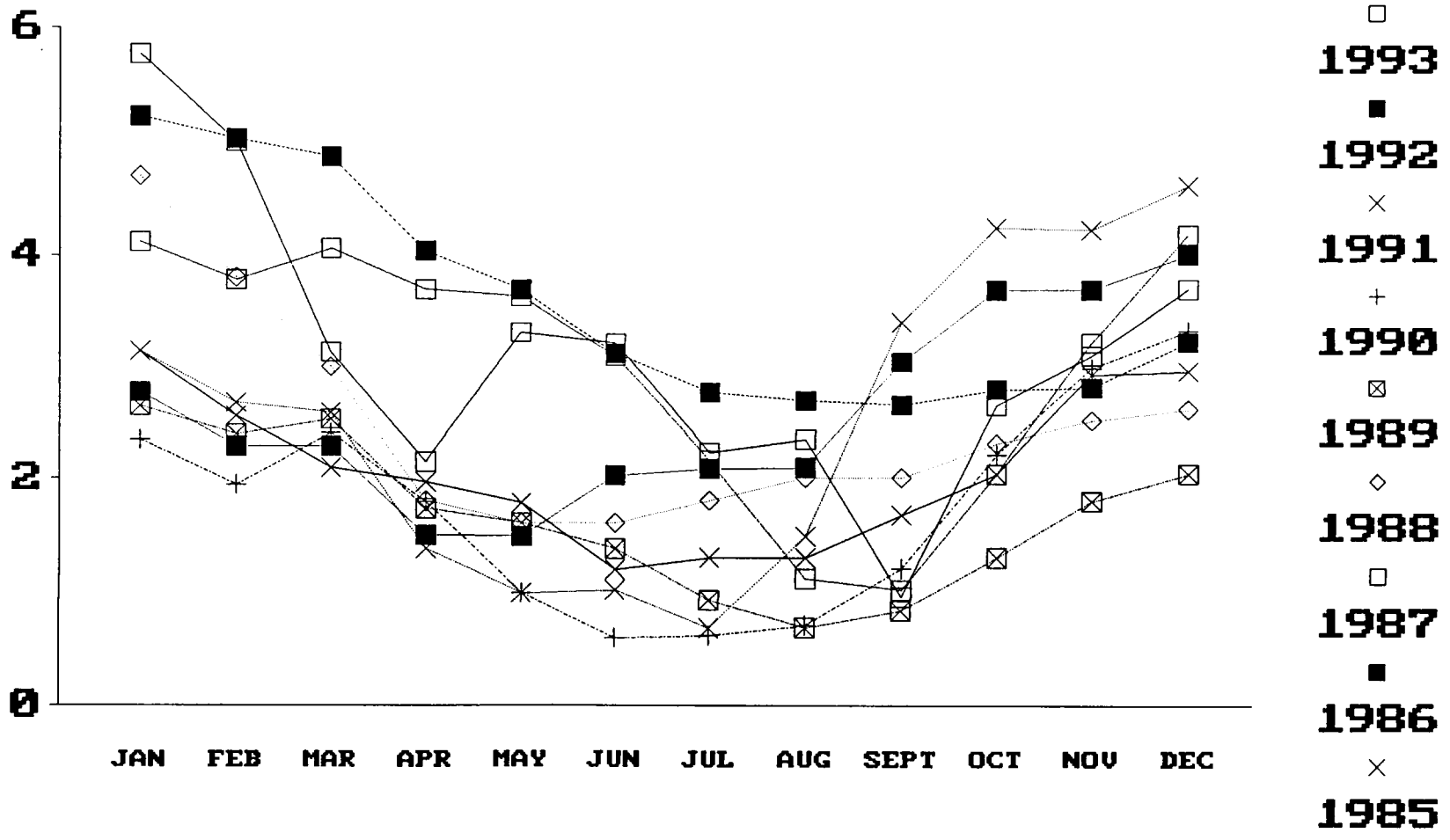


Figure A-3. Comparison of Base Inflow Estimates by month since 1985 (USGS est)