# PECOS RIVER COMPACT

## Report of the River Master

## Water Year 2015

## Accounting Year 2016

## Final Report



Neil S. Grigg
River Master of the Pecos River
749 S. Lemay, Ste. A3, PMB 330
Fort Collins, Colorado 80524

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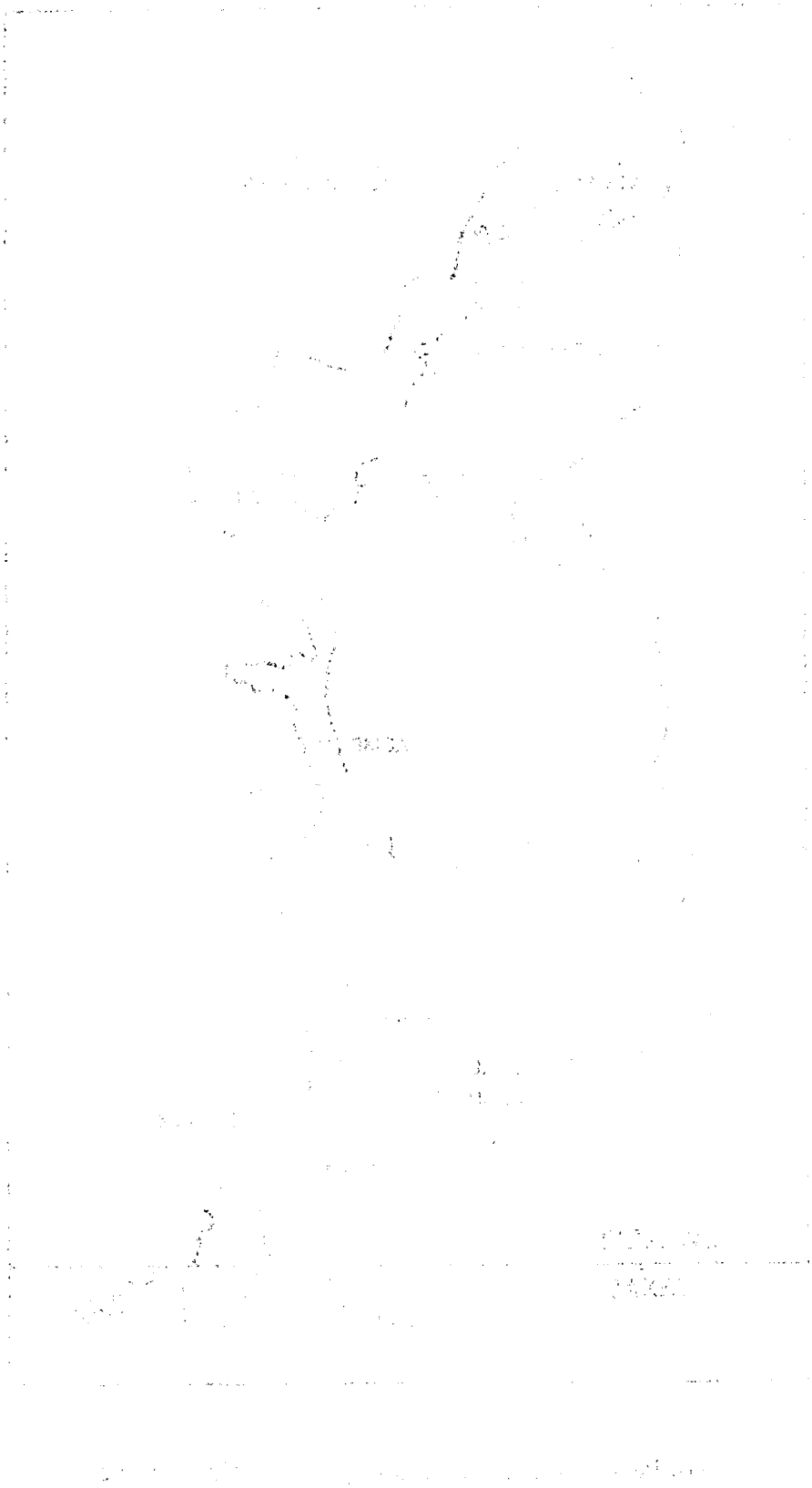
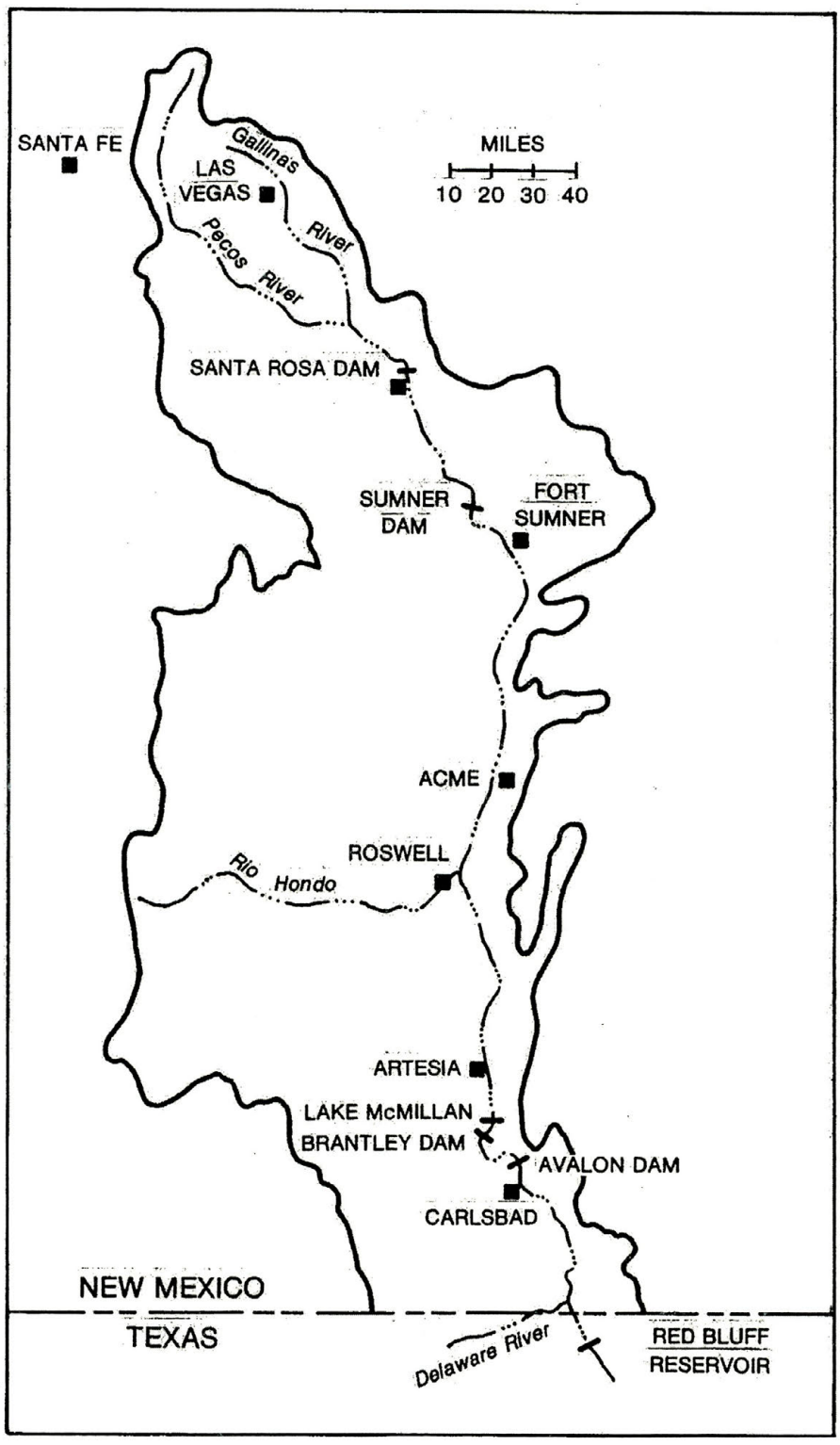





Map of Pecos River Basin Showing Accounting Reaches

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

Final Report of the River Master
Water Year 2015 - Accounting Year 2016
June 23, 2016

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:

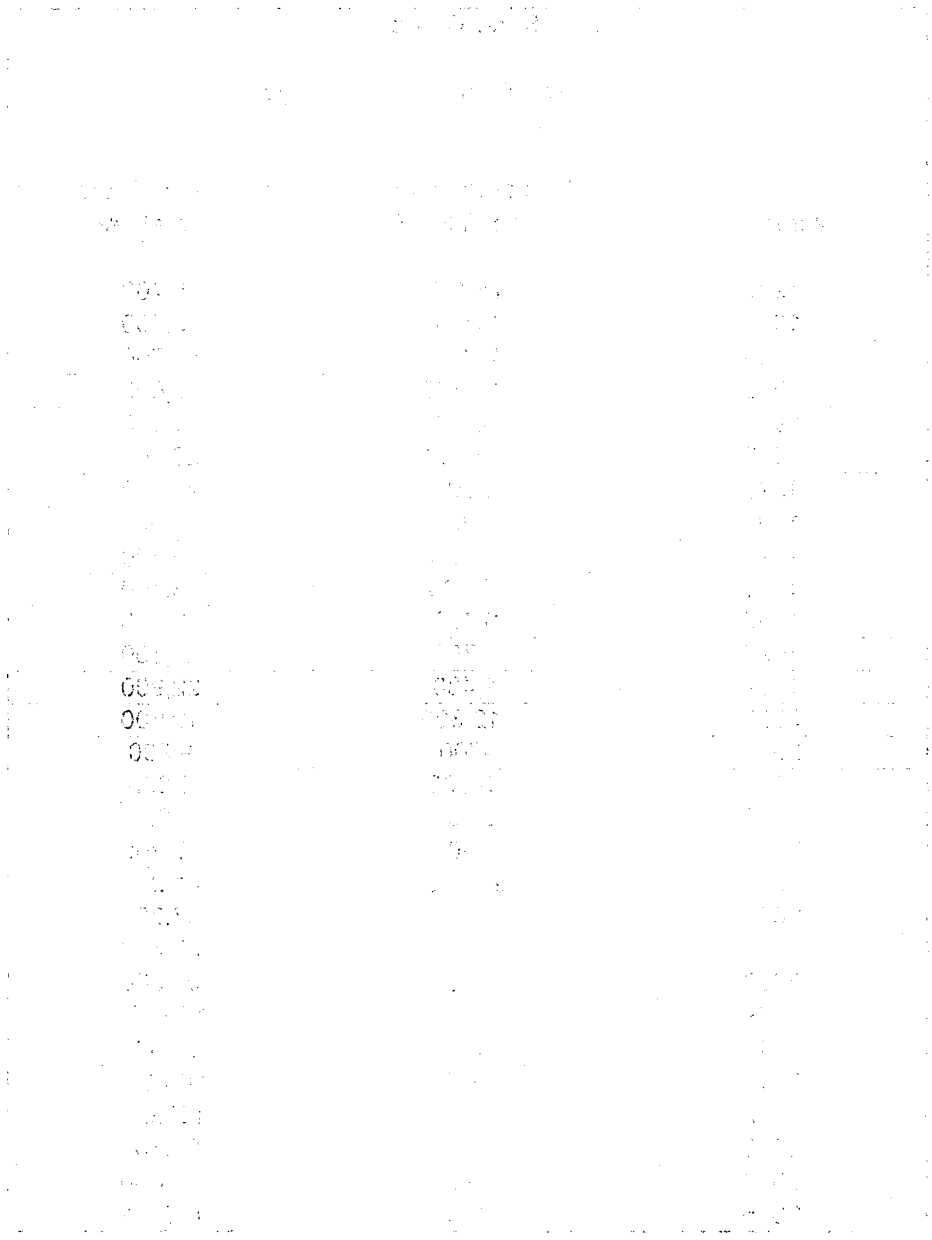
a. The Article III(a) obligation;

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.

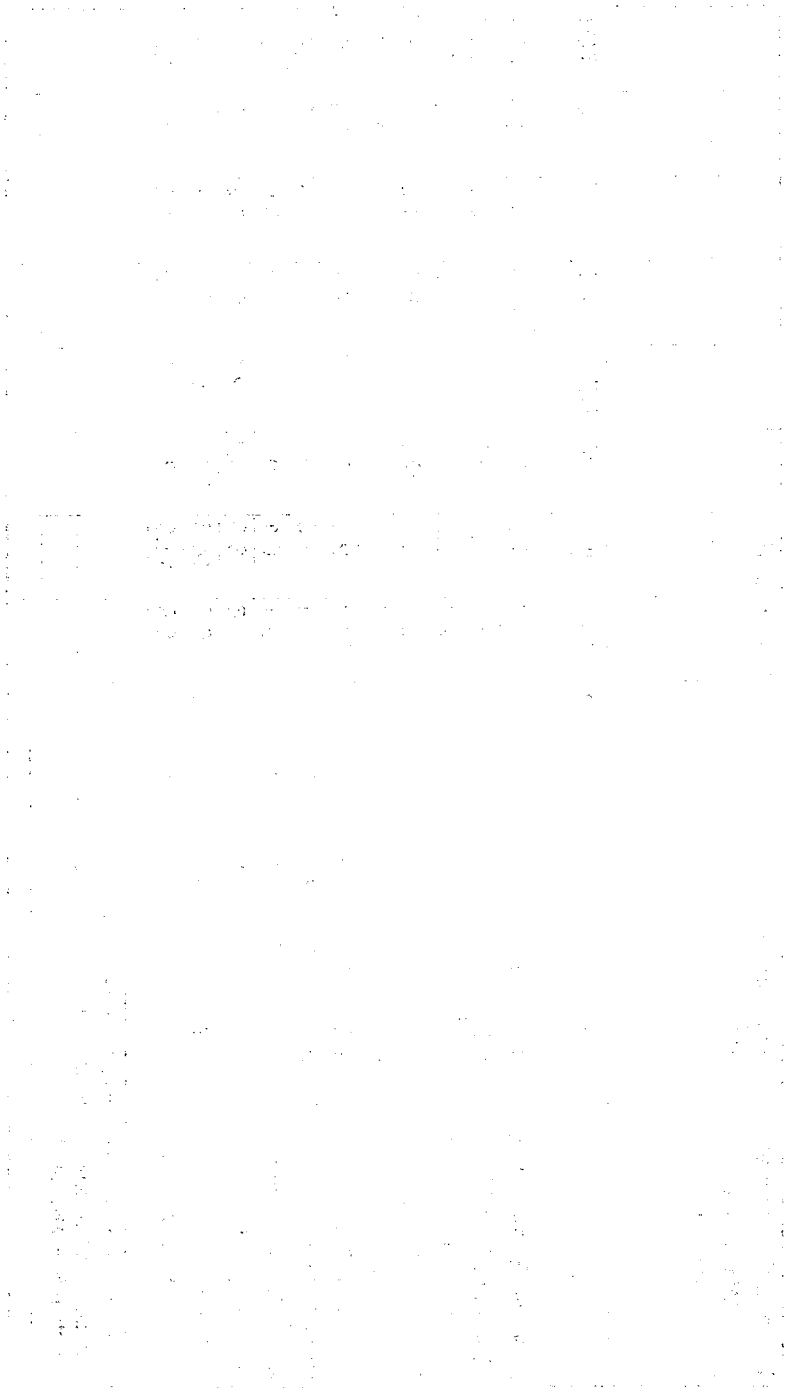
Result of Calculations and Statement of Shortfall or Overage. The results of the calculations in this Final Report show that New Mexico's delivery in Water Year 2015 was an overage of 11,900 acre-feet. The accumulated overage since the beginning of Water Year 1987 is 109,500 acre-feet.

Neil S. Grigg
River Master of the Pecos River



| Pecos River Compact | | |
|---|---|---|
| | | |
| **Accumulated Shortfall or Overage** | | |
| | June 23, 2016 | |
| | | |
| 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 |
| 1996 | -6,700 | 13,700 |
| 1997 | 6,100 | 19,800 |
| 1998 | 1,700 | 21,500 |
| 1999 | 1,400 | 22,900 |
| 2000 | -12,300 | 10,600 |
| 2001 | -700 | 9,900 |
| 2002 | -3,000 | 6,900 |
| 2003 | 2,000 | 8,900 |
| 2004 | 8,300 | 17,200 |
| 2005 | 24,000 | 41,200 |
| 2006 | 26,100 | 67,300 |
| 2007 | 25,200 | 92,500 |
| 2008 | 6,000 | 98,500 |
| 2009 | 1,600 | 100,100 |
| 2010 | -500 | 99,600 |
| 2011 | 500 | 100,100 |
| 2012 | 1,900 | 102,000 |
| 2013 | -6,300 | 95,700 |
| 2014 | 1,900 | 97,600 |
| 2015 | 11,900 | 109,500 |

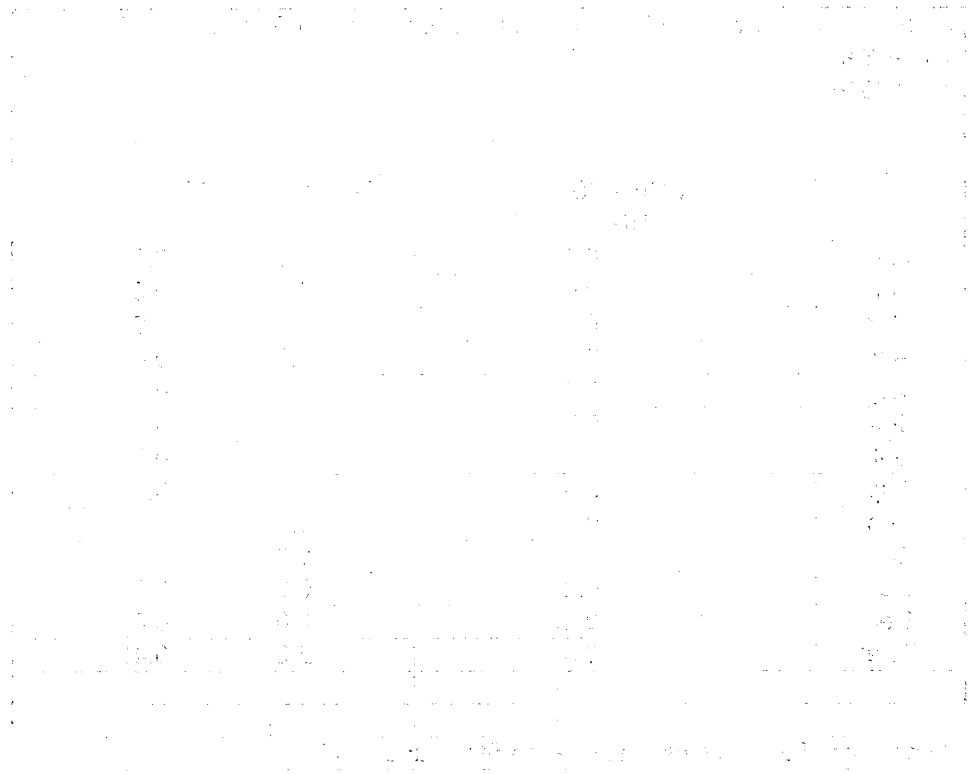
| Table 1. General Calculation of Annual Departures in TAF (B.1) | | | |
|---|---|---|---|
| Water Year | 2015 | | |
| 6/23/2016 | | | |
| | WY 2013 | WY 2014 | WY 2015 |
| B.1.a. Index Inflows | | | |
| (1) Annual flood inflow | | | |
| (a) Gaged flow Pecos R bel Alamogordo Dam | 63.6 | 120.6 | 100.7 |
| (b) Flood Inflow Alamogordo - Artesia (Table 2) | 54.4 | 57.3 | 28.5 |
| (c) Flood Inflow Artesia - Carlsbad (Table 3) | 39.9 | 42.5 | 3.2 |
| (d) Flood Inflow Carlsbad - State Line (Table 4) | 23.2 | 122.8 | 6.2 |
| Total (annual flood inflow) | 181.1 | 343.2 | 138.6 |
| (2) Index Inflow (3-year avg) | | | 221.0 |
| | | | |
| B.1.b. 1947 Condition Delivery Obligation | | | 106.3 |
| (Index Outflow) | | | |
| | | | |
| B.1.c. Average Historical (Gaged) Outflow | | | |
| (1) Annual historical outflow | | | |
| (a) Gaged Flow Pecos River at Red Bluff NM | 51.0 | 146.6 | 101.1 |
| (b) Gaged Flow Delaware River nr Red Bluff NM | 12.2 | 48.3 | 5.4 |
| (c) Metered diversions Permit 3254 into C-2713 | 0.2 | 0.2 | 0.2 |
| Total Annual Historical Outflow | 63.4 | 195.1 | 106.7 |
| (2) Average Historical Outflow (3-yr average) | | | 121.7 |
| | | | |
| B.1.d. Annual Departure | | | 15.4 |
| | | | |
| C. Adjustments to Computed Departure | | | |
| 1. Adjustments for Depletions above Alam Dam | | | |
| a. Depletions Due to Irrigation (Table 5) | 2.0 | -0.2 | -3.2 |
| b. Depl fr Operation of Santa Rosa Reservoir (Table 6) | 8.6 | -1.7 | 16.7 |
| 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 | 74.2 | 118.7 | 114.2 |
| (b) Flood Inflow Alamogordo - Artesia | 54.4 | 57.3 | 28.5 |
| (c) Flood Inflow Artesia - Carlsbad | 39.9 | 42.5 | 3.2 |
| (d) Flood Inflow Carlsbad - State Line | 23.2 | 122.8 | 6.2 |
| Total (annual flood inflow) | 191.7 | 341.3 | 152.1 |
| Recomputed Index Inflow (3-year avg) | | | 228.4 |
| | | | |
| Recomputed 1947 Condition Del Outflow | | | 111.4 |
| (Index Outflow) | | | |
| | | | |
| Recomputed Annual Departures | | | 10.3 |
| | | | |
| Credits to New Mexico | | | |
| C.2 Depletions Due to McMillan Dike | | | 1.5 |
| 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 | | | 11.9 |



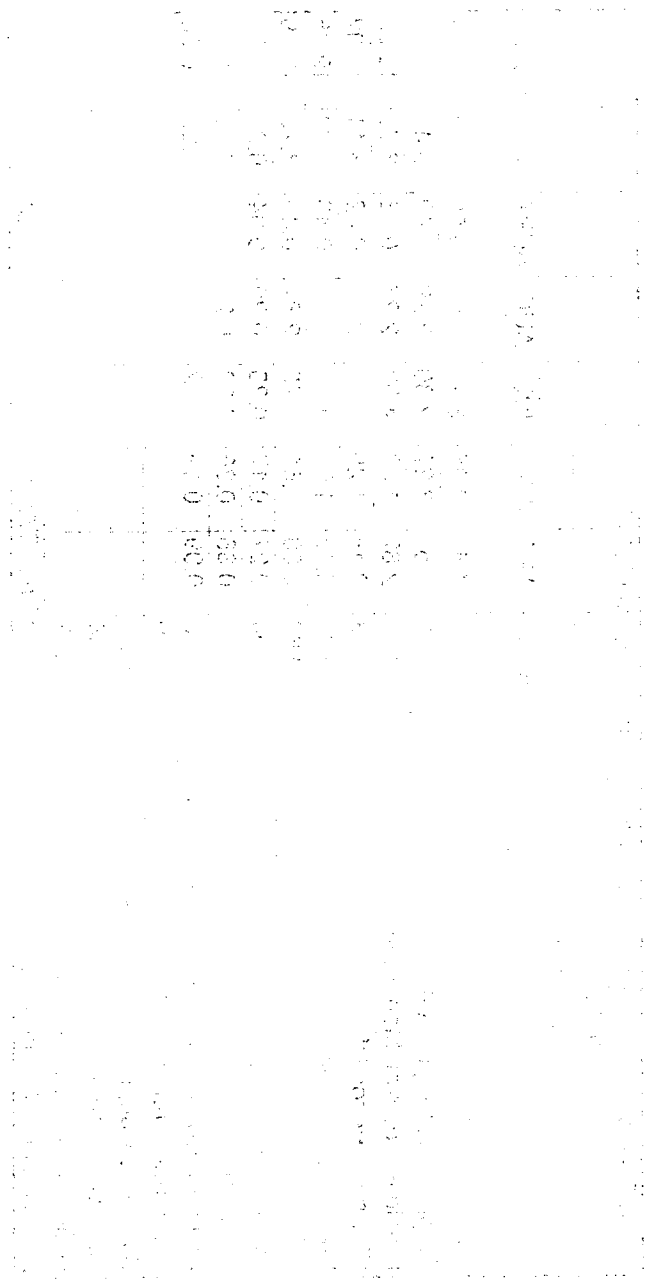
| Table 2. Determination of Flood Inflows, Alamogordo Dam to Artesia (B.3) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Water Year | 2015 | | | | | | | | | | | | |
| 5/8/2016 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | TOT |
| | | | | | | | | | | | | | |
| Flow bel Sumner Dam | 1.3 | 1.4 | 3.8 | 13.1 | 5.3 | 25.9 | 7.0 | 25.0 | 5.7 | 10.3 | 0.6 | 1.5 | 100.7 |
| FtSumner Irrig Div | 0.0 | 0.0 | 3.1 | 5.3 | 3.3 | 5.3 | 5.9 | 4.6 | 5.4 | 3.2 | 0.0 | 0.0 | 36.1 |
| Ft Sumner ID Return | 0.8 | 0.6 | 1.3 | 1.5 | 2.3 | 2.3 | 2.3 | 2.3 | 2.1 | 1.9 | 1.0 | 0.8 | 19.1 |
| Flow past FS IDist | 2.0 | 1.9 | 2.0 | 9.2 | 4.3 | 22.8 | 3.4 | 22.7 | 2.4 | 9.0 | 1.6 | 2.3 | 83.7 |
| Channel loss | 0.2 | 0.2 | 0.6 | 2.2 | 1.6 | 4.5 | 1.1 | 3.3 | 0.8 | 1.6 | 0.7 | 0.2 | 17.1 |
| Residual Flow | 1.8 | 1.7 | 1.5 | 7.1 | 2.7 | 18.3 | 2.3 | 19.3 | 1.6 | 7.4 | 0.9 | 2.1 | 66.6 |
| Base Inflow | 3.0 | 2.3 | 2.5 | 2.1 | 1.8 | 1.4 | 1.0 | 0.9 | 0.7 | 1.6 | 2.3 | 2.6 | 22.2 |
| River Pump Divers | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.5 |
| Residual, Artesia | 4.8 | 4.0 | 3.8 | 9.2 | 4.5 | 19.6 | 3.3 | 20.1 | 2.1 | 9.0 | 3.2 | 4.7 | 88.3 |
| Pecos Flow Artesia | 5.2 | 4.0 | 4.2 | 4.5 | 16.6 | 10.8 | 14.3 | 22.9 | 5.4 | 16.0 | 7.7 | 5.4 | 116.9 |
| Flood Inflow, AD-Art | 0.4 | 0.0 | 0.4 | -4.7 | 12.1 | -8.9 | 11.0 | 2.8 | 3.3 | 7.0 | 4.6 | 0.7 | 28.5 |

Note: Whenever the computed flow past the District is less than the return flow, set the flow past the District equal to the return flow (Manual, B.3.d).

| Table 3. Determination of Flood Inflows, Artesia to Carlsbad (B.4) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Water Year | 2015 | | | | | | | | | | | | |
| 6/18/2016 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | 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 | 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 |
| Rocky Arroyo at Hwy Br | 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 |
| Flood Inflow, Art-DS3 | 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 |
| Pecos R at Dam Site 3 | 1.4 | 1.3 | 1.8 | 13.0 | 7.7 | 14.9 | 9.9 | 40.9 | 40.1 | 3.2 | 1.2 | 1.3 | 136.6 |
| CB Sprgs New Water (from Table 7) | -0.7 | -0.7 | -0.7 | -0.7 | -0.7 | -0.7 | -0.7 | -0.7 | -0.7 | -0.7 | -0.7 | -0.7 | -8.6 |
| Total Inflow, DS3 - CB | 0.7 | 0.6 | 1.1 | 12.2 | 7.0 | 14.2 | 9.1 | 40.1 | 39.3 | 2.5 | 0.5 | 0.6 | 127.9 |
| Evap Loss, Lake Avalon (from Table 10) | 0.2 | 0.3 | 0.3 | 0.4 | 0.3 | 0.5 | 0.5 | 0.7 | 0.4 | 0.0 | 0.2 | 0.1 | 3.7 |
| Storage Chg, Lake Avalon (from Table 11) | 0.6 | 0.3 | -2.4 | 0.1 | 0.0 | 1.6 | -0.8 | 2.8 | 0.0 | -3.8 | 0.7 | 0.8 | -0.2 |
| Carls ID diversions | 0.0 | 0.0 | 3.0 | 11.0 | 5.8 | 11.8 | 8.5 | 10.5 | 6.3 | 4.7 | 0.0 | 0.0 | 61.6 |
| 93% CID diver | 0.0 | 0.0 | 2.8 | 10.3 | 5.4 | 10.9 | 7.9 | 9.7 | 5.9 | 4.4 | 0.0 | 0.0 | 57.3 |
| 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 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.4 |
| Pecos b Dark Canyon | 2.0 | 1.9 | 2.0 | 1.9 | 2.4 | 2.2 | 2.1 | 19.9 | 25.3 | 4.8 | 2.6 | 2.3 | 69.3 |
| Pecos R at Carlsbad | 2.0 | 1.9 | 2.0 | 1.9 | 2.2 | 2.2 | 2.1 | 19.9 | 25.3 | 4.6 | 2.6 | 2.3 | 68.9 |
| Total Outflow | 2.8 | 2.5 | 2.8 | 12.8 | 8.0 | 15.2 | 10.0 | 33.3 | 31.7 | 5.2 | 3.6 | 3.3 | 131.1 |
| Flood Inflow, DS3-CB | 2.1 | 1.9 | 1.7 | 0.6 | 1.0 | 1.0 | 0.9 | -6.9 | -7.7 | 2.8 | 3.1 | 2.8 | 3.1 |
| Flood Inflow, Art-CB | 2.1 | 1.9 | 1.7 | 0.6 | 1.0 | 1.0 | 0.9 | -6.9 | -7.7 | 2.8 | 3.1 | 2.8 | 3.2 |

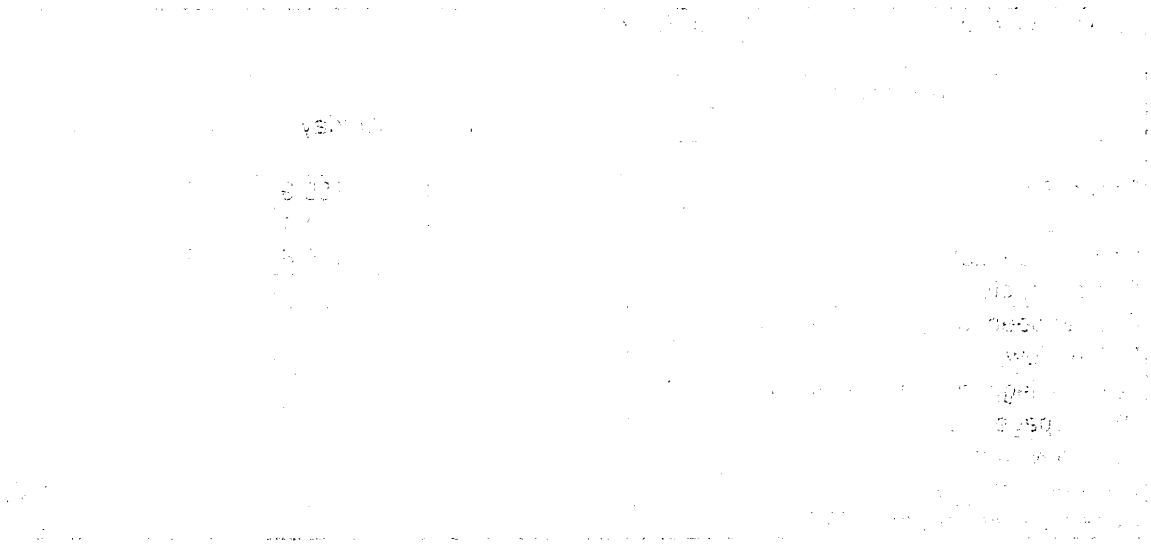


| Table 4. Summary Table for Computations, Carlsbad to State Line (B.5) | | | | | | |
|---|---|---|---|---|---|---|
| Water Year | | 2015 | | | | |
| 6/18/2016 | | | | | | |
| | | | | | | |
| | | | | | | |
| | | BCB - RB | | Del R* | DC | |
| | | RM | | | | |
| Jan | | 0.1 | | 0.0 | 0.0 | |
| Feb | | 0.0 | | 0.0 | 0.0 | |
| Mar | | 0.1 | | 0.0 | 0.0 | |
| Apr | | 0.1 | | 0.0 | 0.0 | |
| May | | 0.8 | | 0.1 | 0.2 | |
| Jun | | 0.2 | | 0.0 | 0.0 | |
| Jul | | 1.0 | | 0.1 | 0.0 | |
| Aug | | 0.0 | | 0.0 | 0.0 | |
| Sep | | 0.3 | | 0.9 | 0.0 | |
| Oct | | 0.7 | | 1.0 | 0.2 | |
| Nov | | 0.2 | | 0.0 | 0.0 | |
| Dec | | 0.2 | | 0.0 | 0.0 | |
| Total | | 3.6 | | 2.2 | 0.4 | |
| | | | | | | |
| | | | | | | |
| Summary of flood inflows, Carlsbad to State Line, TAF | | | | | | |
| | | | | | | |
| Red Bluff - Carlsbad + Dark C RM calcs) | | | | | | 4.0 |
| Delaware River | | | | | | 2.2 |
| **Total Flood Inflow, Carlsbad to State Line** | | | | | | 6.2 |
| | | | | | | |
| *USGS Computation was amended via Final Report | | | | | | |
| Values shown sum to 2.1 TAF but residuals at 1 AF precision add 0.1 TAF | | | | | | |

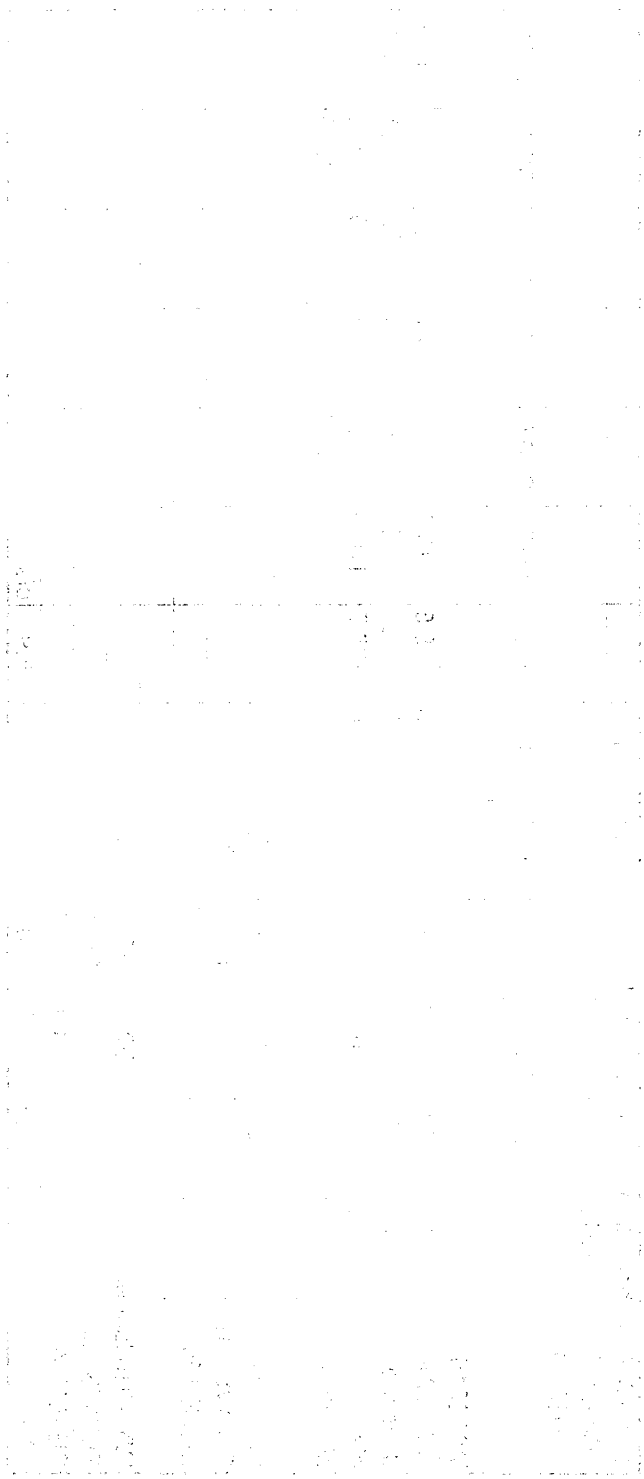


| Table 5. Depletions Due to Irrigation Above Sumner Dam (C.1.a) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Water Year | 2015 | | | | | | | |
| 5/8/2016 | | | | | | | | |
| | APR | MAY | JUN | JUL | AUG | SEPT | OCT | TOTAL |
| | | | | | | | | |
| Precip Las Vegas FAA AP | 0.57 | 4.43 | 3.95 | 3.29 | 2.60 | 0.50 | 4.28 | 19.62 |
| Eff prec Las Veg FAA AP | 0.56 | 3.55 | 3.27 | 2.80 | 2.29 | 0.49 | 3.47 | 16.43 |
| Precip Pecos Natl Monument | 0.13 | 2.82 | 1.32 | 4.52 | 2.27 | 0.43 | 3.73 | 15.22 |
| Eff Precip Pecos RS | 0.13 | 2.46 | 1.25 | 3.61 | 2.04 | 0.42 | 3.11 | 13.02 |
| Precip Santa Rosa | 0.63 | 5.13 | 1.62 | 4.83 | 3.35 | 0.46 | 3.93 | 19.95 |
| Eff Precip Santa Ro | 0.62 | 3.86 | 1.51 | 3.75 | 2.84 | 0.45 | 3.26 | 16.29 |
| Average eff precip, ft | 0.04 | 0.27 | 0.17 | 0.28 | 0.20 | 0.04 | 0.27 | 1.27 |
| Consumptive use, ft | 0.19 | 0.36 | 0.36 | 0.30 | 0.27 | 0.18 | 0.11 | 1.77 |
| Unit depletion rate (CU less eff precip), ft | 0.15 | 0.09 | 0.19 | 0.02 | 0.07 | 0.14 | 0.00 | 0.66 |
| Acres (most recent inventory) | 11529 | | | | | | | |
| Streamflow depletion (actual use), AF | 7641.2 | | | | | | | |
| 1947 depletion, AF | 10804 | | | | | | | |
| Difference (actual use - 1947 depletion), TAF | -3.2 | | | | | | | |
| Adjustment to Gaged Flow, Pecos River below Sumner Dam, TAF = | | | | | | -3.2 | | |

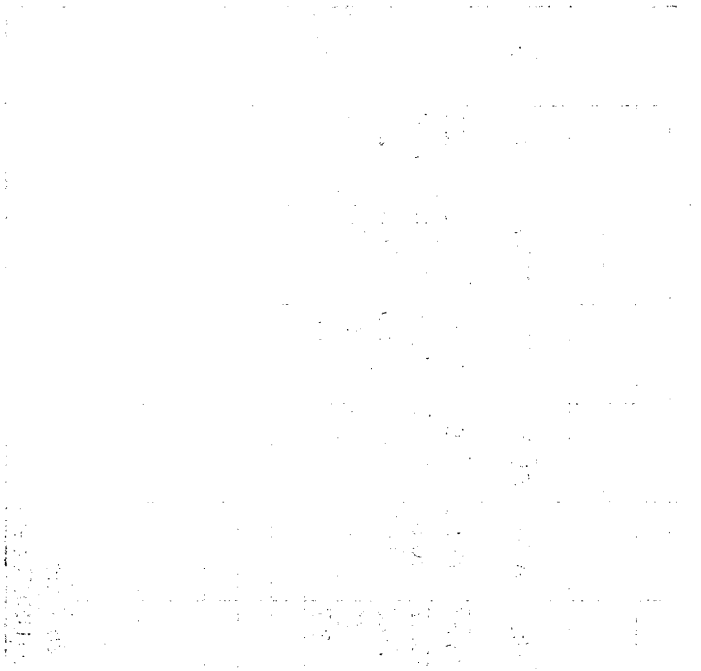
| Table 6. Depletions Due to Santa Rosa Reservoir Operations (C.1.b) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Water Year | 2015 | | | | | | | | | | | | |
| 6/18/2016 | | | | | | | | | | | | | |
| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | TOTAL |
| *LS 2001 table (USBR), add 4,200 feet to value shown; LSR 1997 tables used (COE); Add 4,700 feet to value shown* | | | | | | | | | | | | | |
| Lk Sumner ga ht, avg | 63.3 | 64.3 | 64.9 | 63.9 | 60.8 | 60.2 | 59.2 | 60.5 | 59.4 | 58.7 | 61.4 | 63.3 | |
| LS content, AF, avg | 42209 | 45031 | 46778 | 43887 | 35722 | 34287 | 31994 | 34999 | 32443 | 30889 | 37205 | 42209 | |
| LS area, acres, avg | 2758 | 2880 | 2942 | 2837 | 2431 | 2353 | 2238 | 2392 | 2260 | 2182 | 2510 | 2758 | |
| LS evap, inches | 1.8 | 3.8 | 6.2 | 11.5 | 11.0 | 11.6 | 12.1 | 12.1 | 9.7 | 6.7 | 4.2 | 3.7 | 94.37 |
| .77 LS Evap | 1.40 | 2.94 | 4.77 | 8.83 | 8.45 | 8.91 | 9.35 | 9.29 | 7.48 | 5.15 | 3.21 | 2.88 | 72.67 |
| LS Precip, inches | 1.51 | 0.67 | 0.59 | 0.18 | 2.95 | 4.39 | 6.05 | 1.76 | 1.16 | 4.83 | 0.59 | 0.99 | 25.67 |
| Net LS Evap, inches | -0.11 | 2.27 | 4.18 | 8.65 | 5.50 | 4.52 | 3.30 | 7.53 | 6.32 | 0.32 | 2.62 | 1.89 | 47.00 |
| LSum Evaploss, TAF | -0.02 | 0.55 | 1.03 | 2.05 | 1.11 | 0.89 | 0.62 | 1.50 | 1.19 | 0.06 | 0.55 | 0.43 | 9.94 |
| | | | | | | | | | | | | | |
| L S Rosa ga ht, avg | 36.60 | 37.57 | 36.67 | 37.95 | 40.37 | 46.19 | 44.75 | 45.84 | 46.02 | 46.50 | 45.24 | 44.94 | |
| LSR content, AF, avg | 69359 | 72256 | 69565 | 73416 | 81089 | 101497 | 96160 | 100180 | 100856 | 102672 | 97954 | 96852 | |
| LSR area, acres, avg | 2943 | 3031 | 2949 | 3070 | 3266 | 3780 | 3632 | 3746 | 3764 | 3808 | 3681 | 3650 | |
| LSR evap, inches | 3.7 | 5.0 | 8.7 | 9.2 | 9.4 | 10.7 | 11.2 | 10.0 | 8.5 | 4.3 | 4.9 | 3.7 | 89.30 |
| .77 LSR Evap | 2.86 | 3.88 | 6.72 | 7.05 | 7.25 | 8.20 | 8.60 | 7.70 | 6.58 | 3.31 | 3.74 | 2.86 | 68.76 |
| LSR precip, inches | 1.41 | 1.24 | 0.66 | 0.63 | 5.13 | 1.62 | 4.83 | 3.35 | 0.46 | 3.93 | 1.35 | 0.64 | 25.25 |
| Net LSR Evap, inches | 1.45 | 2.64 | 6.06 | 6.42 | 2.12 | 6.58 | 3.77 | 4.35 | 6.12 | -0.62 | 2.39 | 2.22 | 43.51 |
| LSR Evaploss, TAF | 0.36 | 0.67 | 1.49 | 1.64 | 0.58 | 2.07 | 1.14 | 1.36 | 1.92 | -0.20 | 0.73 | 0.68 | 12.44 |
| Total evaploss, TAF | 0.33 | 1.21 | 2.52 | 3.69 | 1.69 | 2.96 | 1.76 | 2.86 | 3.11 | -0.14 | 1.28 | 1.11 | 22.38 |
| | | | | | | | | | | | | | |
| Sum contents, AF | 111568 | 117287 | 116343 | 117303 | 116811 | 135784 | 128154 | 135179 | 133299 | 133561 | 135159 | 139061 | |
| 1947 area, acres | 4092 | 4233 | 4209 | 4234 | 4221 | 4600 | 4559 | 4600 | 4600 | 4600 | 4600 | 4600 | |
| 1947 evaploss, TAF | -0.04 | 0.80 | 1.47 | 3.05 | 1.93 | 1.73 | 1.25 | 2.89 | 2.42 | 0.12 | 1.00 | 0.72 | 17.37 |
| current-1947evaploss | 0.37 | 0.41 | 1.05 | 0.63 | -0.24 | 1.23 | 0.50 | -0.03 | 0.69 | -0.26 | 0.28 | 0.39 | 5.01 |
| | | | | | | Annual adjustment for excess evaporation = | | | | | | | 5.0 |
| | | | | | | | | | | | | | |
| ADJUSTMENT FOR EXCESSIVE STORAGE IN SANTA ROSA RESERVOIR | | | | | | | | | | | | | |
| | | | 2014 | 2014 | 2015 | 2015 | | | | | | | |
| | | | Gage | Storage | Gage | Storage | | | | | | | |
| EndYear Sumner Sto | | | 4262.55 | 42006 | 4263.90 | 43887 | | | | | | | |
| EndYear S R Sto | | | 4736.55 | 69211 | 4745.00 | 97072 | | | | | | | |
| Sum | | | | 111217 | | 140959 | | | | | | | |
| Sto Adjustment, TAF | | | | | | 11.7 | | | | | | | |
| Adjustm Ex Evap, TAF | | | | | | 5.0 | | | | | | | |
| Total Adjustment,TAF | | | | | | 16.7 | | | | | | | |
| | | | | | | | | | | | | | |
| | Storage adjustment | | | | | | | | | | | | |
| | Both equal or less than 129.3 TAF, adjustment is zero | | | | | | | | | | | | |
| | ~~Both greater than 129.3 TAF, subtract previous from current year~~ | | | | | | | | | | | | |
| | Current year less than 129.3 TAF, previous greater than 129.3 TAF, subtract previous year from 129.3 TAF | | | | | | | | | | | | |
| | Current year greater than 129.3 TAF, previous year less than 129.3 TAF, subtract 129.3 TAF from current year | | | | | | | | | | | | |

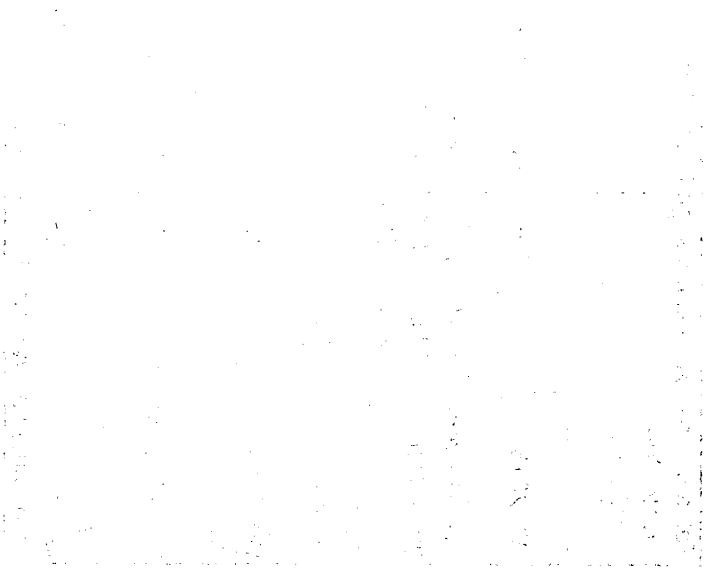


| Table 7. Carlsbad Springs New Water [B.4.c.(2)] | | | | | |
|---|---|---|---|---|---|
| Water Year | 2015 | | | | |
| 6/18/2016 | | | | | |
| | | TAF | AF/day | cfs | Totals |
| | | | | | |
| Pecos R bel DC | | 69.3 | 189.9 | 95.7 | 95.7 |
| Dark Canyon | | 0.4 | 1.1 | 0.6 | 0.6 |
| Pecos R bel Lake Avalon | | 53.2 | 145.8 | 73.5 | 73.5 |
| Depletion, cfs | | | | | 2.0 |
| CID lag seep, cfs (from Table 8) | | | | | 5.9 |
| Return flow, cfs | | | | | 1.0 |
| Lake Av lagged seep, cfs (from Table 9) | | | | | 25.7 |
| PR seepage, cfs | | | | | 3.0 |
| Carls new water, cfs | | | | | -11.9 |
| Carls new wat, TAF | | | | | -8.6 |
| Carls new wat monthly, TAF | | | | | -0.7 |



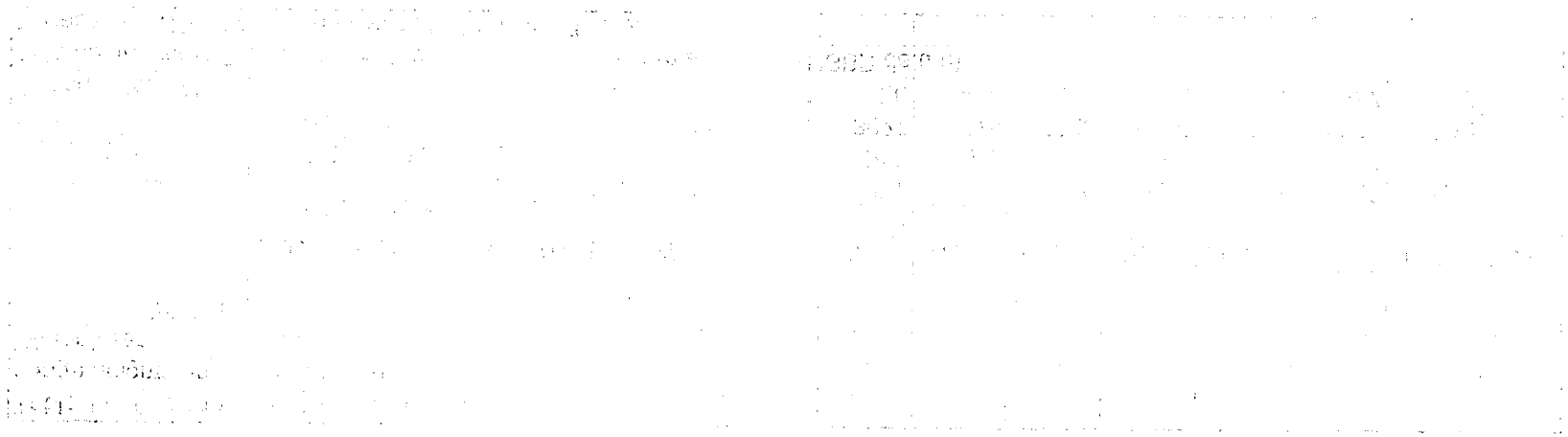
| Table 8. Carlsbad Main Canal Seepage Lagged [B.4.c.(2)(e)] | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Water Year | 2015 | | | | | | | | | | | | |
| 5/8/2016 | | | | | | | | | | | | | |
| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | TOTAL |
| | | | | | | | | | | | | | |
| WY 2015 | | | | | | | | | | | | | |
| CID, TAF | 0.0 | 0.0 | 3.0 | 11.0 | 5.8 | 11.8 | 8.5 | 10.5 | 6.3 | 4.7 | 0.0 | 0.0 | 61.6 |
| days/mo | 31 | 28 | 31 | 30 | 31 | 30 | 31 | 31 | 30 | 31 | 30 | 31 | 365 |
| cfs | 0 | 0.0 | 49.3 | 185.5 | 94.0 | 197.6 | 138.7 | 170.0 | 106.2 | 76.1 | 0.0 | 0.0 | 84.8 |
| cfs, qtr avg | | | 17.0 | | | 158.3 | | | 138.6 | | | 25.6 | |
| | | | | | | | | | | | | | |
| WY 2014 | | 1Q | 2Q | 3Q | 4Q | | | | | | | | |
| FLOWS, cfs | | | | 123.5 | 21.5 | | | | | | | | |
| SEVEN % | | | | 8.6 | 1.5 | | | | | | | | |
| | | | | | | | | | | | | | |
| WY 2015 lagged | | 1Q | 2Q | 3Q | 4Q | | | | | | | | |
| FLOWS, cfs | | 17.0 | 158.3 | 138.6 | 25.6 | | | | | | | | |
| SEVEN % | | 1.2 | 11.1 | 9.7 | 1.8 | | | | | | | | |
| LAG | | 2.5 | 6.2 | 8.7 | 6.0 | Avg = | 5.9 | cfs | | | | | |





| Table 9. Lake Avalon Leakage Lagged [B.4.c.(2)(g)] | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Water Year | 2015 | | | | | | | | | | | | |
| 5/8/2016 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| WY 2015 | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | TOT |
| | | | | | | | | | | | | | |
| Elev NM rept | 75.99 | 76.47 | 76.31 | 73.43 | 73.56 | 74.49 | 75.57 | 77.50 | 78.00 | 75.93 | 73.60 | 74.68 | |
| ga ht, avg* | 18.99 | 19.47 | 19.31 | 16.43 | 16.56 | 17.49 | 18.57 | 20.50 | 21.00 | 18.93 | 16.60 | 17.68 | |
| cfs | 28.8 | 31.1 | 30.3 | 16.5 | 17.2 | 21.6 | 26.8 | 36.0 | 38.4 | 28.5 | 17.3 | 22.5 | |
| days | 31 | 28 | 31 | 30 | 31 | 30 | 31 | 31 | 30 | 31 | 30 | 31 | 365 |
| cfs avg | 30.0 | | | 18.4 | | | 33.7 | | | 22.8 | | | 26.2 |
| | | | | | | | | | | | | | |
| WY 2014 | | 1Q | 2Q | 3Q | 4Q | | | | | | | | |
| cfs | | | | 23.2 | 22.2 | | | | | | | | |
| | | | | | | | | | | | | | |
| WY 2015 lagged | | 1Q | 2Q | 3Q | 4Q | | | | | | | | |
| | | | | | | | | | | | | | |
| cfs | | 30.0 | 18.4 | 33.7 | 22.8 | | | | | | | | |
| lag cfs | | 26.3 | 22.9 | 28.0 | 25.7 | Avg = | 25.7 | cfs | | | | | |
| * Computed as WS elev by NM Report minus Gage datum at 3157.0 (USBR datum) | | | | | | | | | | | | | |

| Table 10. Evaporation Loss at Lake Avalon [B.4.d.(1)] | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Water Year | 2015 | | | | | | | | | | | | | |
| 5/8/2016 | | | | | | | | | | | | | | |
| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOT | |
| Av WS NM Rept | 75.99 | 76.47 | 76.31 | 73.43 | 73.56 | 74.49 | 75.57 | 77.50 | 78.00 | 75.93 | 73.60 | 74.68 | | |
| Avalon ga ht, avg, ft* | 18.99 | 19.47 | 19.31 | 16.43 | 16.56 | 17.49 | 18.57 | 20.50 | 21.00 | 18.93 | 16.60 | 17.68 | | |
| Avg area Avalon, ac** | 806 | 841 | 829 | 638 | 646 | 704 | 777 | 918 | 956 | 802 | 648 | 716 | | |
| Panevap Brantley, in. | 4.65 | 5.60 | 5.73 | 10.14 | 11.34 | 12.01 | 12.60 | 12.47 | 8.71 | 5.90 | 4.80 | 4.34 | 98.29 | |
| Lakeevap Brantley, in. | 3.58 | 4.31 | 4.41 | 7.81 | 8.73 | 9.25 | 9.70 | 9.60 | 6.71 | 4.54 | 3.70 | 3.34 | 75.68 | |
| Precip Brantley, in. | 1.09 | 0.16 | 0.37 | 1.04 | 3.28 | 1.01 | 1.92 | 0.83 | 2.14 | 5.08 | 0.19 | 0.86 | 17.97 | |
| Netevap, inches | 2.49 | 4.15 | 4.04 | 6.77 | 5.45 | 8.24 | 7.78 | 8.77 | 4.57 | -0.54 | 3.51 | 2.48 | 57.71 | |
| Evaploss Av, TAF | 0.17 | 0.29 | 0.28 | 0.36 | 0.29 | 0.48 | 0.50 | 0.67 | 0.36 | -0.04 | 0.19 | 0.15 | 3.71 | |
| * Computed as WS elev by NM Report minus Gage datum at 3157.0 (USBR datum) | | | | | | | | | | | | | | |
| ** Based on USBR Area and Capacity Table in effect January 1, 1997 | | | | | | | | | | | | | | |



| Table 11. Change in Storage, Lake Avalon [B.4.d.(2)] | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (Gage heights are end of month) | | | | | | | | | | | | | | |
| Water Year | 2015 | | | | | | | | | | | | | |
| 5/8/2016 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | TOT |
| | 2014 | 2015 | | | | | | | | | | | | |
| WS NM Rept | 75.6 | 76.3 | 76.6 | 73.3 | 73.5 | 73.5 | 75.7 | 74.7 | 78.0 | 78.0 | 73.2 | 74.2 | 75.3 | |
| Gage EOM, ft* | 18.6 | 19.3 | 19.6 | 16.3 | 16.5 | 16.5 | 18.7 | 17.7 | 21.0 | 21.0 | 16.2 | 17.2 | 18.3 | |
| Storage, AF** | 2948 | 3511 | 3763 | 1333 | 1461 | 1461 | 3027 | 2275 | 5026 | 5026 | 1271 | 1925 | 2718 | |
| Change sto, TAF | | 0.6 | 0.3 | -2.4 | 0.1 | 0.0 | 1.6 | -0.8 | 2.8 | 0.0 | -3.8 | 0.7 | 0.8 | -0.2 |
| * Computed as WS elev by NM Report minus Gage datum at 3157.0 (USBR datum) | | | | | | | | | | | | | | |
| ** Based on USBR Area and Capacity Table in effect January 1, 1997 | | | | | | | | | | | | | | |

| Table 12. Data Required for River Master Manual Calculations | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Water Year | 2015 | | | | | | | | | | | | |
| 6/18/2016 | | | | | | | | | | | | | |
| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | TOTAL |
| | | | | | | | | | | | | | |
| STREAMFLOW GAGING RECORDS, TAF | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Pecos R b Sumner Dam | 1.3 | 1.4 | 3.8 | 13.1 | 5.3 | 25.9 | 7.0 | 25.0 | 5.7 | 10.3 | 0.6 | 1.5 | 100.7 |
| Fort Sumner Main C | 0.0 | 0.0 | 3.1 | 5.3 | 3.3 | 5.3 | 5.9 | 4.6 | 5.4 | 3.2 | 0.0 | 0.0 | 36.1 |
| Pecos R nr Artesia | 5.2 | 4.0 | 4.2 | 4.5 | 16.6 | 10.8 | 14.3 | 22.9 | 5.4 | 16.0 | 7.7 | 5.4 | 116.9 |
| 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 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Rocky Arroyo at Hwy Br nr | 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 |
| Pecos R at Dam Site 3 | 1.4 | 1.3 | 1.8 | 13.0 | 7.7 | 14.9 | 9.9 | 40.9 | 40.1 | 3.2 | 1.2 | 1.3 | 136.6 |
| Pecos bel Avalon Dam | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 22.4 | 29.2 | 1.6 | 0.0 | 0.0 | 53.2 |
| Carlsbad Main Canal | 0.0 | 0.0 | 3.0 | 11.0 | 5.8 | 11.8 | 8.5 | 10.5 | 6.3 | 4.7 | 0.0 | 0.0 | 61.6 |
| Dark Canyon at Carlsbad | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.4 |
| Pecos below Dark Canyon | 2.0 | 1.9 | 2.0 | 1.9 | 2.4 | 2.2 | 2.1 | 19.9 | 25.3 | 4.8 | 2.6 | 2.3 | 69.3 |
| Pecos R at Red Bluff | 4.9 | 4.2 | 4.5 | 4.3 | 5.3 | 4.0 | 4.3 | 19.6 | 27.8 | 11.7 | 5.5 | 5.1 | 101.1 |
| Delaware R nr Red Bluff | 0.3 | 0.3 | 0.4 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 | 1.0 | 1.4 | 0.4 | 0.4 | 5.4 |
| | | | | | | | | | | | | | |
| GAGE HEIGHTS | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Avalon gage ht, end mo | 76.3 | 76.6 | 73.3 | 73.5 | 73.5 | 75.7 | 74.7 | 78.0 | 78.0 | 73.2 | 74.2 | 75.3 | |
| Avalon gage ht, avg | 76.0 | 76.5 | 76.3 | 73.4 | 73.6 | 74.5 | 75.6 | 77.5 | 78.0 | 75.9 | 73.6 | 74.7 | |
| Sumner Lake ga ht, end mo | 63.9 | 64.7 | 64.7 | 61.0 | 60.7 | 59.7 | 59.8 | 60.0 | 58.9 | 57.5 | 62.6 | 63.9 | |
| Sumner Lake gage ht, avg | 63.3 | 64.3 | 64.9 | 63.9 | 60.8 | 60.2 | 59.2 | 60.5 | 59.4 | 58.7 | 61.4 | 63.3 | |
| Lake S Rosa ga ht, end mo | 36.6 | 36.6 | 37.1 | 38.3 | 44.0 | 43.4 | 45.4 | 46.2 | 45.9 | 47.4 | 45.0 | 45.0 | |
| Lake S Rosa ga ht, avg | 36.6 | 37.6 | 36.7 | 37.9 | 40.4 | 46.2 | 44.8 | 45.8 | 46.0 | 46.5 | 45.2 | 44.9 | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| PRECIPITATION, INCHES | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Brantley Lake | 1.09 | 0.16 | 0.37 | 1.04 | 3.28 | 1.01 | 1.92 | 0.83 | 2.14 | 5.08 | 0.19 | 0.86 | 17.97 |
| Las Vegas FAA AP | 0.70 | 1.08 | 1.21 | 0.57 | 4.43 | 3.95 | 3.29 | 2.60 | 0.50 | 4.28 | 0.56 | 0.37 | 23.54 |
| Pecos National Monument | 1.25 | 1.23 | 1.16 | 0.13 | 2.82 | 1.32 | 4.52 | 2.27 | 0.43 | 3.73 | 1.11 | 1.13 | 21.10 |
| Santa Rosa | 1.41 | 1.24 | 0.66 | 0.63 | 5.13 | 1.62 | 4.83 | 3.35 | 0.46 | 3.93 | 1.35 | 0.64 | 25.25 |
| Lake Santa Rosa | 1.41 | 1.24 | 0.66 | 0.63 | 5.13 | 1.62 | 4.83 | 3.35 | 0.46 | 3.93 | 1.35 | 0.64 | 25.25 |
| Sumner Lake | 1.51 | 0.67 | 0.59 | 0.18 | 2.95 | 4.39 | 6.05 | 1.76 | 1.16 | 4.83 | 0.59 | 0.99 | 25.67 |
| | | | | | | | | | | | | | |
| PAN EVAPORATION, INCHES | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Lake Santa Rosa | 3.7 | 5.0 | 8.7 | 9.2 | 9.4 | 10.7 | 11.2 | 10.0 | 8.5 | 4.3 | 4.9 | 3.7 | 89.3 |
| Lake Sumner | 1.8 | 3.8 | 6.2 | 11.5 | 11.0 | 11.6 | 12.1 | 12.1 | 9.7 | 6.7 | 4.2 | 3.7 | 94.4 |
| Brantley Lake | 4.7 | 5.6 | 5.7 | 10.1 | 11.3 | 12.0 | 12.6 | 12.5 | 8.7 | 5.9 | 4.8 | 4.3 | 98.3 |
| | | | | | | | | | | | | | |
| OTHER REPORTS | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Base Acme-Art, TAF (USGS) | 3.0 | 2.3 | 2.5 | 2.1 | 1.8 | 1.4 | 1.0 | 0.9 | 0.7 | 1.6 | 2.3 | 2.6 | 22.2 |
| Pump depl Ac-Artesia, TAF | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.5 |
| Pumping, C-2713, Malaga B | | | | | | | | | | | | | 0.2 |
| NM irrig inv, acres (3/9/2000) | | | | | | | | | | | | | 11529 |
| NM Transfer water use, TAF | | | | | | | | | | | | | |
| NM salvaged water, TAF | | | | | | | | | | | | | 0.00 |
| Texas, water stored NM, TAF | 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 |
| Texas, use Del water, TAF | | | | | | | | | | | | | |

# APPENDIX

# RESPONSE TO STATES' OBJECTIONS

# RESPONSE TO STATES' OBJECTIONS

Final Report, Accounting Year 2016

## NEW MEXICO OBJECTIONS

**1. Table 3. Determination of Flood Inflows, Artesia to Carlsbad.**

New Mexico noted an error in Table 3 where 2014 data were used incorrectly for Carlsbad Irrigation District (CID) diversions. The objection is accepted and the 2015 data were inserted into a revised Table 3. See also response to Texas objection 2.

**2. Table 4. Flood Inflow, Carlsbad to State Line.**

a. New Mexico noted that values listed on Table 4 as Delaware River flood inflow were incorrect because they include the entire flow of the river instead of the scalped flood Inflows. The objection is accepted and values have been revised. See also response to Texas objection 3

New Mexico wrote that the Preliminary Report flood inflow analysis appeared inconsistent with the procedure in B.5.a.(3) of the River Masters Manual for periods when Dark Canyon Draw was flowing. The River Master checked this for the dates mentioned (May 5- 6 and October 8) but on all of those dates the scalped flows were positive, so the revised procedures for Section B.5.a.(3) were not needed.

**3. Monthly Precipitation and Pan Evaporation for WY 2015**

New Mexico reported that Table RM3 provided by the NMISC was incorrect due to an error in pan evaporation data for Sumner Reservoir for November and December. The correct data were inserted into revised Tables 6 and 12.

## TEXAS OBJECTIONS

Texas entered a general objection related to unresolved issues from unusual flooding that occurred during WY 2014. These issues were the subject of a meeting between the states' Technical Representatives and the River Master on February 11, 2016. Notes from the meeting as transmitted by Ms. Hannah Riseley-White indicated that the states would work together to determine accounting for 2014-2015 and send to the River Master along with the necessary data adjustment for Dark Canyon Draw. As indicated in its general objection, Texas will contact New Mexico to resolve any issues related to WY 2014 for presentation to the River Master. If another meeting with the River Master is needed to resolve the issues, it can be held at the convenience of the states.

**1. Table 7. Carlsbad Springs New Water [B.4.c.(2)]. WY 2015:**

Texas noted an incidence where the leap year had not been returned to the 365 day year. This error has been corrected, and the objection is accepted. Tables 3 and 7 have been revised.

**2. Table 3. Determination of Flood Inflows, Artesia to Carlsbad [B.4], WY 2015. .**

The same objection was made by New Mexico (See NM #1 above). The objection is accepted and corrections have been made.

**3. Table 4. Summary Table for Computations, Carlsbad to State Line (B.5)**

a. Scalped Delaware River Flood Inflows.

1). Texas noted that the River Master had included all Delaware River flows and not only scalped flood flows. This is the same as New Mexico objection 2a above, and is accepted.
2). Texas made an independent calculation of Delaware River flood inflows by using a larger scale than USGS. This resulted in identification of additional flood inflows, which were verified by the River Master. The objection is accepted and the value used is 2.2 TAF for Delaware River flood inflows.

b. Scalped Flood Flows for Carlsbad to Red Bluff.
Texas noted several instances where values in the appendix did not look correct.

1) Texas is correct that values for January 30-31 were not included. This omission was corrected.
2) March and April values were also checked and all numbers calibrated, as outlined by Texas.
3) Texas suggested use of incorrect values for December 14-31 for the Pecos River below Dark Canyon gage. This was to be due to changes in the final approved streamflow values. The River Master has not received notification of any such changes and found a May 17, 2016 email message from Jeff Cordova of USGS to Texas that stated "I do not anticipate changes to any of the Pecos gage records for CY15." In any event, as noted by Texas, the totals would change very slightly even if the revisions had been made.
4). Texas noted an indication from the Black River hydrograph that there was flood inflow in the Carlsbad to Red Bluff reach in the late September time period (see Texas Exhibit E). The River Master analyzed this time period and agrees with Texas's assertion that 0.3 TAF of flood inflow should be added as a result of the September flows. However, Texas did not show any added flood inflow for August.

## FINAL CALCULATED DEPARTURE

The Preliminary Report's Final Calculated Departure was an overage of 11.9 TAF. After considering the states' objections, the Final Determination is an overage of 11.9 TAF.