

Upper Colo. - 5  
Cons. Use  
C-11

**M E M O R A N D U M**

March 23, 1998

**TO:** File

**FROM:** John Whipple and Patricia Turney, Staff Engineers,  
Interstate Stream Commission

**SUBJECT:** Upper Colorado River System-Consumptive Uses and Losses  
Report (New Mexico), 1991-95.

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Pursuant to the provisions of Title VI of Public Law 90-537,  
the Secretary of the Interior is directed to prepare reports on the  
annual consumptive uses and losses of water from the Colorado River  
system after each successive five-year period, beginning with the  
five year period starting October 1, 1970. This office is  
requested to furnish data on consumptive uses in New Mexico in the  
Upper Basin of the Colorado River for the period 1991-95.

The Interstate Stream Commission staff compiled consumptive  
use data for the New Mexico portion of the Upper Colorado River  
Basin (New Mexico Upper Basin) for the years 1991-95. Table 1  
shows estimates of water consumption by category for 1991-95.

RESERVOIR EVAPORATION

Evaporation in all reservoirs except Beeline Reservoir, Lake  
Morgan, Jackson, Berland, Big Gap, Holmburg, and Toadacheene are  
reported under the reservoir evaporation category. The named

reservoirs are variously used for municipal water supply, power generation, fish and wildlife, and recreation. Evaporation is reported accordingly.

Navajo Reservoir evaporation was computed for each year using the average of daily reservoir gage heights, corresponding surface areas, and actual pan evaporation and precipitation data recorded at Navajo Dam. Pan evaporation data from New Mexico State Engineer Technical Report 31 were used for months when data was not available at Navajo Dam.

Evaporation on all other reservoirs reported under this category was computed based on a long term average content for each month and long term net lake evaporation rates for individual areas. The same data were used in the 1986-90 Consumptive Uses and Losses Report.

#### AGRICULTURE

Agriculture accounts for about 49-53 percent of the consumptive water uses in the New Mexico Upper Basin during each of the years 1991-95. Irrigated acreage determinations were made using the following references: (1) Navajo Indian Irrigation Project (NIIP) Operation and Maintenance Status Reports for 1991-95; and (2) the writers' June 11, 1997, memorandum to file on Irrigated Acreage in the San Juan Basin in New Mexico. The latter

reference analyzes data obtained from the 1994 San Juan Basin Water-Related Land Use Inventory for New Mexico completed by the U.S. Bureau of Reclamation as part of its Upper Colorado Irrigated Land Assessment.

Irrigated acreage for the New Mexico Upper Basin was segregated into several irrigation areas, including above Navajo Dam, Animas River Valley, La Plata, Upper San Juan River, Middle San Juan River, Lower San Juan River, Chaco River and the NIIP. Except for the NIIP, irrigated acreage thus obtained was multiplied by appropriate consumptive irrigation requirement factors (CIRs). The CIRs used were calculated using the Blaney-Criddle formula and data for irrigated areas in the San Juan Basin in New Mexico as provided by New Mexico State University, Agricultural Experiment Station Bulletin 531, modified for the cropping pattern found by the Bureau of Reclamation's 1994 San Juan Basin Water-Related Land Use Inventory for New Mexico. Depletions for the NIIP were determined using the annual diversion from Navajo Reservoir for the project as reported in the annual NIIP Operation and Maintenance Status Reports and Bureau of Reclamation data relating to the build-up of groundwater in the project area. Irrigation depletions for the La Plata and Chaco River areas were adjusted for shortage conditions. Other irrigated areas did not experience water supply

shortages during the 1991-95 period.

Depletions for incidental losses during delivery to farms was estimated to be 15% of the CIR depletions for areas which had a full supply and 10% of the CIR depletions after supply factors were applied for areas with water supply shortages. Incidental losses were computed for all irrigated acreage except for the NIIP.

Stockpond evaporation data used in the 1986-90 Consumptive Uses and Losses Report were used in the computations for this report. An estimated 3,680 acre-feet per year was used for each year from 1991-95.

Livestock uses were calculated from annual head counts for each county as published in the New Mexico Agricultural Statistics by the United States Department of Agriculture. Percentages of each type of livestock in the New Mexico Upper Basin portions of Rio Arriba, McKinley and Sandoval counties were obtained from New Mexico State Engineer Technical Report 47 (TR 47). These same percentages were used in computations for this report. Per capita livestock water depletions from TR 47 were also used to obtain total livestock depletions for 1991-95 in the New Mexico Upper Basin.

#### MUNICIPAL/INDUSTRIAL

This category includes water use for the extraction of mineral

resources, generation of thermal electric power, municipally-supplied domestic and industrial uses, self-supplied industrial and commercial uses, and rural domestic uses. Self-supplied water use for mineral resource extraction and thermal electric power generation were reported by the Water Rights Division of the Office of the State Engineer for 1991-95. Evaporation from Lake Morgan is included in the industrial category.

Municipal and domestic water suppliers also report annual water withdrawals to the Water Rights Division. Where annual reports were not available, per-capita water demands listed in New Mexico State Engineer Technical Report 49 and population data were used to estimate water withdrawals. Depletions for municipal uses were calculated based on measured diversions and measured wastewater treatment plant returns where the data were available. Where such data were not available, domestic and municipal uses were assumed to have a depletion factor of 40-45%. Evaporation from Beeline Reservoir is included in the municipal category.

#### FISH AND WILDLIFE, RECREATION

Reservoir evaporation data for this category were developed for the 1986-90 Consumptive Uses and Losses Report and these data were included in this 1991-95 report. Evaporation from Jackson, Berland, Big Gap, Holmburg and Toadacheene reservoirs is included

in this Fish and Wildlife, Recreation category. About 85% of the depletion attributed to this category is for fish and wildlife purposes, including reservoir evaporation and irrigated acreage at Jackson Wildlife Refuge for wildlife feeding. Also included in the Fish and Wildlife, Recreation category are depletions at National and State Parks in San Juan and Rio Arriba counties and self-supplied golf courses and miscellaneous businesses in San Juan County.

#### EXPORTS

The only exported water in the New Mexico Upper Basin in the 1991-95 period occurred from the San Juan-Chama Project diversions. These diversions are considered fully depleted and are reported by the U.S. Geological Survey in annual water supply papers for New Mexico as the discharge of Azotea Tunnel at Outlet, near Chama, New Mexico.

#### POPULATION

Population estimates for 1991-95 were based on population data prepared by the Bureau of Business and Economic Research at the University of New Mexico. Table 2 summarizes population estimates for 1991-95.

**Table 1.****Consumptive Water Use in the Upper Colorado River Basin, New Mexico**

Units: Thousand acre-feet

Year	Reservoir Evaporation	AGRICULTURE				M & I			Fish & Wildlife, Recreation	Export SJ-C Project	Estimated Total Water Use
		Irrigation	Stockpond Evap & Livestock	Mineral Resources	Thermal Electric Power	Municipal & Industrial, & Domestic					
1991	43.9	192.3	4.5	1.1	34.5	10.7	1.0	113.4	401.4		
1992	45.0	178.8	4.5	1.6	35.3	9.7	1.0	87.1	363.0		
1993	40.5	192.4	4.5	1.8	43.7	11.0	1.0	98.8	393.7		
1994	44.0	203.0	4.4	1.8	44.5	11.0	1.0	82.2	391.9		
1995	39.5	197.3	4.4	2.2	43.1	11.0	0.9	86.3	384.7		

**Table 2.****Population in the Upper Colorado River Basin, New Mexico**

Year	McKinley	Rio Arriba	Sandoval	San Juan	UCRB-NM
					Total Population
1990	9,735	3,402	32	91,896	105,065
1991	9,939	3,450	33	93,532	106,954
1992	10,148	3,498	35	95,197	108,877
1993	10,361	3,547	36	96,891	110,835
1994	10,578	3,597	38	98,616	112,829
1995	10,801	3,647	40	100,371	114,859