242. ST.
NAVAJO UNIT COLORADO RIVER STORAGE Navajo Res

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

November 21, 1967

3095

Dear Mr. President:

Enclosed is a draft of a proposed joint resolution, "To approve long-term contracts for delivery of water from Navajo Reservoir in the State of New Mexico, and for other purposes." cy-105 w/

We recommend that this joint resolution be referred to the appropriate committee for consideration, and we recommend that it be enacted.

The Act of June 13, 1962 (76 Stat. 96, Public Law 87-483), authorized the construction and operation of the Navajo Indian Irrigation Project and the San Juan-Chama Project as participating projects of the Colorado River Storage Project. The Act also authorized the Secretary to market water from Navajo Reservoir for other municipal and industrial uses in New Mexico if he determines on the basis of hydrologic investigation that such water is reasonably likely to be available. Section 11(a) of the Act provides in part that:

> "No long-term contract, except contracts for the benefit of the lands and for the purposes specified in sections 2 /Navajo Indian Irrigation Project/ and 8 /San Juan-Chama Project/ of this Act, shall be entered into for the delivery of water stored in Navajo Reservoir or of any other waters of the San Juan River and its tributaries, as aforesaid, until the Secretary has determined by hydrologic investigation that sufficient water to fulfill said contract is reasonably likely to be available for use in the State of New Mexico during the term thereof under the allocations made in Articles III and XIV of the Upper Colorado River Basin Compact, and has submitted such determination to the Congress of the United States and the Congress has approved such contracts."

3095

I hereby determine that sufficient water is reasonably likely to be available under the provisions of section 11(a) to fulfill contracts that involve water depletions up to 100,000 acre-feet annually through the year 2005. The basis for this determination is explained in the enclosure entitled "Hydrologic Determinations".

cc: Commissioner of Reclamation
Reg. Dir., Salt Lake City, Utah
Reg. Solicitor, Salt Lake City

Also enclosed with this letter are copies of the following two contracts which have been negotiated for the delivery of water from Navajo Reservoir for municipal and industrial use in the Four Corners area of New Mexico. They involve an estimated water depletion of 16,250 acre-feet annually, and are within the preceding determination.

	Water Diversion (acre-feet)	Estimated Water Depletion (acre-feet)	Proposed Uses
Public Service Company of New Mexico	20,200	16,200	Thermal-electric generation
Southern Union Gas Company	50	50	Pump cooling
	20,250	16,250	

A summary of the contract provisions is enclosed.

The purpose of the proposed legislation is to approve the execution of these contracts. Other contracts within the 100,000 acre-feet total will be submitted for approval after they are processed within the Department.

The Bureau of the Budget has advised that there is no objection to the presentation of this proposed legislation from the standpoint of the Administration's program.

Sincerely yours,

Assistant Secretary of the Interior

Hon. Hubert H. Humphrey
President of the Senate
Washington, D. C.

Enclosures

NOTICE: IF YOU DETACH ENCLOSURES PLEASE INSERT CODE NO._____

J O I N T R E S O L U T I O N

To approve long-term contracts for delivery of water from Navajo Reservoir in the State of New Mexico, and for other purposes.

Whereas section 11(a) of the Act of June 13, 1962 (76 Stat. 96, Public Law 87-483), provides that:

"No long-term contract, except contracts for the benefit of the lands and for the purposes specified in sections 2 /Navajo Indian Irrigation Project/ and 8 /San Juan-Chama Project/ of this Act, shall be entered into for the delivery of water stored in Navajo Reservoir or of any other waters of the San Juan River and its tributaries, as aforesaid, until the Secretary has determined by hydrologic investigation that sufficient water to fulfill said contract is reasonably likely to be available for use in the State of New Mexico during the term thereof under the allocations made in Articles III and XIV of the Upper Colorado River Basin Compact, and has submitted such determination to the Congress of the United States and the Congress has approved such contracts."; and

Whereas the Secretary has made such determination in connection with the following contracts transmitted to Congress by letter dated _____:

	Water Diversion (acre-feet)	Estimated Water Depletion (acre-feet)	Proposed Uses
Public Service Company of New Mexico	20,200	16,200	Thermal-electric generation
Southern Union Gas Company	50	50	Pump cooling
	20,250	16,250	

Now, therefore, be it

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That such contracts are hereby approved by the Congress. The Secretary may enter into amendments thereto which would in his judgment be in the interest of water conservation, but the total water depletion shall not exceed the estimates set forth in this joint resolution.

Hydrologic Determinations

Determinations as to the availability of water under long-term service contracts for municipal and industrial uses from Navajo Reservoir involve a projection into the future of estimated water uses and water supplies. On the basis of such hydrologic studies, water depletions under municipal and industrial contracts could reasonably be allowed to rise to 100,000 acre-feet annually through the year 2005.

To avoid a critical compact interpretation, we assume that the Upper Basin will be obligated to deliver 75 million acre-feet of water every 10 years at Lee Ferry, plus 750,000 acre-feet annually toward Mexican Treaty deliveries. This would require an average annual water delivery at Lee Ferry of at least 8,250,000 acre-feet. This assumption is not to be considered as an interpretation of the Upper Basin obligation for water delivery at Lee Ferry under the Colorado River Compact. It represents, rather, a practical and conservative approach for the purposes of the present determination required by section 11(a).

In August 1965, we provided the Congress with the following water data in connection with the proposed Lower Colorado River Project:

	Year of Development	
	2000	2030
Estimated normal annual depletion in Upper Basin	5,430,000 AF	5,800,000 AF
Estimated annual Lee Ferry regulated delivery	8,600,000 AF	8,250,000 AF

Water deliveries at Lee Ferry, in the absence of depletions under proposed long-term municipal and industrial contracts, would in all probability be at least 8,500,000 acre-feet annually through year 2005. Contracts involving a depletion of up to 100,000 acre-feet would leave more than enough water to meet the 8,250,000 acre-feet estimated annual delivery requirement even in year 2030. On this basis, we conclude that the expansion of water uses now envisioned in the Upper Basin by 2005, including deliveries under long-term contracts involving 100,000 acre-feet depletions, would not impair the Upper Basin's ability to meet its water delivery obligation at Lee Ferry.

As to water use in the Upper Basin, subsection (b) of article III of the Upper Colorado River Basin Compact permits New Mexico or any other Upper Basin State to use waters in excess of its percentage allotment, provided such excess use does not prohibit any of the remaining States from utilizing its respective allotment. Thus, the availability of Navajo Reservoir water for municipal and industrial purposes in New Mexico through year 2005 depends upon the extent of water use in the entire Upper Basin during that period as well as upon the physical availability of water in Navajo Reservoir.

Hydrologic studies based on repetition of the 1928-65 water runoff period, which includes the severest drought period of record, and with water depletions anticipated during the 38 years prior to the year 2005, indicate with reasonable certainty the availability of a sufficient amount of water from Navajo Reservoir for the proposed municipal and industrial water delivery contracts, with reasonable shortages to be borne at times by all diverters from Navajo Reservoir. Pertinent data from the operation study on the shortages are summarized below.

	Navajo Indian Irrigation Project	Hammond Project	M&I Contracts
No. of years of study	38	38	38
No. of years of full supply	35	35	35
Assigned shortage (% of Normal Diversion Requirement)			
1955	10	10	10
1956	40	40	40
1964	26	26	26
Average for 38 years	2	2	2

We therefore conclude that water deliveries specified in the proposed municipal and industrial contracts can be provided from Navajo Reservoir with reasonable shortages.

Summary of Contract Terms

I. Each of the proposed contracts provides for:

1. Termination in year 2005, and subject to renewal or extension only if such is authorized by law;

2. A sharing of shortages in accordance with law, compact, and treaty;

3. Advance payment for the water to be delivered at an annual rate of $7 per acre-foot;

4. Water pollution control provisions on return flows; and

5. Standard provisions for penalties for delinquency in payment, water measurement, and responsibility for distribution, water quality, record keeping, conflict of interest, equal employment opportunity, etc.

II. The proposed contract with Public Service Company of New Mexico also provides for:

1. Termination of the contract for nonuse of the water after January 1, 1977;

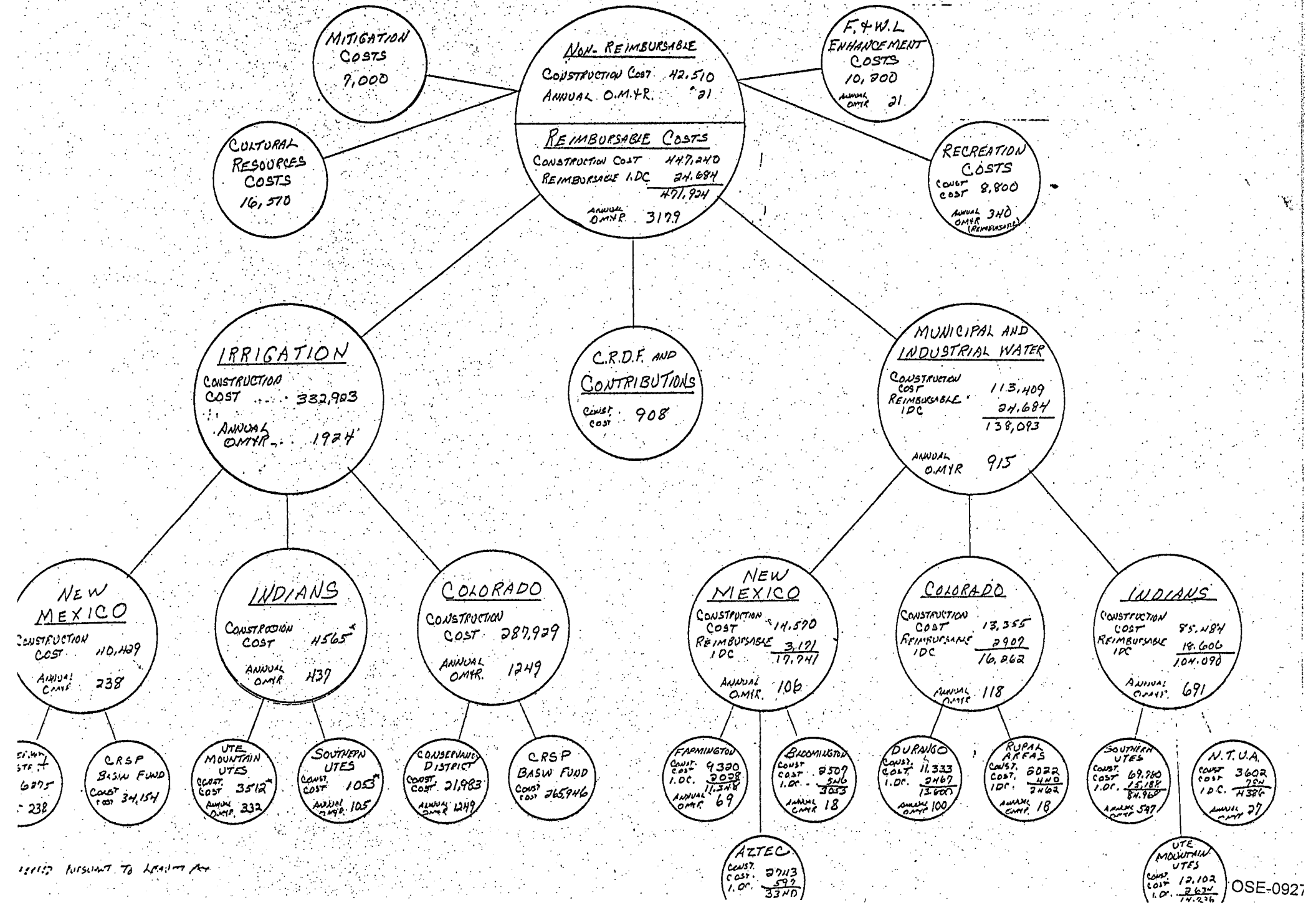
2. Advance approval by the Secretary of contractor's designs, plans, and specifications for facilities or major modifications thereof which will utilize the contracted water;

3. Air pollution control standards, with provision for review of these standards not less often than each 10 years, and with the further condition that in case agreement cannot be reached between the contractor and the United States on designs, plans, or equipment, the matter shall be submitted to arbitration;

4. Coordination of Federal and non-Federal generating and transmission facilities as a precedent to the delivery of water for thermal-electric generation.

(. UNIT $1,000)

PROJECT CONSTRUCTION COST	489,750
REIMBURSABLE INTEREST DURING CONSTRUCTION AT 8.625%	24,684
ANNUAL OPERATION, MAINTENANCE AND REPLACEMENT COSTS	3,200



SUBJECT PURSUANT TO LEGISLATION

OSE-0927

Table C-
Effects on Animas, La Plata, Mancos and San Juan Rivers in project area

Location	Average Annual Decrease or Increase (acre-feet)		
Animas River			
Durango service area outfall to Basin Creek	-132,700	-128.6	ANIMAS @ LA PLATA
Basin Creek to Florida River	-131,800		
Florida River to upstream of diversions to Aztec, Farmington, and NTUA service areas	-131,000	-127.8	ANIMAS @ CEDAR HILL
Aztec service area outfall to mouth	-161,600	-158.2	ANIMAS @ FARMINGTON " " MOUTH
La Plata River			
Upstream of La Plata Diversion Dam	-1,900	-1.1	LA PLATA @ HESPERUS
Downstream of Dry Side Canal	+17,100		
Upstream of Southern Ute Diversion Dam	+29,800	+32.5	@ S.U. DIVERSION DAM
Downstream of Southern Ute Diversion Dam	-18,100	-18.9	@ STATE LINE
At mouth	-12,300	-6.5	@ FARMINGTON
Mancos River			
South of Mancos (20 miles)	+5,300		
San Juan River			
Bloomfield service area outfall to Animas River	-2,500		
Farmington service area outfall to La Plata River	-154,100	-151.2	SJ @ FARMINGTON
La Plata River to NTUA service area outfall	-166,400		
NTUA service area outfall to Mancos River	-162,400		
Downstream of Mancos River	-154,700	-153.4	SJ @ BLUFF

LOWER ANIMAS MAINSTREAM DITCHES PRIORITY

		DITCH	PRIORITY	PRIORITY DATE	MAX DIV RATE CFS	ACCUM DIV RATE CFS	ACRES SERVED	TOWN SERVE
1	1/	LOWER ANIMAS	1A	1877	44.11	44.11	1477	AZTEC
2	2/ 3/	STAR	1B	1877	54.97	109.08	1362	FARMING
3	4/	GRAVES	2A	1878	1.68	110.76	55	
4	5/	ELEDGE	2B	1878	25.79	136.55	1032	
5	6/	FARMINGTON-ALLEN	2C	1878	16.25	152.8	650	
6	7/	WILLETT	2D	1878	1.61	154.41	49	
7	8/	WRIGHT-LEGGETT	2E	1878	41.22	195.63	809	FARMING
8		KELLO-BLANCETT	3A	1880	13.15	208.78	526	
9		TERRELL	3B	1880	8.63	217.41	345	
10	9/	AZTEC	4	1882	28.24	245.65	1130	
11		CEDAR	5A	1886	8.52	254.17	341	
12		RALSTON	5B	1886	9.2	263.37	364	
13		STACEY	5C	1886	12.08	275.45	483	
14		TWIN ROCKS	6	1887	8.62	284.07	345	
15		SARGENT	7	1888	4.5	288.57	174	
16	10/	INDEPENDENT	8A	1891	71.96	360.53	1788	FARMING
17		HALFORD	8B	1891	22.28	382.81	891	
18	11/	FARMERS'	9	1892	27.4	410.21	1096	
19		ECHO	10	1896	39.61	449.82	1585	
20	12/	NORTH FARMINGTON	11	1897	57.9	507.72	1188	FARMING
21		ATTEBERRY	12	1901	16.08	523.8	643	
22		AZTEC EXT	13	1903	6.38	530.13	253	
23		JONES EXT of FARMERS'	14	1907	5.26	535.39	210	
24								
25		LOWER ANIMAS EXT	15	1907	16.05	551.44	642	
26		FARMERS MUTUAL	16	1920	104.53	655.97	4182	
27								
28								
29	1/	3.59 cfs of 44.11 for Aztec, Lower Animas and Extension Combined for diversion						
30								
31	2/	10.47 cfs of 54.97 for FARMINGTON						
32	3/	10 cfs reflected on column 4 for Farmington Municipal Reservoir diverted through Independent Ditch - 1877 Priority						
33								
34	4/	Graves-Atteberry combined for diversion; thereafter known as INCA						
35	5/	200 cfs for N.M. Public Service not included						
36	6/	Farmington-Allen and Echo combined for diversion; thereafter known as Farmington-Echo						
37								
38	7/	205 cfs for N.M Public Service not included						
39	8/	10.5 cfs of 41.22 for Farmington						
40	9/	Aztec and Aztec Extension combined for diversion						
31	10/	8.76 cfs of 71.96 for Farmington; 110 cfs for Farmington Municipal Reservoir is not included - Reflected on column 4 of Star entry						
32								
33								
34	11/	Farmers' and Jones Extension combined for diversion						
35	12/	14.1 cfs of 57.9 for Farmington						
36								
37		Total Acres served 21620						
38								
39								
40								

Table C-
Effects on Animas, La Plata, Mancos and San Juan Rivers in project area

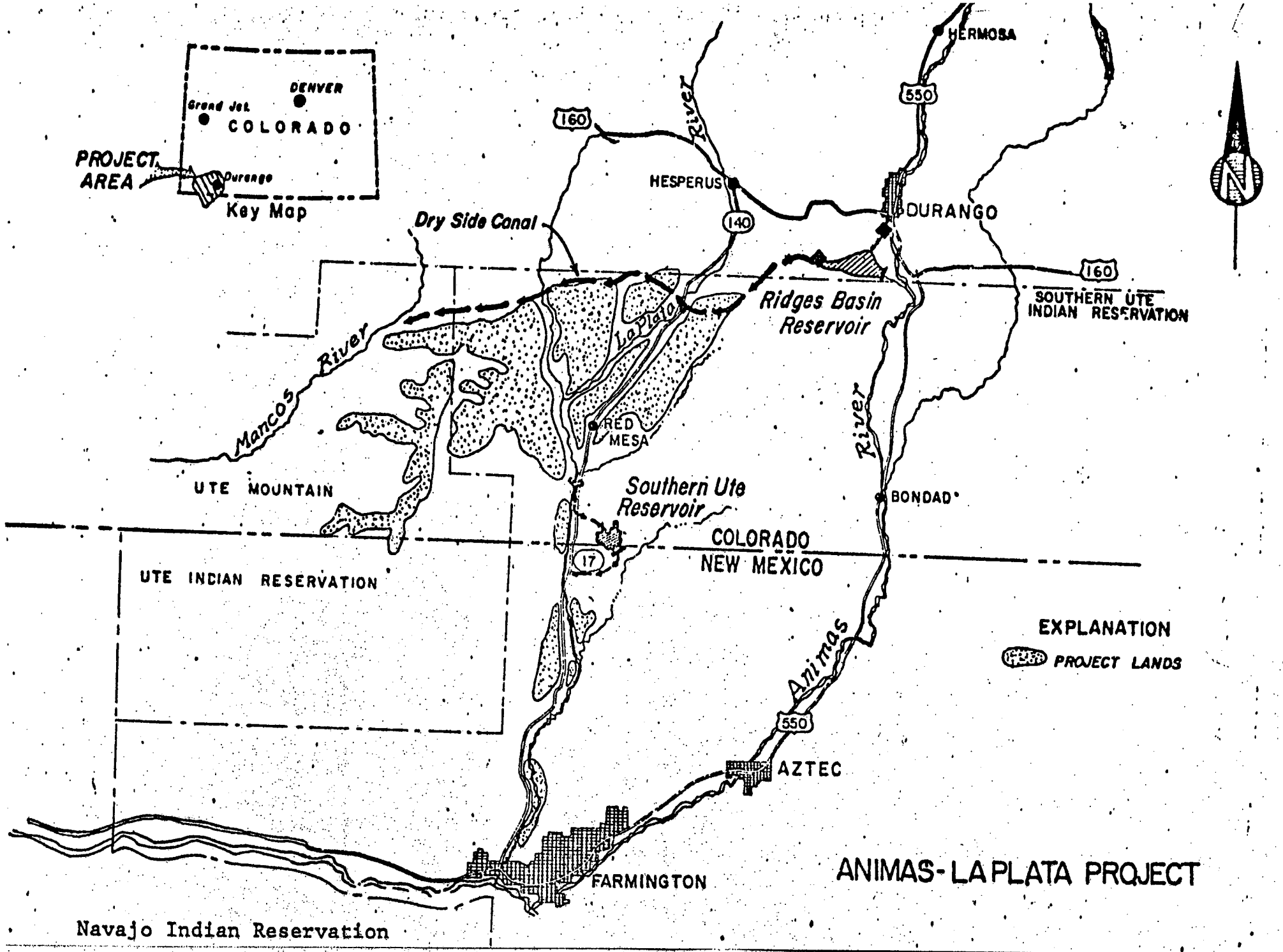
Location	Average Annual Decrease or Increase (acre-feet)	Percent of Decrease or Increased Inflow
Animas River		
Durango service area outfall to Basin Creek	-132,700	-24
Basin Creek to Florida River	-131,800	-24
Florida River to upstream of diversions to Aztec, Farmington, and NTUA service areas	-131,000	-21
Aztec service area outfall to mouth	-161,600	-28
La Plata River		
Upstream of La Plata Diversion Dam	-1,900	-6
Downstream of Dry Side Canal	+17,100	+68
Upstream of Southern Ute Diversion Dam	+29,800	+112
Downstream of Southern Ute Diversion Dam	-18,100	-79
At mouth	-12,300	-68
Mancos River		
South of Mancos (20 miles)	+5,300	+30
San Juan River		
Bloomfield service area outfall to Animas River	-2,500	0
Farmington service area outfall to La Plata River	-154,100	-10
La Plata River to NTUA service area outfall	-166,400	-11
NTUA service area outfall to Mancos River	-162,400	-11
Downstream of Mancos River	-154,700	-9

SJ @ Bluff

THE
ANIMAS-LA PLATA
PROJECT

APRIL 1978

OSE-0931


DENVER
Grand Jct.
COLORADO
PROJECT AREA
Durango
Key Map
HERMOSA
550
160
River
HESPERUS
140
DURANGO
Dry Side Canal
160
SOUTHERN UTE INDIAN RESERVATION
La Plata
Ridges Basin Reservoir
Manco's River
RED MESA
River
UTE MOUNTAIN
Southern Ute Reservoir
BONDAD
COLORADO
NEW MEXICO
17
UTE INDIAN RESERVATION
EXPLANATION
PROJECT LANDS
Animas
550
AZTEC
FARMINGTON
ANIMAS-LA PLATA PROJECT
Navajo Indian Reservation

OSE-0932

THE ANIMAS-LA PLATA PROJECT

Introduction

The Animas-La Plata Project would be located in the Upper Colorado River Basin in La Plata and Montezuma Counties of southwestern Colorado and in San Juan County of northwestern New Mexico. The authorization for construction, operation, and maintenance of the project came under Title V of Public Law 90-537, September 30, 1968, as a participating project of the Colorado River Basin Project Act.

Project Objectives

The project serves as a multiple purpose water resource development. Municipal and industrial water will be furnished to the cities of Durango, Colorado, and Aztec, Farmington, and the Navajo Tribe in New Mexico and to surrounding communities and for the development of resources on the Southern Ute and Ute Mountain Ute Indian Reservations. The project will also provide irrigation water primarily for land in the La Plata River drainage and for some land in the Mancos River drainage. Opportunities will be made for recreational development and for fish and wildlife enhancement at project reservoirs.

Proposed Plan

The main storage feature of the project will be Ridges Basin Reservoir, located southwest of the city of Durango. The Durango Pumping Plant, south of the city, will pump Animas River water to Ridges Basin Reservoir. Stored water will be released as required back to the Animas River for Aztec, Farmington, the Navajo Tribe and other potential municipal and industrial users in New Mexico. Durango and the surrounding communities will obtain their additional municipal and industrial water from Ridges Basin Reservoir.

In addition to storing Durango's municipal and industrial water, Ridges Basin Reservoir will also provide storage for the Southern Ute and the Ute Mountain Ute Indian Tribes' industrial and irrigation water and for the Colorado irrigators' water.

The Ridges Basin Pumping Plant, located on the western edge of the reservoir, will pump water from the reservoir into the Dry Side Canal, which will then convey the water to the La Plata Drainage. The canal will provide most of the water for the La Plata, Colorado and Dry Side areas, some water for New Mexico irrigation, and municipal and industrial water for the Southern Ute and Ute Mountain Ute Tribes. La Plata River flows could be diverted into the Dry Side Canal when the flows could not be stored in Southern Ute Reservoir.

Southern Ute Reservoir will store La Plata River flows diverted into the reservoir through the Southern Ute Diversion Dam and Canal.

Southern Ute Reservoir will meet the municipal and industrial water requirements of the Southern Ute Indians and the irrigation requirements of the New Mexico lands.

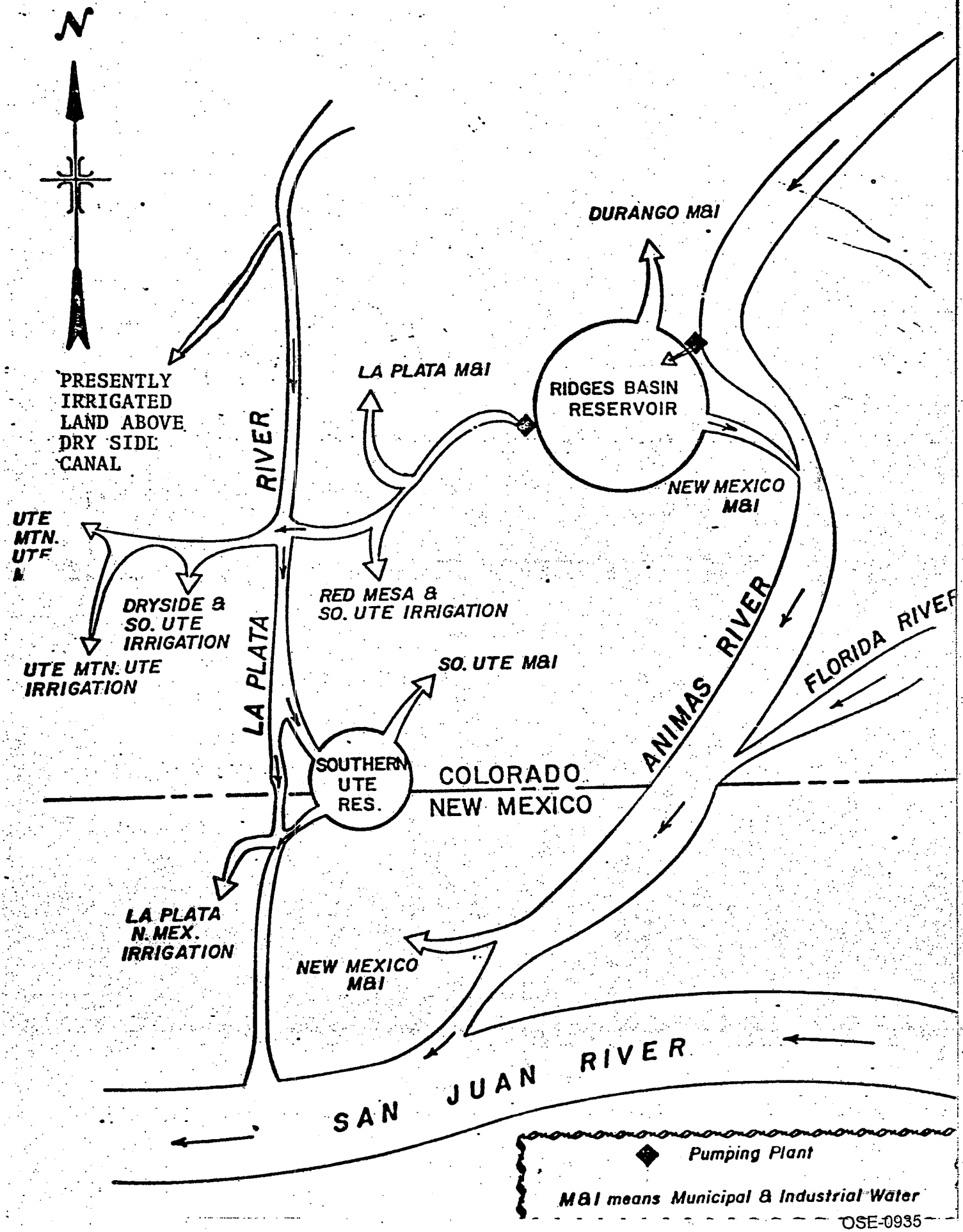
Should not enough La Plata River water be available from the reservoir to meet these requirements, additional water will come from Ridges Basin Reservoir (through Ridges Basin Pumping Plant, Dry Side Canal and the La Plata River).

Presently irrigated lands, north of the Dry Side Canal, will be given an opportunity to buy project water from the La Plata River. This water is presently used below the canal, but with the project it can be used elsewhere. Existing ditches will distribute the water.

Sprinkler irrigation will be used on all project lands except above the Dry Side Canal. The lateral systems will provide sprinkler pressure at each farm turnout. Pumping plants will provide this pressure where the ground slope is insufficient to pressurize the pipeline. Project drainage will also be furnished, where required, on project land.

- Fisheries will be created in the inactive pools of Ridges Basin and Southern Ute Reservoirs. In addition, recreational facilities will be provided at these reservoirs.

ANIMAS-LA PLATA PROJECT
WHERE THE WATER GOES



OSE-0935

ANIMAS-LA PLATA PROJECT

PLAN OF DEVELOPMENT

STATISTICS

MUNICIPAL AND INDUSTRIAL WATER (acre-feet)

Durango, Colorado[1/]	10,600
Southern Ute Indian Reservation	26,500
Ute Mountain Ute Indian Reservation	6,000
San Juan County New Mexico[2/]	31,000
Navajo Tribe	7,600
Total	81,700

IRRIGATION (Land and Water Supply)

	(Acres)	(Acre-Feet)
Colorado		
Full Service		
Southern Ute Tribe	1,800	3,300
Ute Mountain Ute Tribe	11,580	25,300
Non-Indian	30,280	54,600
Total	43,660	83,200
Supplemental Service		
Non-Indian	17,810	19,500
Total	17,810	19,500
Total Colorado	61,470	102,700
New Mexico		
Full Service		
Ute Mountain Ute Tribe	400	900
Non-Indian	4,510	11,800
Total	4,910	12,700
Supplemental Service		
Non-Indian	3,720	4,900
Total	3,720	4,900
Total New Mexico	8,630	17,600
Project Total	70,100	120,300

Project Water Supply

Municipal and Industrial	83,200	acre-feet
Irrigation	120,300	acre-feet
Total	203,500	acre-feet

1/ Includes city of Durango, Florida Mesa and La Plata River drainage.

2/ Farmington, Aztec, et al.

ANIMAS-LA PLATA PROJECT

PLAN OF DEVELOPMENT

STATISTICS

CRSP DEPLETION (acre-feet)

Colorado	
M&I	38,700
Irrigation	78,100
Evaporation	3,200
Total	120,000
New Mexico	
M&I	18,700
Irrigation	13,000
Evaporation	2,400
Total	34,100
Project Total	
Colorado	120,000
New Mexico	34,100
	154,100

EFFECTS ON COLORADO RIVER AT IMPERIAL DAM

Estimated stream depletion (acre-feet)	154,100
Estimated effect of salt loading (mg/l)	1.2

ANIMAS-LA PLATA PROJECT
PLAN OF DEVELOPMENT

PROJECT FEATURES	Ridges Basin	Southern Ute
RESERVOIRS		
Total Capacity (acre-feet)	280,500	70,000
Active Capacity (acre-feet)	130,000	40,000
Inactive Capacity (acre-feet)	150,500	30,000
Height of Dam Above Streambed (ft.)	307	175
Crest Length of Dam (ft.)	1,500	2,300
Crest Width of Dam (ft.)	30	30
Type of Dam	Earth	Earth
Normal High Water		
Surface Area (acres)	2,230	1,400
Elevation (Ft. above M.S.L.)	6,960	6,080
Minimum		
Surface Area (acres)	1,610	830
Elevation (Ft. above M.S.L.)	6,890	6,040
Average Pool		
Surface Area (acres)	1,950	1,200
Elevation (Ft. above M.S.L.)	6,930	6,060

ANIMAS-LA PLATA PROJECT
PLAN OF DEVELOPMENT
STATISTICS

PROJECT COSTS (Jan. 1978 prices)

Estimated construction cost	$300,000,000
Estimated annual operation and maintenance cost	$ 2,000,000

BENEFITS

Estimated average annual benefits	$ 17,600,000

PROJECT FEATURES

	Approximate Capacity (second-feet)
DIVERSION DAMS	
Southern Ute	375
La Plata	225

CANALS

	Length (miles)	Initial Capacity (second-feet)
New Mexico Irrigation	8.1	100
Dry Side	34.8	700
Laterals	151.0	Varies
Drains	65.0	Varies

PUMPING PLANTS

	Max. Capacity (second-feet)	Maximum Dynamic Head (feet)	Installed Capacity (Kilowatts)
Durango	430	560	27,000
Ridges Basin	700	330	26,000
Sprinkler	vary	vary	8,000

APPROXIMATE ANNUAL POWER REQUIREMENTS	Capacity (KW-Mo)	Energy (KW-hrs.)
	290,000	180,000,000

Municipal and Industrial Water

The project would supply 80,100 acre-feet of municipal and industrial water to Durango and other rural users in Colorado, and to Aztec, Farmington, and other New Mexico communities.

Recreation and Fish and Wildlife

Recreation facilities would be provided at the Ridges Basin and Southern Ute Reservoirs for boating, fishing, hiking, and other recreational activities. Land will be purchased to replace land required for the reservoir areas and thereby lost to wildlife.

PROJECT DATA

Land Areas (1977)

Irrigable area	70,100	acres
Full service	48,620	acres
Supplemental service	21,480	acres
Number of irrigated farms	420	

Climatic Conditions

Annual precipitation	9-18	in
Temperature:		
Maximum	105	°F
Minimum	−35	°F
Average	43-50	°F
Growing season	140-157	days
Elevation of irrigable area	6500-7200.0	ft

ENGINEERING DATA

Water Supply

ANIMAS RIVER

Drainage area at Durango	758	mi²
Annual discharge:		
Maximum (1941)	1,074,500	acre-ft
Minimum (1977)	208,100	acre-ft
Average	542,300	acre-ft

LA PLATA RIVER

Drainage area at Hesperus	37	mi²
Annual discharge:		
Maximum (1941)	76,100	acre-ft
Minimum (1976)	6,700	acre-ft
Average	30,000	acre-ft

LA PLATA RIVER

Drainage area at State line	331	mi²
Annual discharge:		
Maximum (1941)	92,500	acre-ft
Minimum (1976)	4,400	acre-ft
Average	22,800	acre-ft

Storage Facilities

RIDGES BASIN DAM

Type: Zoned earthfill
Location: 3 miles southwest of Durango.
Construction period: 6 years

Reservoir, Ridges Basin:		
Average annual inflow	133,000	acre-ft
Total capacity to El. 6968	280,040	acre-ft
Active capacity to El. 6964	130,000	acre-ft
Surface area	2,270	acres
Dimensions:		
Structural height	313	ft
Hydraulic height (at maximum water surface)	306	ft
Top width	30	ft
Maximum base width	1,650	ft
Crest length	1,600	ft
Volume	7,620,000	yd³
Spillway: Emergency spillway, 100 ft, excavated to El. 6968.		
Outlet works: Capacity at El. 6968	2,160	ft³/s

SOUTHERN UTE DAM

Type: Zoned earthfill
Location: Offstream near Colorado-New Mexico State line.
Construction period: 5 years

Reservoir, Southern Ute:		
Average annual inflow	51,000	acre-ft
Total capacity to El. 6078.6	70,000	acre-ft
Active capacity to El. 6076.2	40,000	acre-ft
Surface area	1,386	acres
Dimensions:		
Structural height	170	ft
Hydraulic height	162.6	ft
Top width	30	ft
Maximum base width	1,010	ft
Crest length	2,900	ft
Volume	2,640,000	yd³
Spillway: None		
Outlet works: Capacity at El. 6078.6	730	ft³/s

Diversion Facilities

SOUTHERN UTE

Location: 700 ft west of Colorado Highway 140 at a point 2.8 mi north of Colorado-New Mexico State line.
Concrete spillway dimensions:

Length	100	ft
Height at crest	9.5	ft
Crest elevation	6130.5	ft
Protective dike dimensions:		
Maximum height	8	ft
Width	16	ft
Earth dike extending 500 ft on left abutment and 200 ft on right abutment.		
Diversion capacity	375	ft³/s

LA PLATA

Location: 15 mi southwest of Durango.
Concrete spillway dimensions:

Length	50	ft
Height	8.5	ft
Crest elevation	7194.5	ft
Protective dike dimensions:		
Maximum height	10	ft
Width	16	ft
Would extend 450 ft on both sides of the river at 30° angles.		
Settling basin dimensions:		
Length	1,000	ft
Width	75	ft
Depth	10	ft
Diversion capacity	150	ft³/s

☆ U.S. GOVERNMENT PRINTING OFFICE: 1980—777-484

ANIMAS - LA PLATA

ANIMAS @ FARMINGTON — WITHOUT PROJECT

1. PERIOD OF RECORD : SEPT, 1912 TO CURRENT YEAR (1976)
2. AVERAGE DISCHARGE:

USGS data:
- 64 YEARS : 658,600 AF/YR (909 cfs)
- 20 YRS. (1957-76) 585,000 AF/YR (808 cfs)
- 1929-77 571,500 Report period of study

WITH PROJECT

1. PERIOD OF RECORD 1929-77 49 yrs.
2. AVG DISCHARGE 413,314 AF/YR.

LA PLATA @ FARMINGTON

W/O PROJECT

1. PERIOD OF RECORD MARCH, 1938 TO CURRENT YR. (1976) USGS
2. AVERAGE DISCHARGE 38 YRS 17,750 AY/YR 25 cfs dist
   20 YRS (1957-76) 16,010 AF/YR 22 cfs
   1939-77 17,300 Report period of study

WITH PROJECT

1. PERIOD OF RECORD 1939 - 77
2. AVERAGE DISCHARGE : 10,844 AF/YR

Additional

ANIMAS-LA PLATA

UNITS: 1000 AF

PROJECT STATUS

ITEM	WITHOUT	WITH	Δ	
ANIMAS @ DURANGO	542.3	413.7	-128.6	-128.6
" @ CEDAR HILL	627.5	499.7	-127.8	+0.8
@ FARMINGTON	571.5	413.3	-158.2	-30.4
ANIMAS FLOW INTO SAN JUAN	550.4	392.2	-158.2	0.0

Σ = -158.2 AF

LA PLATA RIVER @ HESPERUS	30.0	28.9	-1.1	-1.1
@ S.U. DIVERSION DAM	22.8	55.3	+32.5	+33.6
@ STATE LINE	22.8	3.9	-18.9	-51.4
@ FARMINGTON	17.3	10.8	-6.5	+12.4

Σ = -6.50

SAN JUAN @ FARMINGTON	1500.1	1348.9	-151.2	-151.2
@ BLUFF	569.8	1416.4	-153.4	-2.2

-153.4

OSE-0942

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JUL 20 1977

1977 JUL 25 AM 11:28

STATE ENGINEER OFFICE
SANTA FE, N.M.

Mr. Phillip Mutz
New Mexico Interstate Stream Commission
Bataan Memorial Building
State Capitol
Santa Fe, New Mexico 87503

Dear Phil:

Enclosed for your review and comment is a draft of our M&I water requirement estimates for New Mexico. We have used 275 g/c/d for Farmington and less for the other communities. This is the rate we feel Durango can achieve by installation of meters and pipeline repairs which would be a reduction of over 100 g/c/d. Farmington, being more arid and having significant growth, should have a use rate comparable to Durango. They would probably be hard pressed to achieve a reduction over their present use rate since their water is already metered. The USBR-NTUA Water Study, January 1976, shows Shiprock's current use rate of 209 g/c/d growing to about 260 g/c/d in the future because cities gaining in pupulation increase their per capita consumption. Based on the rationale used in this study, the Farmington rate could be projected to about 340 g/c/d. Using a zero water consumption growth rate contemplates some degree of water conservation. Although the attached study includes Blanco, we have not included that community as a participant in the project.

The Farmington population grew at an average annual compound rate of 8.1% from 1970 to 1976 based on information obtained from local planners. We show the Farmington service area as having grown at a weighted average rate of 7.6% from 1970 to 1976. Projections are based on a 4% growth rate from 1976 to 1986, which contemplates development of seven coal gasification plants in the area. A growth rate of 1.7% was used for 1986 through 2030, which approximates the long term historic growth rate of the area and is the value projected by OBERS Series "C". The average growth rate produced by this combination from 1976 to 2030 is 2.6%. For comparative purposes the USBR-NTUA Water Study shows the Shiprock-Burnham area growing at an average rate of 4.1% from 1975 to 2025 and their total study area at an average rate of 3.425%.

New Mexico's Municipal and Industrial Water Demand from the Animas-La Plata Project

Project Area

The Animas-La Plata Project would develop water from the Animas and La Plata Rivers for irrigation purposes, municipal and industrial use, and recreation. The project area is located in southwestern Colorado and northwestern New Mexico. One of the objectives of the project would be to provide municipal and industrial water to project participants in northwestern New Mexico.

Project Municipal Water

The project would provide municipal water to most of the organized communities north of the San Juan River in northwestern New Mexico. Population figures for each of the towns were projected to the year 2030. Per capita use rates were derived from present use rates when data were available. The usable existing supply of each community was based on an examination of water rights, river flows, and facility capability. The difference between the projected 2030 annual demand and the usable existing supply is the computed project demand.

Farmington Service Area

Farmington is located at the confluence of the Animas and San Juan Rivers in northwestern New Mexico. The city is growing rapidly at present due to the vast energy resources located in the area. The

Farmington Service Area includes the towns of Kirtland, Fruitland, and Waterflow as well as Farmington. The City of Farmington presently delivers treated water to the Lower Valley Water Users Assoc. which serves the communities of Kirtland, Fruitland and Waterflow, and to the town of Shiprock. The Farmington Service Area includes the Lower Valley Water Users Assoc. but excludes Shiprock, which will be served by a separate pipeline from Navajo Res. in the future. Table 1 below gives the present and projected population figures of the Farmington Service Area.

Table 1

Population projections - Farmington Service Area

1970	1976	1980	1986	1990	2000	2010	2020	2030
25,032	38,863	45,500	57,500	61,500	72,800	86,200	102,000	120,800

The 1970 population figure was obtained from Bureau of the Census data (Farmington, 21,979 and Kirtland Division, 3,350). The population estimate for 1976 for the city of Farmington was obtained from the city's urban planning office. The 1976 population estimate for the Lower Valley[1/] was obtained by assuming a 4% annual growth rate for the area. Planned development of seven coal gasification plants in the area makes the high growth rate seem reasonable. In the report "Water System Master Plan, 1974" prepared for the city of Farmington by Gordon Herkenhoff and Assoc. Inc., an annual growth rate of 4% is assumed to apply through 1980. In this study, the 4% annual growth rate is assumed to apply through 1986.

1/ The Lower Valley and the Kirtland Division of the Census are identical.

An annual growth rate of 1.7% was used for projecting population from 1986 to 2030. This is based on the OBERS Series "C" growth rate documented in the "Upper Colorado Region Comprehensive Framework Study", Appendix IV.

Present per capita use rates in Farmington Service Area are about 275 gallons per capita per day. Below in Table 2 is a summary of the water production records for the Farmington treatment plant for the years 1968 to 1974. It was estimated from 1974 records that the city of Farmington uses about 83% of the treated water produced at the plant annually, the remainder going to Shiprock and the Lower Valley.

Table 2
Farmington Treated Water Production Summary

Year	Treated Water to System (mil. gal.)	Percent to Farmington	Treated Water to Farmington (mil. gal.)
1968	2,314.888	83	1,921.357
1969	2,463.332	83	2,044.566
1970	2,551.760	83	2,117.961
1971	2,915.556	83	2,419.911
1972	3,084.071	83	2,559.779
1973	3,123.273	83	2,592.317
1974	3,470.763	83	2,880.733

Population estimates for corresponding years were obtained from census data, status reports, the San Juan Council of Governments, and by linear interpolation. Combining population with total annual water use gives per capita demand estimates, as shown in Table 3 below.

Table 3
Per Capita Use Rates
City of Farmington

Year	Population	Treated Water to Farmington (mil. gal.)	Per Capita Demand (gal/day)
1963	23,200	1,921.357	227
1969	22,600	2,044.566	248
1970	22,000	2,117.961	264
1971	23,300	2,419.911	285
1972	24,600	2,559.779	285
1973	26,000	2,592.317	273
1974	27,300	2,880.733	289
Avg.	24,150	2,362.375	268

Including a 3% non-reusable backwash requirement at the plant and an estimated raw water use of 100,000,000 gallons/year for watering public parks and grassways, present per capita use in the city of Farmington is about 285 GPCD[1/]. Per capita use in the Lower Valley is about 165 GPCD according to a report prepared for the San Juan Council of Governments. A weighted average per capita is therefore about 275 GPCD.

No increase in per capita use rates is projected for the service area. It is assumed that the normal increase of per capita use with increased affluency and rapid growth would be offset by the stress on water conservation programs and more efficient use of domestic and other municipal water.

Table 4 contains the projected total demand of the Farmington Service Area through 2030.

1/ GPCD = gallons per capita per day.

Table 4
Projected Total Municipal Water Demand
Farmington Service Area

Year	Population	Per Capita Use (gpcd)	Total Municipal Water Demand (ac.-ft.) 1/
1980	45,500	275	14,000
1990	61,500	275	18,950
2000	72,800	275	22,450
2010	86,200	275	26,550
2020	102,000	275	31,400
2030	120,800	275	37,200

1/ Rounded to nearest 50 ac.-ft.

Included in the municipal water category is an allowance for industrial growth within the service area, which would be served through the municipality. A certain ratio of domestic to commercial to industrial water use is in effect at the present time, and this ratio is assumed to remain in effect through the period of projection.

The projected total municipal water demand for a service area less the usable existing supply yields the project demand. The usable existing supply is a function of water rights, water availability, and existing system capability.

The city of Farmington (whose rights serve the entire Farmington Service Area) obtains its water for municipal use from the Animas River. The city can divert water from the river at either of two sites - through the Farmer's Ditch which feeds Farmington Lake, the raw water storage reservoir for the city and/or at the Animas River pumping plant located just east of the city. The facilities can also be operated concurrently. Farmington has a total water right of 17,600 acre-feet per year. Various

constraints on the operation of the system made it difficult to estimate what the actual useable existing supply would be during drought years. A simulation model of the facilities and operation of the system was developed and ran using the 1953 to 1957 drought period for streamflow and the projected demand in 1980, 2000, and 2030.[1/] The following constraints were assumed in the modeling:

1. The end-of-day capacity of Farmington Lake could not exceed the active capacity of 4,180 acre-feet,
2. the amount of water delivered to Farmington Lake through the Farmer's Ditch is equal to:
   a) zero in January, February, June, and July[2/], or
   b) the flow at the Animas River at Cedar Hill gage minus 360 cfs[3/], but not to exceed 15 cfs in April, May, August and September, or
   c) the gage at Cedar Hill but not to exceed 36 cfs in March, October, November, and December.
3. The pumping plant has a capacity of 34.0 cfs, and delivers water directly into the filtration plant in an amount equal to:
   a) zero second-feet in January[4/], April[5/], May[5/], and June[5/]
   b) 34.0 cfs, but not to exceed the water demand or the flow at the gage at Farmington, during every other month.

1/ The program was run on a daily basis.
2/ In Jan. & Feb., ditch is iced over, June & July, farmers are using all the water in the ditch.
3/ Approx. total senior water rights below the Cedar Hill gage.
4/ Icing problems in the river.
5/ The pumping plant is not used during times of high sediment concentration in the river.

The simulated system operation was run during the drought years of 1953 to 1957. It showed that the city of Farmington has the capability of developing 17,600 acre-feet of water when the demand arises. The study is considered a slightly conservative estimate of the volume of water the city could develop. A copy of the simulation is included as Appendix A.

Table 5 below shows the project municipal water demand of the Farmington Service Area.

Table 5
Project Water Demand of the
Farmington Service Area

Year	Total Demand (ac.-ft.)	Useable Existing Supply (ac.-ft.)	Project Water Demand (ac.-ft.)
1980	14,000	14,000	0
1990	18,950	17,600	1,350
2000	22,450	17,600	4,850
2010	26,550	17,600	8,950
2020	31,400	17,600	13,800
2030	37,200	17,600	19,600

Aztec Service Area

Aztec is located 8 miles northeast of Farmington on the Animas River. The city obtains its raw water supply from the Animas River and supplies treated water to two water user's associations: The Flora Vista Water Users Assoc. and the Southside Water Users Assoc. Table 6 below gives the population projections for the Aztec Service Area.

Table 6
Population Projections
Aztec Service Area

Year	1970	1976	1980	1986	1990	2000	2010	2020	2030
Pop.	4,157	7,136	8,300	10,600	11,300	13,400	15,800	18,700	22,200

The 1970 figure is comprised of the census estimate for the town of Aztec (3,354) and an estimate made by the San Juan Council of Governments for Flora Vista, Round Valley, and Spencerville (803). The 1976 figure for the town of Aztec was supplied by the county planning office. All other population figures were computed as for the Farmington Service Area.

Present per capita use rates in the town of Aztec are approximately 200 GPCD of treated water. Water shortages are fairly common in late summer restricted,per capita use being the result. Taking into account the effect of water shortages and raw water use, it is estimated that per capita demand would be about 250 GPCD[1/]. Combining the population projections with the daily per capita use yields the total municipal water demand as shown below in Table 7.

Table 7
Total Municipal Water Demand
Aztec Service Area

Year	Population	Per Capita Use (GPCD)	Total Municipal Water Demand [2/] (ac.-ft.)
1980	8,300	250	2,300
1990	11,300	250	3,150
2000	13,400	250	3,750
2010	15,800	250	4,400
2020	18,700	250	5,250
2030	22,200	250	6,200

1/ This also allows for some increase in light industry within the service area.

2/ Rounded to the nearest 50 ac.-ft.

The city of Aztec obtains its present water supply from the Animas River at a diversion point just north of the city. The town owns a total of 830 acre-feet of adjudicated water rights. However, according to the city manager, the town can only develop about 600 acre-feet of the water right.

The project municipal water demand of the Aztec Service Area in 2030 would be 5,600 acre-feet.

Bloomfield (including Lee Acres)

The town of Bloomfield is located 13 miles east of Farmington. It presently obtains its water supply from the Bloomfield Irrigation District pipeline. The community of Lee Acres is located between Farmington and Bloomfield and receives its municipal water from the town of Bloomfield. The present and projected population of Bloomfield (including the Lee Acres area) is given below in Table 8.

Table 8
Population Projection
Bloomfield Service Area

Year	1970	1976	1980	1986	1990	2000	2010	2020	2030
Pop.	2,844	4,629	5,400	6,900	7,300	8,700	10,300	12,200	14,400

The 1970 population figure for Bloomfield was taken from 1970 census data. The 1970 population of Lee Acres was taken from a report prepared by the San Juan Council of Governments 1/. The 1976 Bloomfield population figure was recommended by the county planning office. All other figures were projected as stated previously.

1/ "The Water and Sewer Element for San Juan County", 1974.

Present per capita use rate in the Bloomfield Service Area is about 110 gallons per day [1]. This use rate has been severely limited by shortages which occur almost every summer. Accounting for these shortages, raw water use, and introduction of light industry, per capita use is expected to be about 175 GPCD. Table 9 below gives the total municipal water demand of the Bloomfield Service Area.

Table 9
Projected Total Municipal Water Demand
Bloomfield Service Area

Year	Population	Per Capita Use (GPCD)	Total Municipal Water Demand [2] (ac.-ft.)
1980	5,400	175	1,050
1990	7,300	175	1,430
2000	8,700	175	1,700
2010	10,300	175	2,020
2020	12,200	175	2,400
2030	14,400	175	2,850

The town of Bloomfield has no adjudicated water rights and so, is completely dependent upon the Bloomfield Irrigation District for water. It is assumed that the Bloomfield Service Area will desire a project water supply to replace their present supply. Therefore, Table 9 becomes the project water demand. The area could be serviced by exchange from Navajo Reservoir.

1/ "County Profile, San Juan County, Water Resources Assessment for Planning Purposes", 1975, and corroborated by the consulting engineer for the town.

2/ Rounded to the neartest 50 ac.-ft.

Blanco

The community of Blanco is located 9 miles east of Bloomfield. It obtains its present water supply from an infiltration gallery located on the bank of the San Juan River. The town has no water rights for such a well.

The population projections for the community are given below in Table 10.

Table 10
Population Projections
Blanco

Year	1970	1976	1980	1986	1990	2000	2010	2020	2030
Pop.	375	411	500	600	700	800	900	1,100	1,300

Per capita use rates in the community are estimated to be 150 GPCD at present. It is expected that with a firm water supply, use rates would increase to about 175 GPCD. Since the community has no adjudicated water rights, their firm useable existing supply is assumed to be zero and the total municipal water demand equals the project water demand. The project demand is given below in Table 11

Table 11
Project Municipal Water Demand
Blanco

Year	Population	Per Capita Demand (GPCD)	Project Demand (ac.-ft.)
1980	500	175	100
1990	700	175	140
2000	800	175	155
2010	900	175	175
2020	1,100	175	215
2030	1,300	175	255

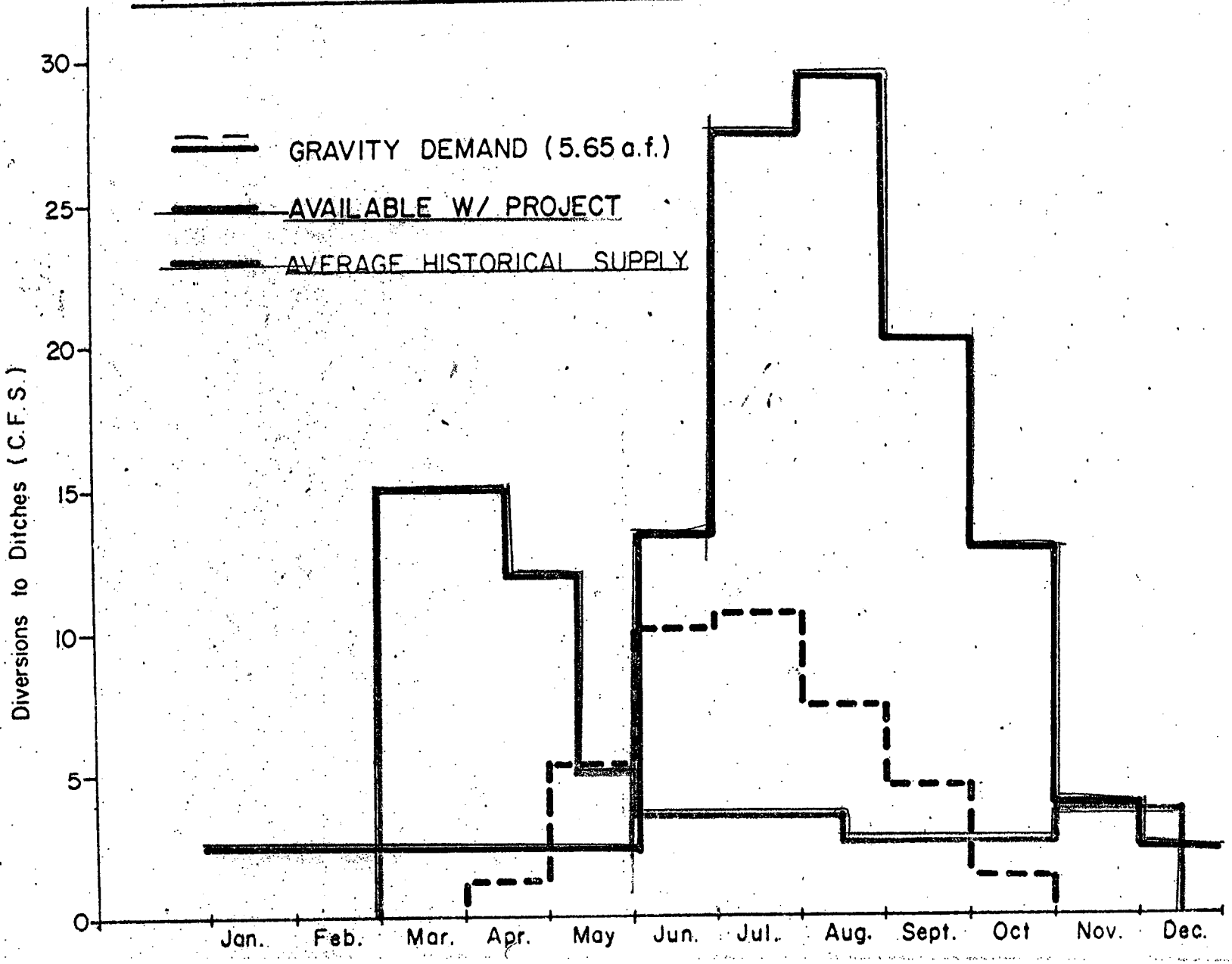
Blanco would be served from Navajo Reservoir by exchange.

Table 12 contains a summary of the project municipal water demand in New Mexico.

Table 12
Project Municipal Water Demand - 2030
San Juan County, New Mexico

Service Area	Population	Per Capita Use (GPCD)	Total Demand (ac.-ft.)	Useable Existing Supply (ac.-ft.)	Project Demand (ac.-ft.)
Farmington	120,800	275	37,200	17,600	19,600
Aztec	22,200	250	6,200	600	5,600
Bloomfield	14,400	175	2,850	—	2,850
Blanco	1,300	175	255	—	255
				Total	28,305

IRRIGATION FOR 440 ACRES FROM THE JACKSON AND PICKERING DITCHES



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