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SAN JUAN-CHAMA AND NAVAJO INDIAN PROJECTS: RELATED IMPACTS IN THE SAN JUAN RIVER BASIN

Prepared For the Senate Committee on
Interior and Insular Affairs

by
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(1) Adjust bypass increment
(2) Aboriginal - B.S.
(3) Dulce Project - CRS-34
(4) Indian rights
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SAN JUAN-CHAMA AND NAVAJO INDIAN PROJECTS: RELATED IMPACTS IN THE SAN JUAN RIVER BASIN

I. SUMMARY

The San Juan-Chama Project of the Bureau of Reclamation supplements irrigation and municipal and industrial water supplies in the Rio Grande River Basin by diverting tributary flows of the San Juan River. The Navajo Irrigation Project of the Bureau of Indian Affairs will furnish irrigation water to 110,630 acres of Navajo Indian Reservation land. Both facilities impact on waters of the San Juan River and the quantities depleted constitute an important part of New Mexico's share of Upper Colorado River flows.

Questions have been raised about operating policies of the San Juan-Chama diversion works, the magnitude of expected return flows from the Navajo Project, and contracts for Navajo water use for coal gasification facilities. The issues are accountability of New Mexico's share of the Upper Colorado River water, maintenance of adequate streamflows for preservation of fish and aquatic life and water quality,, Winters' doctrine water rights of Indians*, and the impact of water development projects on the San Juan River Basin.

Data through 1974, indicate that the San Juan-Chama Project is generally operated according to project specifications as far as quantity of flow is concerned. Questions on operational impact on water quality and adequacy of by-pass flows as originally determined have not been resolved. The Indian water rights issue is in controversy and awaits

*Winters refers to the U.S. Supreme Court case that established the legal basis for Indian water rights. See p. 40

court action for determination. The findings of an adjudication suit filed in New Mexico in March 1975 should permit complete quantification of water allocations in the San Juan River Basin.

Numerous studies of availability of water in the Upper Colorado River Basin have been conducted. Analyses by the Department of Interior, the firm of Tipton and Kalmback, Inc., and the Upper Colorado Region State-Federal Interagency Group are representative. On the basis of these, estimated annual availability of water to New Mexico is 671,000, 727,000, and 763,000 acre-feet, respectively. Relating these quantities to an ultimate depletion estimated at 714,000 acre-feet indicates a surplus in two of three cases. None of the estimates include potential

Comparison of Estimated Quantities of Water Available to New Mexico For Depletion From the San Juan River Basin with Estimated Ultimate Depletion

Assumptions	Estimated Annual Availability of Water to New Mexico acre-feet	Estimated Ultimate Depletion acre-feet	Surplus(+) or Deficiency (-) acre-feet
Dept. of Interior	671,000	714,000	-43,000
Tipton and Kalmbark Inc.	727,000	714,000	+13,000
Upper Colorado Region State-Federal Interagency Group	763,000	714,000	+49,000

Winters' doctrine rights nor do they include 26,000 acre-feet of water reduced from initial estimates of depletion for the Navajo Project due to proposed shifting from gravity to sprinkler irrigation. The calculated quantities of available water range between a conservative assessment of Upper Basin deliveries required at Lee Ferry to satisfy the treaty with Mexico and more liberal interpretations of the Colorado River Basin Compact. All have underlying assumptions relative to water availability and future use which are subject to interpretation and change. The estimates are adequate, however, for guidance in planning and policy assessment. They clearly indicate the proximity to total commitment of San Juan River waters in-so-far as New Mexico is concerned and the importance of basing future decisions relative to allocation of the Basin's water resources on complete quantitative analyses. Resolution of Indian water rights is fundamental.

Water resources planning is at best hazardous. Physical processes which are only partly understood coupled with even more complex and less well-known human behavior patterns are ingredients. For the San Juan River Basin, incomplete and limited interpretations of data further cloud the issues. Many of these problems can be resolved, however. The following comments serve as guidelines.

1. Regarding water supply, it would be appropriate to evaluate the hydrologic system of the Upper Colorado River Basin in terms of the level of risk associated within a range of projected water deliveries. The use of average flows is often misleading and does not adequately satisfy the role of modern day planning. Risks should be clearly identified in water management programs and accepted and provided for when water allocations are proposed.

2. Air cooling may replace water cooling in some existing and many future energy-producing and other industrial plants. This could release some water presently allocated for these purposes.

3. Weather modification in the Colorado River Basin appears feasible. The Department of Interior Energy Management Team states that a conservative increase in water supply of 500,000 acre-feet annually by the year 2000 seems possible.

4. Rational planning in the San Juan River Basin will require quantification of all existing and proposed uses. The water requirements and rights of the Indians must be determined and incorporated as known in the planning process.

5. The impact of the Federal Water Pollution Control Act Amendments of 1972 and the National Environmental Policy Act of 1969 must be considered. Flow requirements to maintain water quality, support fish and wildlife and provide for recreation and associated purposes should be reconsidered. Major deficiencies in environmental data needed for water supply planning must be overcome. The question of adequacy of previously prescribed by-pass flows is pertinent.

6. The dynamic nature of the planning process should be recognized. Future water uses will not be those estimated today. Decisions on allocations should provide flexibility for continuous reassessment and modification as better information becomes available and conditions change. Importation of water, transfer of water rights, and other factors can all profoundly affect current projections. The decision-making process should be designed to flow with these.

II. INTRODUCTION

The adequacy of water supply in the San Juan River Basin is of concern to the citizens of that area. Questions have been raised about the operation of the San Juan-Chama and Navajo Indian Projects and their impact on the quantity of water available for other purposes. Highly pertinent issues are proposed uses of water for coal gasification and the status of Indian water rights. New Mexico's entitlement to waters of the Upper Colorado River system and the allocation of these are basic to identification of problems and proposals for solution.

III. HISTORY OF INVESTIGATIONS FOR WATER DEVELOPMENT IN THE UPPER SAN JUAN RIVER BASIN

The Upper San Juan River area was long considered Indian territory and was not settled until shortly before the turn of the century. The population is sparse with much of the land in reservations for the Navajo, Southern Ute, and Jicarillo Apache Indian Tribes.

Studies of the waters of the San Juan River and its tributaries began following World War I. They were land surveys and did not provide adequate data on water quality or streamflows.

The first serious study was the Bunger Survey (1933).[1/] This was later incorporated into the Rio Grande joint investigations sponsored and coordinated by the National Resources Committee. The purpose of the joint investigation was to provide information needed to determine an equitable allocation of Rio Grande water between Colorado, New Mexico, and Texas. Water availability, its uses and requirements; possible importation schemes; and storage and salvage of water lost through non-beneficial consumptive uses were principal topics. These investigations established a basis for recognizing, in the Rio Grande Compact, the possibility of a transmountain diversion from the San Juan River into the Rio Grande. Based on streamflow records now considered inadequate, the report on the Rio Grande joint investigations concluded that 350,000 acre-feet could be diverted.

During negotiation of the Upper Colorado River Basin Compact in 1946, the Bureau of Reclamation issued a report establishing 300,000 acre-feet as the limit for transmountain diversion.

In 1950, the Secretary of the Interior appointed the San Juan Technical Committee consisting of representatives of Bureau of Reclamation Regions Four and Five and the Bureau of Indian Affairs. The committee was designed to assist New Mexico in utilizing San Juan River waters by presenting to the "State engineer or other responsible State official the essential findings of the investigations by the Bureau of Reclamation Regions Four and Five, and by the Bureau of Indian Affairs and to interpret these findings to him, to assist him in making comparative studies involving various combinations of projects to utilize San Juan River waters within New Mexico's allotment and to advise him on technical matters relating to the advisability of including such projects."

In May 1950, a special report was compiled for use by the San Juan Technical Committee summarizing available data on three sizes of diversions; namely, 295,000 acre-feet, 274,000 acre-feet; and 178,000 acre-feet. The report was based on studies of the 11-year period from 1930 through 1940. These studies included by-pass allowances for downstream demands based on ideal irrigation requirements. Later studies reduced the amount of divertible water to 235,000 acre-feet annually making allowances for decreed water rights; by-passes to maintain a live stream for fishing, recreation, and sanitary purposes; and an allowance of 35,000 acre-feet for the potential Dulce Project.

In March 1951, a study of the San Juan-Chama Project involving a diversion of 235,000 acre-feet annually into the Rio Grande Basin was initiated. This study was to support Congressional deliberations on the Colorado River Storage Project. It considered full utilization of imported waters to supplement irrigation and municipal and industrial water supplies and for hydroelectric power generation at favorable sites in the Rio Chama Basin.

During the 83rd Congress, Senate Bill 1555 was introduced to authorize the Secretary of the Interior to construct, operate and maintain the Colorado River Storage Project and participating projects including the San Juan-Chama and Navajo Indian Projects. Congress passed over this legislation to provide time for resolution of several issues including the need for further study of the Shiprock Unit of the Navajo Project. Energies were then directed toward completion of a feasibility report on the San Juan-Chama Project. The study was completed in March 1955 and modified the original project by eliminating regulatory storage on the Rio Chama to insure noninterference with delivery of Rio Chama flows belonging to downstream users.

IV. SAN JUAN-CHAMA PROJECT

A. DESCRIPTION

The initial stage of the San Juan-Chama Project, located in south-central Colorado and north-central New Mexico (in the San Juan, Rio Grande, and Canadian Basins) is designed to divert an average of 135,000 acre-feet of water from the San Juan River into the Rio Grande Basin in New Mexico for supplemental irrigation and municipal and industrial water supplies. The total diversion is limited by P.L. 87-483 to 135,000 acre-feet per year, but a lesser allocation of 110,000 acre-feet is expected as a practical limit. The distribution is given below.

	Acre-Feet
Supplemental Irrigation	
Tributary Units*	30,100
Middle Rio Grande Conservancy District	22,600
	52,700
Municipal and Industrial Water Supply	57,300
TOTAL	110,000

*Provides for irrigation of previously irrigated and adjoining lands to increase economic base of tributary areas.

Availability of water for diversion was determined by criteria established by representatives of the states of Colorado and New Mexico. The criteria included consideration of prior water rights and the maintenance of sufficient flows to preserve fish and wildlife values and to maintain sanitary conditions.

Three major elements comprise the initial stage of the San Juan-Chama Project. They are diversion, regulation, and water use.

Diversion - This element delivers San Juan River waters into the Rio Grande Basin. It includes three dams for diverting flows of the Rio Blanco, Little Navajo River, and Navajo River; about 29.49 miles of main conduits, and 3.06 miles of feeder conduits.

Regulation - Heron No. 4 Dam and Reservoir on Willow Creek, a tributary of the Rio Chama, regulates and stores imported waters. Enlarged outlet works of the El Vado Dam on Rio Chama pass Heron No. 4 Reservoir releases unimpeded.

Water Use - Under the initial stage water-use plan, the imported waters would be used to: (1) provide Albuquerque with additional municipal and industrial water supplies; (2) replace new depletions in the Rio Grande Basin that result from furnishing a firm water supply to 39,330 acres of land in the Cerro, Taos, Llano, and Pojoaque tributary units; and (3) provide supplemental water for irrigation of 81,610 acres of irrigable land in the Middle Rio Grande Conservancy District. Municipal and industrial water, and water allocated to the Middle Rio Grande Conservancy District is released to users at Heron No. 4 Dam with no specific facilities provided for delivery of these waters.

The ultimate plan for development anticipates an average annual diversion of 235,000 acre-feet to be distributed as follows:

	Acre-Feet
Supplemental Irrigation	
Tributary Units	*39,800
Middle Rio Grande Conservancy District	25,000
Elephant Butte Irrigation District	71,000
	136,700
Municipal and Industrial Water Supply	55,800
Replacement of Miscellaneous Basin Depletions	42,500
Total	235,000

*Provides for irrigation of some new or previously irrigated lands adjacent to existing irrigation developments to increase economic base of tributary areas.

The reservoir produced by Heron No. 4 Dam has a capacity of 500,000 acre-feet and a surface area of 5,925 acres at normal water surface elevation. The dam stores imported water for distribution to meet demands on the project by various users entitled to water. The dam also allows flows of the Rio Chama to pass unimpeded but can regulate and store Willow Creek water during periods of excessive flows. Project water, when released from Heron No. 4 Dam, is allowed to pass freely through El Vado Dam and Reservoir located about five miles downstream from the mouth of Willow Creek. The outlet works of this dam were enlarged to allow the water released from Heron No. 4 Dam to pass unimpeded through the reservoir. If desired, however, water allocated to the Middle Rio Grande Conservancy District could be delivered from El Vado Reservoir. The passing of project flows through the reservoir demonstrates non-interference with Rio Chama flows at El Vado Dam.

B. LEGISLATIVE HISTORY

1. 83rd Congress/2nd Session Senate Bill 1555 --- Senate Report 1983 with amendment

This bill was to authorize the Colorado River Storage Project which included the San Juan-Chama Project. Congress passed over the legislation because several issues were not satisfactorily resolved.

2. 84th Congress/1st Session House Bill 3383 --- House Report 1067
Senate Bill 500 --- Senate Report 128
--- Conference Report 1950
Public Law 485, April 11, 1956

These bills proposed authorization of the Colorado River Storage Project. Senate Bill 500 was passed in lieu of House Bill 3383. The language of HR 3383 was substituted for the language of the Senate Bill and agreed to by both Houses. The Colorado River Storage Project Act was passed on April 11, 1956 (70 Stat. 105). It included the San Juan-Chama Project as one of its components.

3. 85th Congress/1st Session House Bill 6575

The objective of this bill was to repeal authorization for the Colorado River Storage Project. It was referred to committee and not reported.

4. 85th Congress/2nd Session House Bill 12170
Senate Bill 3648 --- Senate Report 2198

This bill was for authorization of construction, operation, and maintenance of the San Juan-Chama and Navajo Projects as part of the initial state of the Colorado River Storage Project. The bill was referred to committee for further consideration.

5. 86th Congress/2nd Session Senate Bill 72 --- Senate Report 155

This bill sought authorization for construction, operation, and maintenance of the San Juan-Chama and Navajo Projects as a part of the initial stage of the Colorado River Storage Project. It was referred to committee for further consideration.

6. 87th Congress/1st Session House Bill 7596 --- House Report 685
Senate Bill 107 --- discharged and amended in lieu of HR 7596
Public Law 87-483, June 13, 1962

House Bill 7596 was reported out of committee and subsequently referred to the Committee of the Whole House. Senate Bill 107 was discharged and amended in lieu of HR 7596 and finally passed by both Houses. The Act (76 Stat. 96) authorizes the Secretary of the Interior to construct, operate, and maintain the initial stage of the San Juan-Chama and the Navajo Indian Projects as part of the Colorado River Storage Project.

V. NAVAJO INDIAN PROJECT

A. PROJECT DESCRIPTION

The Navajo Indian Project is designed to supply water to 137,250 irrigable acres of land. The South San Juan division contains 109,000 acres and the Shiprock division, 28,250 acres. Eighty percent of the project area is Indian-owned which includes allotments in the South San Juan divison and the Navajo Indian Reservation. The project will provide irrigation water for the Navajo Indians and consequently with employment and increased economic opportunity.

The water for the Navajo Project is stored and regulated by the Navajo Dam located 19.5 miles upstream on the San Juan River from the town of Blanco, New Mexico, and about 3.5 miles downstream of the confluence of Los Pinos and San Juan Rivers. The reservoir has a total storage capacity of 1,709,000 acre-feet including inactive and dead storage of 673,000 acre-feet.

Project water is to be transferred from the Navajo Dam by means of a main gravity canal. The Bureau of Reclamation project schedule is for delivery of water to the first 10,000 acres of land in 1976. Annual increases of 10,000 acres are expected thereafter until 1986 when all lands are to be served.

LEGISLATIVE HISTORY

1. 83rd Congress/2nd Session — Senate Bill 1555 --- Senate Report 1983 with amendment

This bill was to authorize the Colorado River Storage Project which included the Navajo Irrigation Project. Congress passed over the legislation to permit time for resolution of several issues.

2. 84th Congress/1st Session — House Bill 3383 --- House Report 1067
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These bills proposed authorization of the Colorado River Storage Project. Senate Bill 500 was passed in lieu of House Bill 3383. The language of HR 3383 was substituted for the language of the Senate Bill and agreed to by both Houses. The Colorado River Storage Project Act (70 Stat. 105), was passed on April 11, 1956. It included the Navajo Project as one of its components.

3. 85th Congress/1st Session — House Bill 6575

The objective of this bill was to repeal authorization for the Colorado River Storage Project. It was referred to committee and not reported.

4. 85th Congress/2nd Session — House Bill 12170
Senate Bill 3648 --- Senate Report 2198

This bill was for authorization of construction, operation, and maintenance of the San Juan-Chama and Navajo Projects as part of the initial stage of the Colorado River Storage Project. The bill was referred to committee for further consideration.

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7. 90th Congress/2nd Session Senate Joint Resolution 123 --- House Report 1106
Public Law 90-272, March 22, 1968

The resolution pertained to three long-term water delivery contracts for allocations from the Navajo Reservoir. The Act of June 13, 1962 requires that the Secretary of Interior determine by hydrological investigation that sufficient water will be available for use during the term of a contract and that he submit such determination to the Congress. The Secretary made such determination and the Congress approved. The Act of March 22, 1968 (82 Stat. 52) approved the long-term contracts.

C. ALL-SPRINKLER IRRIGATION SYSTEM

In August 1972, a joint development report issued by the Bureau of Indian Affairs and the Bureau of Reclamation proposed an all-sprinkler irrigation system for the Navajo Indian Irrigation Project. A 1973 report of the Bureau of Reclamation analyzed the costs and benefits of all-sprinkler and gravity systems and compared them.

1. Sprinkler System

Interest in sprinkler irrigation is high because less water, labor and land preparation are needed. Pertinent hydrologic data for the proposed sprinkler system are:

Irrigation Requirements for All-Sprinkler System[2/]

Consumptive Use Requirement (feet)	2.49
Effective Precipitation (feet)	.61
Irrigation Requirement (feet)	1.88
Farm Loss (percent)	25
Farm Loss (feet)	.63
Farm Turnout Requirement (feet)	2.51
Canal and Lateral Loss (percent)	20
Canal and Lateral Loss (feet)	.63
Main Canal Diversion Requirement (feet)	3.14
Project Irrigable Acres	110,630
Project Productive Acres*	105,000
Average Annual Diversion (acre-feet)	330,000
Average Annual Beneficial Consumptive Use (acre-feet)	198,000
Average Annual Losses and Return Flow (acre-feet)	132,000
Average Annual Non-Beneficial Use (acre-feet)	28,000
Average Annual Depletion (acre-feet)	226,000

*Excludes five percent of land for roads, rights-of-way, etc.

2. Gravity System

The original plan for the Navajo Indian Irrigation Project included a gravity system with a diversion of 508,000 acre-feet per year to irrigate 110,630 acres. A more compact area for irrigation has been delineated and othe project modifications such as greater use of pipe have been made. A reduction in estimated diversion requirements and depletions results. Pertinent hydrologic data for the revised gravity system follow:

Irrigation Requirements for Gravity System[3/]

Consumptive Use Requirement (feet)	2.49
Effective Percipitation (feet)	.61
Irrigation Requirement (feet)	1.88
Farm Loss (percent)	40
Farm Loss (feet)	1.25
Farm Turnout Requirement (feet)	3.13
Canal and Lateral Loss (percent)	30
Canal and Lateral Loss (feet)	1.34
Main Canal Diversion Requirement (feet)	4.47
Project Irrigable Acres	110,630
Project Productive Acres*	105,000
Average Annual Diversion (acre-feet)	470,000
Average Annual Beneficial Consumptive Use (acre-feet)	198,000
Average Annual Losses and Return Flow (acre-feet)	50,000
Average Annual Non-Beneficial Use (acre-feet)	272,000
Average Annual Depletion (acre-feet)	248,000

*Excludes five percent of land for roads, rights-of-way, etc.

3. Economic Comparison Between Gravity and Sprinkler Systems

Crop yields for the two systems were considered the same in analyses because of limited data, but it was noted that the sprinkler system would likely increase crop yields. The sprinkler irrigation system would have an advantage over the gravity system in providing better water distribution and more timely application. Annual economic costs, benefits, benefit-cost ratios, and farm income for the two systems are compared in Table 1.

4. Impact on San Juan River Flows

It is estimated that the average annual flow immediately below the dam will be about 140,000 acre-feet greater under the all-sprinkler plan and that annual depletions will be reduced by approximately 20,000 acre-feet. Average annual depletions for the sprinkler and gravity systems are estimated at 226,000 and 248,000 acre-feet, respectively.

With the sprinkler irrigation system, application of water will be more accurately controlled and leaching and runoff of applied chemicals and native soil salts materially reduced. The total quantity of water applied and return flows will be reduced. Decline in degradation of downstream flows will be a major benefit. The sprinkler system will maintain a better fishery than the gravity-flow system and provide about 10,000 more man-days of fishing. In addition, better quality fishing will prevail and monetary benefits will exceed those of the gravity system by about $87,000 annually.

Table 1. Comparison of Annual Economic Costs and Benefits and Benefit-Cost Ratios for the Gravity and Sprinkler Irrigation Systems (dollars) 4/

	Gravity System	Sprinkler System
Annual Costs:		
Investment cost of major structures	7,942,000	8,696,000
On-farm land development & drainage	1,542,000	1,217,000
Annual OM&R cost	2,000,000	1,583,000
Colorado River Storage costs	496,000	452,000
Total Annual Costs	11,980,000	11,948,000
Annual Benefits:		
Irrigation:		
Primary	(9,269,000)	(10,683,000)
Secondary	(3,983,000)	(4,322,000)
Total Irrig.	13,252,000	15,005,000
Fishery	103,000	190,000
Indian Employment:		
Farm	5,921,000	5,326,000
Project construction	369,000	369,000
Project OM&R	502,000	394,000
Total Benefits	20,147,000	21,284,000
Primary Benefits	16,164,000	16,962,000
Benefit-Cost Ratios:		
Primary Benefits	1.35	1.42
Total Benefits	1.68	1.78
Annual farm income (with project area fully developed)	10,852,000	12,508,000

VI. ALLOCATION OF WATER IN THE UPPER BASIN OF THE COLORADO RIVER

A. CONTROLLING COMPACTS

The water supply of the San Juan River Basin is limited by climatic, topographic, geologic, and human factors and by laws pertaining to the Colorado River. Principal legal instruments pertaining to the San Juan River Basin are the Colorado River Compact (1922), the LaPlata Compact (1925), the Rio Grande Compact (1939), the Upper Colorado River Basin Compact (1948), and the Mexican Water Treaty of 1944 which guaranteed Mexico an annual quantity of 1,500,000 acre-feet of water from any and all sources.

These compacts specify amounts and/or percentages of available water supply to be allocated between the Upper and Lower Basins and among the several states. In this capacity, they determine the ultimate extent of water development.

The Colorado River Compact (1922) is the basic law of the Colorado River. It was negotiated by the states of Arizona, California, Nevada, New Mexico, Utah, and Wyoming pursuant to the Act of August 19, 1921 (42 Stat. 171) and apportioned the waters of the Colorado River to the Upper and Lower Basins separated at a point known as Lee Ferry. State water apportionments were not made. Article III (a) apportions to each basin in perpetuity 7.5 m.a.f. of water per year. Article III (b) permits the Lower Basin to increase its beneficial consumptive use by 1 m.a.f. above the apportionments in III (a). Article III (c) provides that future Mexican water rights, recognized by the United States, are to be satisfied as provided for in the compact. Article III (d) states that the Upper

Division states may not deplete the flow of the river measured at Lee Ferry below an aggregate of 75,000,000 acre-feet for any period of ten consecutive years reckoned in continuing progressive series. In section (e) of the same Article, the compact specifies that the states of the Upper Division shall not withhold water, and the states of the Lower Division shall not require the delivery of water, which cannot reasonably be applied to domestic and agricultural uses.

In 1925, the LaPlata River Compact was signed apportioning the waters of the LaPlata River, a tributary of the San Juan River, between the states of Colorado and New Mexico. The apportionment specified was not affected by the later Upper Colorado River Basin Compact (1948), but the 1948 law did provide that all consumptive use of waters of the LaPlata River and its tributaries shall be charged to the state's apportionment made by the Upper Colorado River Basin Compact.

The Rio Grande Compact was signed in 1959. This instrument apportions the surface waters of the Rio Grande above Caballo Dam among the states of Colorado, New Mexico, and Texas. In Article IX, it is stated that "Colorado agrees with Nex Mexico that in event the United States or the state of New Mexico decides to construct the necessary works for diverting the waters of the San Juan River, or any of its tributaries into the Rio Grande, Colorado hereby consents to the construction of said works and the diversion of waters from the San Juan River, or the tributaries thereof, into the Rio Grande in New Mexico, provided the present and prospective uses of water in Colorado by other diversions from the San Juan River, or its tributaries, are protected." Article X of

this compact provides that in the event water is imported from another drainage basin into the Rio Grande Basin, the states having the right to the use of such water shall be given proper credit therefore in the application of schedules established in the compact.

The Upper Colorado River Basin Compact was signed by the states of Arizona, Colorado, New Mexico, Utah, and Wyoming in 1948. Article III (a) apportions among the states: Arizona 50,000 acre-feet, and after deduction of Arizona's 50,000 acre-feet; Colorado, 51.75 percent; New Mexico, 11.25 percent, Utah, 23 percent and Wyoming, 14 percent. Article III (b) 3 provides that no state shall exceed its apportioned use in any year if this deprives another state of its water during that year. The compact does not preclude the right or power of any state to regulate within its boundaries the appropriation, use and control of water apportioned to such state. The failure of any state to use water shall not constitute a relinquishment or a forfeiture of water rights.

Article XIV apportions the waters of the San Juan River between the states of Colorado and New Mexico as follows:

Article XIV

> "The state of Colorado agrees to deliver to the state of New Mexico from the San Juan River and its tributaries which rise in the state of Colorado a quantity of water which shall be sufficient, together with water originating in the San Juan River Basin in the state of New Mexico, to enable the state of New Mexico to make full use of the water apportioned to the state of New Mexico by Article III of this Compact, subject, however, to the following:

(a) a first and prior right shall be recognized as to:

(1) All uses of water made in either state at the time of the signing of this Compact; and

(2) All uses of water contemplated by projects authorized, at the time of signing of this Compact, under the laws of the United States of America or by some other entity.

(b) the state of Colorado assents to diversions and storage of water in the state of Colorado for use in the state of New Mexico, subject to compliance with Article IX of this Compact.

(c) the uses of the waters of its tributaries within either state which are dependent upon a common source of water and which are not covered by (a) hereof, shall in times of water shortages be reduced in such quantity that the resulting consumptive use in each state will bear the same proportionate relation to the consumptive use in each state during times of average water supply as determined by the Commission; provided, that any preferential uses of water to which Indians are entitled under Article XIX shall be excluded in determing the amount of curtailment to be made under this paragraph.

(d) the curtailment of water use by either state in order to make deliveries at Lee Ferry as required by Article IV of this Compact shall be independent of any and all conditions imposed by this Article and shall be made by each state, as when required, without regard to any provision of this Article.

(e) all consumptive use of the waters of the San Juan River and its tributaries shall be charged under the apportionment of Article III hereof to the state in which the use is made; provided, that consumptive use incident to the diversion, impounding, or conveyance of water in one state for use in the other shall be charged to the latter state."

Article XIX of this compact states that nothing in the compact shall be construed as "affecting the obligations of the United States of America to Indian Tribes" or "affecting any rights or powers of the United States of America, its agencies or instrumentalities, in or to the waters of the Upper Colorado River System, or its capacity to acquire rights in and to the use of said waters."

The Colorado River Basin Project Act of 1968 (P.L. 90-537) provides for release of the Upper Division and Lower Division states of all obligations imposed by Article III (c) of the Colorado River Compact in the event that alternative water to satisfy the Mexican Treaty is provided. The portion of the Act dealing with this is Section 202:

"The Congress declares that the satisfaction of the requirements of the Mexican Water Treaty from the Colorado River constitutes a national obligation which shall be the first obligation of any water augmentation project planned pursuant to section 201 of this Act and authorized by the Congress. Accordingly, the States of the Upper Division (Colorado, New Mexico, Utah, and Wyoming) and the States of the Lower Division (Arizona, California, and Nevada) shall be relieved from all obligations which may have been imposed upon them by Article III (c) of the Colorado River Compact so long as the Secretary shall determine and proclaim that means are available and in operation which augment the water supply of the Colorado River System in such quantity as to satisfy the requirements of the Mexican Water Treaty together with any losses of water associated with the performance of that treaty: provided, that the satisfaction of the requirements of the Mexican Water Treaty (Treaty Series 994, 59 Stat. 1219), shall be from the waters of the Colorado River pursuant to the treaties, law, and compacts presently relating thereto, until such time as a feasibility plan showing the most economical means of augmenting the water supply available in the Colorado River below Lee Ferry by two and one-half million acre-feet shall be authorized by the Congress and is in operation as provided in this Act."

B. ELEPHANT BUTTE RESERVOIR CONTROVERSY (93rd Congress)

Elephant Butte Reservoir is a component of the Rio Grande Project in southern New Mexico. It is located on the main stem of the Rio Grande near Truth or Consequences. The project was developed principally for supplying irrigation water and hydroelectric power but is located in a scenic area and extensively used for recreation.

Inflow to the reservoir has been decreasing due to changes in the watershed. As a result, the reservoir has been drawn down in summer months with adverse effect on recreation.

On March 6, 1973, Senators Montoya and Domenici introduced S. 1119, legislation to authorize the Secretary of the Interior to make releases from Heron Reservoir into the Rio Grande to provide 50,000 acre-feet of water for an initial pool in Elephant Butte Reservoir. In addition, up to 6,000 acre-feet annually for not more than ten years to accommodate evaporative and other losses would be provided. The rationale for this was that waters being stored in Heron Reservoir by the San Juan-Chama Project included allocations for the city of Albuquerque which would not be required for about ten years.

In a July 11, 1974 letter, the Jicarilla Apache Tribe expressed its opposition to passage of S. 1119 on the grounds that: there was no surface water for storage in Elephant Butte Reservoir from the San Juan River and its tributaries; water was being diverted from the Navajo River that rightfully belonged to the Indians; operation of the San Juan diversion works produced a combination of factors adversely affecting

water quality; and the diversion of San Juan waters jeopardized the future survival of the Jicarilla Apache and other Tribes.

Senator Abourezk in a letter of June 24, 1974 to Senator Church, also expressed concern over this issue and stated his belief that exportation of San Juan River waters for use in Elephant Butte Reservoir would cause irreparable damage to the Jicarilla and other Indians.

S.E. Reynolds, State Engineer of New Mexico, wrote Senator Domenici in July of 1974 commenting on the Elephant Butte controversy. He noted:

> "that S. 1119 would authorize the use of San Juan-Chama Transmountain Diversion Project water for the purpose of a minimum recreation pool at Elephant Butte Reservoir for a period of not to exceed ten years from the establishment of the recreation pool. Furthermore, this use of San Juan-Chama Project water would be, by the terms of the bill, subject to the availability of stored water in Heron Reservoir (the storage unit of the San Juan-Chama Project) in excess of 100,000 acre-feet, which water is not required for existing authorized uses. The bill would not authorize any diversions from the San Juan River system in excess of those authorized by P.L. 87-483 (Section 8) in 1962."
>
> "The availability of San Juan-Chama Project water for a recreation pool at Elephant Butte Reservoir, a purpose not authorized by P.L. 87-483 in 1962, arises out of the circumstance that the four tributary irrigation units authorized in 1962 are not yet, and will not be for several years, in operation."

It was further noted that the authorization to create and maintain a recreation pool at Elephant Butte for ten years would result in diversion from the San Juan system of about 100,000 acre-feet more during this period than would otherwise be made, but that the diversion would be within limits set in the 1962 authorization and without damage to Indian Reservations.

Regarding concern about the shortage of Colorado River water, Mr. Reynolds acknowledged emerging problems but pointed out that authorization of S. 1119 would expire before the scheduled 1985 operation of the Central Arizona Project.

During consideration of H.R. 15736, the House "Omnibus Reclamation Bill," the Senate Committee on Interior and Insular Affairs reported the bill without the Elephant Butte Reservoir Title. This was restored on the floor, however, and the Reclamation Development Act of 1974 (P.L. 93-493) was signed into law on October 27, 1974.

During floor debate on October 11, Chairman Jackson acknowledged concern of the Indians over diversions from the tributaries of the San Juan River and on November 12, asked the Secretary of Interior to provide information on the operation of the San Juan-Chama Project. The December 26 response of Mr. Morton indicated compliance with P.L. 87-483. Details of the Secretary's letter are presented in part F of this section entitled "By-Pass Flows."

C. 1968 CONTRACTS FOR WATER DELIVERY FROM NAVAJO RESERVOIR

In 1967, the Department of the Interior transmitted to Congress three contracts for water supply from Navajo Reservoir together with determination that sufficient water was available and recommended approval. The following contracts were approved by Public Law 90-272, enacted 22 March 1968:

	Water diversion (acre-feet)	Estimated water depletion (acre-feet)	Proposed uses
Public Service Company of New Mexico - -	20,200	16,200	Thermal-electric
Southern Union Gas Company - - - - - - -	50	50	Pump cooling
Utah Construction and Mining Company - -	44,000	35,300	Thermal-electric generation
	64,250	51,550	

The determination that sufficient water was available was as follows:

HYDROLOGIC DETERMINATIONS[5/]

"Determination 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-Acre-feet	
	2000	2030
Estimated original annual Dept. in Up. Basin	5,430,000	5,800,000
Estimated annual Lee Ferry regulated delivery	8,600,000	8,250,000

"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
Number of years of study	38	38	38
Number of years of full supply	35	35	35
Assigned shortage (percent 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."

The hyrdologic study was conducted in compliance with Section 11 (a) of the Act of June 13, 1962 (76 Stat. 96; Public Law 87-483), which provides that: "No long-term contract, except contracts for the benefit of the lands and for the purposes specified in Section 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."

D. PROPOSED EL PASO NATURAL GAS COMPANY CONTRACT

The El Paso Natural Gas Company holds a coal lease on 40,000 acres of land within the Navajo Indian Reservation, San Juan County, New Mexico. The company has made application to the Federal Power Commission for a license to operate a coal gasification plant of 288 million cubic feet per day capacity. This would be the initial unit of three contemplated. A combined total capacity of 788 million cubic feet per day is anticipated. The requested contract for 28,250 acre-feet of water annually

would serve ultimate development and provide for operation of the coal mine supporting the gasification units. All of the water diverted for this use would be consumed.

The Interior Department draft report of a proposed bill for the El Paso Natural Gas Company coal gasification plant notes the water shortages may occur as early as 1990 in the Upper Basin states. In recognition of this, the Secretary of the Interior recommended the following provision in the proposed legislation:

> "This agreement to furnish water to the contractor shall not have priority over any rights of the Jicarilla Apache, Southern Ute, Ute Mountain Ute, and Navajo Indian Tribes to the use of waters from the San Juan River or its tributaries, which have not been quantified or adjudicated, and the contractor agrees to such reduction in the amount of water to be delivered hereunder as the Secretary determines is necessary to protect Indian rights."

Water use for industrial development in the Upper Colorado River Basin has been supported until recently by the Navajo Tribe because of employment opportunities and the economic exploitation of tribal-owned resources (land and coal). Presently, however, younger members of the Tribe have expressed dissatisfaction with existing and proposed industrial contracts. Public hearings by the Bureau of Reclamation on a draft environmental statement on the proposed El Paso Coal Gasification Plan originally scheduled for February 18 and 19, 1975 were indefinitely postponed at the request of Peter McDonald, Chairman of the Navajo Tribal

Council. The Jicarilla Apache Tribe also requested delay in Congressional hearings on authorization of long-term contracts for El Paso Natural Gas Company water supply until the Indian Tribes having undetermined water rights upstream from Navajo Reservoir could be heard (February 12, 1975).

E. OTHER PROPOSED PLANTS

1. The Public Service Company of New Mexico Generating Plant

An existing coal fire generating plant is operated by the Public Service Company of New Mexico. This plant receives water from the Navajo Reservoir. Present generating capacity is 330 MW with an additional 330 MW under construction and plans for 1,000 MW more. Under the present water contract, the projected full 1,660 MW development cannot be achieved without resorting to air cooling. The Public Service Company is interested in amending its contract to permit depletion of additional water.

2. The WESCO Proposal

The Transwestern, Pacific and Western Coal Gasification Companies (WESCO) have proposed the construction of four units each having a capacity of 250 million cubic feet per day to be operated using water under the Utah International, Inc., contract under the terms of P.L. 90-272.

It is expected that the plant would consume 35,300 acre-feet annually, the entire water depletion allowance noted in the existing contract.

F. BY-PASS FLOWS

By-pass flows for support of fish and aquatic life and other purposes are in controversy. The Jicarilla Apache Tribe and the Southwestern Water Conservation District of Colorado have initiated court action on this aspect of operation of the San Juan-Chama Project. Senators Jackson, Abourezk and Kennedy have also raised questions on this point. Interpretation and implementation of Sections 8(b) and 8(f) of the Project Authorization Act, P.L. 87-483, is the issue.

8(b) "the Secretary shall operate the project so that there shall be no injury, impairment, or depletion of existing or future beneficial uses of water within the State of Colorado by article III of the Upper Colorado River Basin compact, as provided by article IX of the Upper Colorado River Basin compact and article IX of the Rio Grande compact;"

8(f) "the Secretary shall operate the project so that for the preservation of fish and aquatic life the flow of the Navajo River and the flow of the Blanco River shall not be depleted at the project diversion points below the values set forth at page D2-7 of appendix D of the United States Bureau of Reclamation report entitled "San Juan-Chama Project, Colorado-New Mexico," dated November 1955;"

The Jicarilla Apache Tribe contends that the San Juan-Chama Diversion has not been operated in accordance with requirements of the Project Act. It is asserted that by-pass flows are not being maintained; temperatures in the Blanco and Navajo Rivers have been allowed to rise above a level detrimental to fish and aquatic life, and sluicing silt into these rivers has damaged aquatic life and irrigation works downstream.

1. By-Pass Flow Requirements Specified on Page D2-7 of Appendix D, of the United States Bureau of Reclamation Report Entitled "San Juan-Chama Project, Colorado-New Mexico," November 1955

Rio Blanco. The following tabulation shows the minimum monthly by-pass requirements at the Blanco dam site. The by-pass requirement would be made from the dam to the extent that natural flow is available. The inflow from between the dam site and conduit diversion dam site was not used, it being small and estimated to balance depletions in the reach.

MONTH	Minimum By-Pass Requirements Blanco Dam (acre-feet)
January	900
February	800
March	1,200
April	1,200
May	2,400
June-September, inclusive, per month	1,200
October	1,200
November	1,200
December	900

Little Navajo River. The by-pass requirement at the point of diversion is 1,600 acre-feet per month, when available from the

natural flow of the stream, during the irrigation season from May 1 to September 30. A by-pass release during the non-irrigation season is not required.

Navajo River. Surplus water available in the Navajo River at the point of diversion to the transmountain diversion conduit, which is available for joint use by the Dulce Project and the San Juan-Chama Project, consists of the aforementioned estimated run-off of the Navajo River at the point of diversion, minus the following minimum monthly by-passes which are required to meet the prior direct flow rights downstream and to sustain a minimum flow for fish and stock. The minimum by-pass requirements at the point of diversion, which are tabulated below, therefore, have a prior right over surplus waters at that point which could be available for the Dulce Project and the San Juan-Chama Project.

MONTH	Minimum By-Pass Requirements Navajo River Diversion Dam (acre-feet)
January	1,800
February	1,900
March	2,200
April	2,200
May	5,300
June-September, inclusive, per month	3,300
October	2,200
November	2,200
December	2,200

2. Commissioner of Reclamation's Report on By-Pass Flows

On December 16, 1974, the Commissioner of Reclamation, at the request of Secretary Morton, responded to a query by Senator Jackson for detailed

information on the operation of the San Juan-Chama Project. The Commissioner's response is summarized herein.

The initial diversion was made by the project on March 26, 1971. From that time until the report was issued, the only request under Section 8(b) of the Project Act was that of Colorado for 4 ft 3/s (240 acre-feet/month) in the Little Navajo River during the winter months, if water was available. Table 2 shows that when sufficient water was available, this request was satisfied.

Monthly by-pass requirements and quantities of water by-passed and diverted at Blanco Diversion Dam on the Rio Blanco and at Oso Diversion Dam on the Navajo River are shown in acre-feet on Tables 3 and 4. A minimum by-pass requirement for the Little Navajo River is not specified but 1,600 acre-feet per month are to be delivered when available from natural streamflow during the irrigation season (May 1 through September 30). A by-pass is not required during the non-irrigation season. Monthly by-pass requirements and actual quantities of water by-passed and diverted at little Oso Diversion Dam on the Little Navajo River are shown on Table 2.

Through October 1974, the minimum by-pass quantity for the Rio Blanco was not met during seven of 44 months (during four months, the shortage was caused by insufficient flows in the river, and in one month, diversions were caused by gate leakage). The minimum by-pass quantity for the Navajo River was not met during seven months (in two months, no diversions were made; in two months, the essential cause of deficiency was insufficient

Table 2

SAN JUAN-CHAMA PROJECT, COLORADO-NEW MEXICO

LITTLE OSO DIVERSION DAM ON LITTLE NAVAJO RIVER*

YEAR	STATION	TOTAL MONTHLY FLOW IN ACRE-FEET												TOTAL
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
	Minimum bypass flow required at diversion dam	246	223	246	239	1,600	1,600	1,600	1,600	1,600	246	239	246	
1970	Bypass													
	Diversion													
1971	Bypass						622	208	215	195	241	200	186	
	Diversion			68	974	20	0	0	0	0	8	2	0	1,072
1972	Bypass	152	140	242	424	555	260	62	29	62	297	245	123	2,391
	Diversion	0	0	291	320	1	2	2	0	10	533	113	0	1,272
1973	Bypass	217	186	336	282	4,079	1,364	740	240	164	125	100	114	7,947
	Diversion	0	0	23	1,379	4,625	3,461	161	5	0	0	0	0	9,649
1974	Bypass	119	86	232	305	722	277	150	124	74	107			
	Diversion	0	0	83	471	525	0	0	0	0	0			

NOTE: The bypass requirements on the Little Navajo River are to satisfy beneficial use (irrigation) downstream. Bypass established at 1,600 acre-feet per month during irrigation season and 4 cubic feet per second daily during the nonirrigation season for stock water. The water users demand is generally less than bypass amount. By coordination with the water commissioners for the State of Colorado, the amount in excess to the needs of the downstream water users on the Little Navajo River is diverted.

*U.S. Bureau of Reclamation.

Table 3

SAN JUAN-CHAMA PROJECT, COLORADO-NEW MEXICO

BLANCO DIVERSION DAM ON RIO BLANCO *

YEAR	STATION	TOTAL MONTHLY FLOW IN ACRE-FEET												TOTAL
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
	Minimum bypass flow required at diversion dam	900	800	1,200	1,200	2,400	1,200	1,200	1,200	1,200	1,200	1,200	900	
1970[1]	Bypass	-	-	-	-	-	-	-	-	-	-	-	-	-
	Diversion	-	-	-	-	-	-	-	-	-	-	10	0	10
1971[2]	Bypass	-	-	2,255	2,136	2,628	12,61	1,265	1,248	1,254	1,682	1,331	1,347	
	Diversion	-	-	212	4,552	7,218	8,811	1,995	1,992	320	938	1,465	312	27,815
1972[3]	Bypass	1,339	1,150	1,305	1,265	2,525	1,271	1,210	924	1,051	1,634	1,940	1,129	16,743
	Diversion	0	138	2,676	4,653	5,740	4,404	369	50	306	7,909	986	871	28,102
1973	Bypass	1,117	843	1,323	1,291	9,775	14,200	4,348	1,458	1,234	1,258	1,025	689	38,561
	Diversion	569	539	596	3,750	19,156	22,032	11,159	2,415	1,365	494	0	0	62,075
1974[4]	Bypass	714	756	1,283	1,214	3,584	1,390	1,386	1,305	942	1,319	..	..	
	Diversion	0	0	1,745	3,997	11,496	4,667	1,499	1,636	30	188			

NOTE: Water accounting procedures dated February 1963 and approved by all interested agencies expressed bypass amount in acre-feet and in mean daily flow in cubic feet per second. The accounting procedures included the statement: "On any day when the flow at a point of diversion exceeds required bypass at that diversion, the flow in excess of required bypass would be divertable by the project." This procedure was followed through December 1972. Procedures were modified following discussions with the State of Colorado for operations beginning in January 1973. The modified procedure was to have the bypass volume in acre-feet current (on prorated time basis) before diversions could be made.

[1]Diversions in November were made for testing purposes.
[2]No record available for January and February 1971.
[3]Diversions were made during the last week of August and middle of September.
[4]Diversion in September was caused by gate leakage.

*U.S. Bureau of Reclamation.

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Table 4

SAN JUAN-CHAMA PROJECT, COLORADO-NEW MEXICO

OSO DIVERSION DAM ON NAVAJO RIVER *

YEAR	STATION	TOTAL MONTHLY FLOW IN ACRE-FEET												TOTAL
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
	Minimum bypass flow required at diversion dam	1,800	1,900	2,200	2,200	5,300	3,300	3,300	3,300	3,300	2,200	2,200	2,200	
1970	Bypass											32	29	64
	Diversion											32	29	61
1971[1]	Bypass	-	-	3,624	3,140	5,476	3,342	3,380	3,306	2,862	2,592	2,241	2,390	
	Diversion	-	-	313	4,709	4,917	10,257	1,702	940	403	1,531	1,124	272	26,168
1972[2]	Bypass	2,206	2,015	2,402	2,315	5,544	3,338	2,469	1,726	2,400	3,269	2,208	2,394	32,286
	Diversion	289	163	2,474	3,927	4,572	3,849	67	0	170	7,315	2,628	1,033	26,487
1973[3]	Bypass	2,335	1,900	2,356	2,231	15,507	15,404	4,669	3,572	3,247	2,370	2,233	2,400	58,224
	Diversion	820	624	1,041	6,375	22,167	25,835	15,967	1,787	617	548	0	0	75,787
1974[4]	Bypass	2,073	2,057	2,579	2,323	6,666	3,646	3,689	2,898	1,908	2,241			
	Diversion	0	0	1,397	3,836	8,949	4,095	198	503	0	0			

NOTE: See note on table 2.

[1]Diversions were made the first week and the last day of September.
[2]Diversions were made 2 days in middle of July; diversions made 4 days in middle of September.
[3]Diversions were made during first part of September and below average flows occurred during last part of the month.
[4]Diversions were made during first part of month of August and below average flows occurred during last part of month.

*U.S. Bureau of Reclamation.

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streamflow, although diversions were made on a total of six days during the two months; in two months, diversions were made during the first part of the month, and the streamflow decreased during the latter part of the month; and in one month, a sudden increase in streamflow caused automatic gate operation to permit diversions, which would not have occurred under current operating procedures). The operation of the diversion works on the Little Navajo River was governed by requests for water submitted by downstream diverters. Tables 2-4 illustrate the foregoing points.

The Commissioner concluded that in view of unstable streamflow conditions, the San Juan-Chama Project diversion structures on the Rio Blanco, Navajo and Little Navajo Rivers were operated in compliance with Public Law 87-483 and existing operating agreements. To avoid diverting considerably less than the San Juan-Chama Project's allocated share of water, water in excess of the daily pro-rated by-pass requirement is diverted, providing that the monthly by-pass requirement has been met. If streamflow drops signficantly later in the month, it may not be possible to meet the monthly by-pass requirement.

Questions pertaining to the project's operation on water quality and the adequacy of by-pass flows specified on page D2-7 of the Project Report have not been resolved. Since the report was published in 1955, greater focus has been placed on environmental impacts of facilities and on water requirements for protection of fish and wildlife. It is also clear that lack of knowledge of water requirements for fish and wildlife purposes exists in the Upper Colorado River Basin. Reassessment of operational procedures and criteria may, therefore, be justified.

G. Indian Water Rights

Questions have been raised about the water rights of the Jicarilla, Ute, Ute Mountain Ute and Navajo Tribes in the San Juan River Basin. Operation of the San Juan-Chama, Navajo and other projects in the Basin is dependent upon an understanding of these allocations. In a July, 1974 resolution (No. 75-18) passed in opposition to Senate Bill.S. 119 by the Tribal Council of the Jicarilla Apache Tribe it was stated that "the Jicarilla Apache Tribe has been and will be deprived of water from the Navajo River, which water rightfully belongs to the Jicarilla Apache Tribe, other Indian Tribes and prior water users on the Navajo River and other tributaries of the San Juan River."

This issue has also been raised by others and was a fundamental point made by Senators Abourezk and Kennedy in a November 1974 request to the Secretary of the Interior for explicit information on the allocation of San Juan River waters for a proposed coal gasification plant to be developed by the El Paso Natural Gas Company.

In the Colorado River Basin, the question of Indian water rights is of maximum importance since any assessment of water allocation versus supply available must be made on the basis of quantitative determination of all uses. For the San Juan Basin, Indian water rights have not yet been established and the validity of current analyses of supply versus demand are subject to question.

1. General Background on Indian Water Rights

Historically, state law has accommodated establishment of water rights related to diversion of a watercourse for beneficial use. The central feature of this appropriative right is the right to obtain water in periods of reduced supply before others having rights established later in time are served. First in time, first in right describes the process. Presently, permits are issued by states as evidence of rights and on the basis that unappropriated waters are available.

Indian water rights are independent of the state law system. 6/ They arise in federal law and generally are established at the time a reservation is created. When the reservation is on lands aboriginally owned by the Indian tribe, the water rights may be considered to exist from time immemorial. Ordinary appropriated waters have a priority in time dating to the time of first use or from the date of a permit while Indian rights have a priority in time dating at least to the date the reservation was established. Indian reservations considered to have aboriginal water rights would have first priority on the body of water serving their supply.

The legal basis for Indian water rights was established by the U.S. Supreme Court in the case of Winters v. United States. 7/ The findings of the Court was that the Government, in creating a reservation, intended to reserve waters for the Indian lands so that they could be put to use. Arizona v. California decided the question of quantifying Indian water rights by concluding that the only reasonable way to measure water to be reserved for the reservations was by way of acreage of irrigable land. Although this premise serves those areas engaged in farming and ranching,

it is likely that Indian reservations created for other types of occupations may have water rights measured in different terms. This relates to the statement in Winters which implies that interpretation of agreements with Indian Nations should support the purpose of the agreement. 8/

The competition between Indian and non-Indian water rights poses some extraordinary problems. Most Indian reservations predate extensive water development projects in the Western U.S. although the use of water in significant quantities by the Indians has generally developed only in recent years. In many water critical areas of the west, the development of water projects by the Indians could preempt the use of water and facilities already established at the cost of billions of dollars. The resolution of such conflicts will be difficult.

In its June, 1973 final report, the National Water Commission addressed the question of Indian water rights and made several recommendations. In view of the importance of this issue, these are given below: 9/

Recommendations of the National Water Commission

A. "At the request of any Indian tribe the Secretary of the Interior or such other Federal officer as the Congress may designate should conduct studies in cooperation with the Indian tribe of the water resources, the other natural resources, and the human resources available to its Reservation. An object of the studies should be to define and quantify Indian water rights in order to develop a general plan for the use of these in conjunction with other tribal resources. When warranted by the results of such studies, litigation

should be instituted by the United States in behalf of the Indian tribe to adjudicate its water rights. Congress should appropriate funds to support the studies and the litigation."

B. "Prior to the authorization of any federally assisted non-Indian water resource project, a final adjudication should be made of all Indian water rights which when exercised could substantially affect the water supply for the project."

C. "Existing water uses on Indian Reservations, whether or not they have yet been adjudicated, should be quantified and recorded in State water rights records for the purpose of providing notice of such use. All adjudications or other binding determinations of Indian water rights whether heretofore or hereafter rendered similarly should be reocrded. When requested to do so by a tribe, the Secretary of the Interior should also file notice of the existence of unquantified Indian water rights with the appropriate State official."

D. "Jurisdiction of all actions affecting Indian water rights should be in the U.S. District Court for the district or districts in which lie the Indian Reservation and the water body to be adjudicated. Indian tribes may initiate such actions and the United States and affected Indian tribes may be jointed as parties in any such action. The jurisdiction of the Federal district court in such actions should be exclusive, except where Article III of the Constitution grants jurisdiction to the U.S. Supreme Court. In such actions, the United States should represent the Indian tribes whose water rights are in issue, unless the tribe itself becomes a party to the action

and requests permission to represent itself. Any State in which the Reservation lies and any State having water users that might be affected by an Indian water rights adjudication may initiate an adjudication and may intervene in an adjudication commenced by others, including adjudications initiated by the United States and by Indian tribes. Upon such appearance by the State, the State may move to represent its non-Indian water users parens patriae, and the motion should be granted except as to non-Indian water users as to whom the State has a conflict of interest."

E. "Congress should make available financial assistance to Indian tribes which lack funds to make economic use of their water to permit them to make economic use of it. In addition, Congress should enact legislation providing that on fully appropriated streams the United States, shall make a standing offer of indefinite duration to Indian tribes to lease for periods not to exceed 50 years any water or water rights tendered by the Indian owners at the fair market value of the interest tendered."

F. "Congress should enact legislation providing that whenever the construction and operation of a water resource project on an Indian Reservation shall take, destroy, or impair any water right valid under State law to the diversion, storage, or use of water off the Reservation, which right was initiated prior to the date of the decision in Arizona v. California (June 3, 1963), the United States

shall provide a substitute water supply or pay just compensation to the owner of such right; provided, however, that:

(1) such owner shall not be entitled to a substitute supply or to compensation if, prior to development of his right he had actual notice of conflicting Indian water rights claims that would render the water supply inadequate to serve the diversion requirements of himself and the Indian Reservation, and

(2) compensation shall not include values created by subsidies granted by the United States to such owner.

The cost of such compensation shall be recognized as a prior national obligation and shall not be reimbursable by the beneficiaries of water resources projects on Indian reservations."

2. Status of Litigation on Indian Water Rights in the San Juan River Basin

As of the end of March 1975, there were two suits pending which related to adjudication of Indian water rights in the San Juan River Basin. The first of these, Schutz, et. al. v. Stamm et. al. was filed in the District Court of Colorado on April 10, 1974. 10/ It originally dealt with water quality and associated issues stemming from the operation of the San Juan-Chama diversion dam. On March 17, 1975, a motion to intervene was filed by the Jicarilla Apache Tribe. This motion and accompanying complaint appeared to open the door to consideration of questions related to the priority, nature and extent of water rights claimed by the Jicarilla Apache Tribe and possibly other claimants. On March 24, 1975,

the state of New Mexico filed a motion for leave to make special appearance in opposition to the motion of the Jicarilla Apache Tribe for leave to intervene. On March 27, 1975, ~~the state of New Mexico~~ U.S. filed a defendant's response to order to show cause - Jicarilla Apache Tribe. In this ~~motion~~ response it was stated that the defendants had no objection to the Tribe's intervention as long as the issues were not extended beyond those defined in a December 30, 1974 court memorandum order. This order specified that the case would be limited to an assessment of the duty, if any, owed the Plaintiffs by the named public officials and whether such duty was being properly performed. The basic issue of the case is the operation of the San Juan-Chama project in relation to by-pass flow requirements and environmental impact. The concern of New Mexico relates to the possible expansion of the case to include adjudication of water rights as such.

The second suit was filed on March 13, 1975 in the District Court of the Eleventh Judicial District in and for the County of San Juan, New Mexico (Case No. 75-184). The state of New Mexico in the relation of S.E. Reynolds, State Engineer is Plaintiff and the United States of America, City of Farmington, The Echo Ditch Company, Utah International, Inc., Bloomfield Irrigation District and F.F. Montoya, et. al. are Defendants. The subject matter of this suit is a statutory adjudication of all known claims of whatever character, to the right to impound, divert and/or use public waters of the San Juan River Stream System in the state of New Mexico. Rights of the Jicarilla and other Indian Tribes

will be determined in the course of these proceedings. The outcome should permit a quantitative analysis of all water allocation issues in the San Juan River Basin in N.M.

3. Considerations Related to Indian Water Rights in the San Juan River Basin

Articles VII and IX of the Colorado River Basin and Upper Colorado River Basin Compacts respectively include this provision related to Indian Water rights.

> "Nothing in the Compact shall be construed as affecting the obligation of the United States of America to Indian Tribes". . .

Article VII of the Upper Colorado River Basin Compact also includes the following statement which charges Indian and other water uses to the state in which use is made:

> "The consumptive use of water by the United States of America or any of its agencies, instrumentalities or wards shall be charged as a use by the state in which the use is made; provided, that such consumptive use incident to the diversion, impounding, or conveyance of water in one state for use in another shall be charged to such latter state."

The 1955 Project report of the Bureau of Reclamation included the following discussion related to water allocation by the San Juan-Chama Project and the satisfaction of water rights of downstream users: 11/

"Imported water supply.--The project water supply would come from the share of Colorado River water allocated to New Mexico by the Upper Colorado River Basin compact. It would be obtained by diversion of part of the flows of the West Fork, East Fork, Rito Blanco, Rio Blanco, Little Navajo, and Navajo Rivers, all of which are tributaries of the San Juan River. The total mean annual flows for the period 1928-51 for the streams, at the proposed diversion sites, was 372,000 acre-feet."

"Criteria for determination of streamflows to be reserved for downstream uses and, therefore, not available for diversion were established by representatives of the States of Colorado and New Mexico. They included satisfaction of prior water rights and the maintenance of sufficent flows to preserve fish and wildlife values and to maintain sanitary conditions. The water bypassed averaged 131,200 acre-feet per year, leaving for diversion a total of 241,700 acre-feet annually. After subtracting unavoidable spills of 6,100 acre-feet annually and the reservoir evaporation losses of 2.300 acre-feet per year and adjusting for the annual drawdown of storage of 2,000 acre-feet, there remained a net amount of 235,300 acre-feet divertible to the Rio Grande Basin."

"An evaluation of the effect a San Juan-Chama diversion of 235,300 acre-feet annually would have on a Navajo project, or other inbasin uses, having an average annual diversion demand of 630,000 acre-feet at Navajo Reservoir indicates that the effect on the water supply would be negligible. However, additional storage would be required in the Navajo Reservoir to provide the regulation necessary for the modified flows of the San Juan River. Although the usable water for the Navajo project would be decreased about 8,500 acre-feet annually, the mean irrigation shortage for the 24-year period would be about the same under either condition."

The Winters' rights of the Indians were not included in these analyses and are still to be resolved. Further comment on this is given in the following section of the report.

H. WATER BUDGET FOR THE SAN JUAN RIVER BASIN

The surface water supply of the Upper Colorado River Basin is determined at Lee Ferry. For the period 1906-1973, streamflow records show an average annual natural flow of about 15.0 million acre-feet (m.a.f.). Annual flows during this period have ranged from 5.6 m.a.f. in 1934 to 24.0 m.a.f. in 1917. Variability of streamflows in the river basin is well-known and multi-year periods of sustained above or below

average flow are on record. Only part of the average annual flow is available for use in the Upper Colorado River Basin. The distribution to this region depends of governing compacts and available storage facilities.

A number of studies have been conducted for the expressed purpose of determining the amount of water available for consumptive used in the Upper Basin. The most significant of these are by the Department of Interior, the consulting firm of Tipton and Kalmback, Inc., and the Upper Colorado Region State-Federal Interagency Group. 12, 13, 14/

1. Department of Interior Estimate

This study supported determination that the 1968 contracts could be met and has been used in plans for the Central Arizona and other projects. Basic assumptions were that 8.25 m.a.f. would be delivered to the Lower Basin, the project would be operated through the most critical low-flow period of record (1931-1964), reservoir capacity would be that estimated for the year 2030 after sediment accumulation, bank storage would be utilized for part of the water delivered, evaporation allowances would be consistent with other assumptions and allowance would be made for irrigation deficiencies during subnormal years. On the strength of these assumptions, it was estimated that 5.8 m.a.f. would be the lower limit of water available annually to the Upper Basin for all consumptive uses. By modifying assumptions, the available supply could be either increased or decreased. The estimate is considered conservative by the Bureau of Reclamation. It should not be looked upon as an interpretation

of the Colorado River Compact for delivery of water at Lee Ferry. Neither the Upper Colorado States or the Upper Colorado River Commission accept the 5.7 m.a.f. estimate as accurate from either a technical or legal viewpoint. 15/

2. Report of Tipton and Kalmback, Inc.

This study was conducted in 1965 at the request of the Upper Colorado River Commission. On the basis of active storage available or under construction, it was concluded that 6.3 m.a.f. would be available annually for consumptive use in the Upper Basin. This presupposed a delivery of only 7.5 m.a.f. at Lee Ferry and no Upper Basin shortages. These conditions explain the principal difference between the Tipton and Kalmback and Bureau estimates.

3. Upper Colorado Region State-Federal Interagency Group Study 1971

To determine the quantity of water remaining in excess of 1965 uses, reconstruction of modified flows was accomplished for the period 1914 to 1965. This period was selected because it was considered to be the longest period for which reliable records were generally available. The procedure used was one of adding past annual depletions to historic annual flows at the outflow points of each subregion. This process produced estimates of virgin or undepleted annual outflows. Average annual discharge of the Colorado River at Lee Ferry was 12,426,000 acre-feet in 1971 and 4,396,000 acre-feet in 1934. Average annual virgin flow at Lee Ferry, as unaffected by the activities of man, was estimated

at 14.87 million acre-feet over the 52-year period 1914-65. Using the Interagency estimate of mean annual virgin flow and subtracting a delivery of 8.25 m.a.f. at Lee Ferry yields 6.6 m.a.f. for Upper Basin depletions (this assumes full development of the mean annual flow and is an upper limit).

4. 1974 Estimated Consumptive Utilization

The Water for Energy Management Team studied the consumptive use pattern in the Upper Basin. 16/ They estimated that the 1974 level of depletions from the Upper Colorado River system above Lee Ferry totaled 3,187,000 acre-feet. Deducting main stem reservoir evaporation of 520,000 acre-feet gave a utilization of 3,707,000 acre-feet. Depletions included all average annual uses for agriculture, municipal, industrial, fish and wildlife, recreation and net export of water above Lee Ferry together with associated evaporation from reservoirs. Depletions did not include on-site use of surface and subsurface water on public lands through management of natural resource programs. Depletions estimated for each State based on normal 1974 operations and main stem evaporation are given in Table 5.

5. Water Budget For New Mexico's Allocation of Upper Colorado River Basin Water

Assessment of the water supply situation in the Colorado River Basin is difficult and controversial due to: (1) a rather optimistic estimate of water availability at the time the Colorado River Compact was designed; (2) the complexity of making estimates of water utilization

due to interaction of physical, legal and social processes; and (3) the open-ended status of Indian Water Rights.

As a consequence of this, the summary water budgets given here are approximate and subject to assumptions underlying estimates of water availability, and use. Further, the impact of Winters' rights of the Indians is not determined and is omitted. This should be carefully noted in any interpretation. The consequences of such an omission clearly indicate the need for a rapid resolution of this problem.

(a) Water Available for Projects

All estimates are based on a required delivery of 50,000 acre-feet annually to Arizona and an 11.25 percent allocation of the total minus Arizona flows to New Mexico. A water salvage of 24,000 acre-feet is added for New Mexico. 17/

Table 5 [18]/

Estimated 1974 Depletions*

1,000 AF

	Arizona	Colorado	Utah	Wyoming	New Mexico	Total
Thermal Powerplants	a/	9	1	3	25	38
Food and Fiber (Irrigation)	10	1,255	529	258	102	2,153
Fish, Wildlife, and Recreation b/	3	31	24	16	6	80
Minerals and Mining		17	9	18	4	48
Livestock Ponds and Evaporation		21	6	21c/	31d/	79
Municipal and Industrial		18	6	3	8	35
Exports		504	130	10	110	754
Coal - Gasification						
Oil Shale						
Subtotal	13	1,855	905	328	286	3,187
Main Stem Reservoir Losses	0	269	120	73	58	520
Total Depletion	13	2,124	825	401	344	3,707

a/ First unit of Navajor Powerplant went on line in May of 1974. Actual depletion amount not available.

b/ Natural historic wildlife consumption not included.

c/ Includes evaporation from Fontenelle Reservoir.

d/ Includes evaporation from Navajo Reservoir.

*Report on water for Energy. U.S. Dept. of Interior Water For Energy Management Team.

Department of Interior Estimate

(5,800,000 - 50,000) X .1125 = 647,000 acre-feet

647,000 + 24,000 (water salvage) = 671,000 acre-feet

Tipton and Kalmback Estimate

(6,300,000 - 50,000) X .1125 = 703,000 acre-feet

703,000 + 24,000 = 727,000 acre-feet

Upper Colorado Region State-Federal Interagency Group Study

(6,600,000 - 50,000) X .1125 = 739,000 acre-feet

739,000 + 24,000 = 763,000 acre-feet

(b) State of New Mexico Upper Colorado River Depletions Future depletions in the Upper Colorado River System have been estimated for the State of New Mexico by the State Engineer's Office.

DEPLETIONS (Nominal at-site, 1,000's acre-feet)

	Future
Irrigation (Present)	83
Other (M&I, F&W & rec., Mineral, etc.) (Present)	13
Hammond	10
San Juan-Chama	110
Navajo Reservoir Evap.	26
Hogback Expansion	10
Utah International Inc.	10
(Four Corners)	39
Farmington M&I (increase)	5
Navajo Indian Irrigation	226
Navajo M&I Contracts	100
N.M. Pub. Serv. Co. (San Juan)	(20)
Utah Internal Inc.	(20)
(WESCO)	(44)
El Paso Natural Gas Co.	(28)
Other (Gallup)	(8)
Animas-La Plata	34
Irrigation	(14)
M&I	(20)
Mainstream Reservoir Evap.	58
Estimated Total Depletions--	714

The estimated depletion resulting from the Navajo Indian Project is based on use of an all-sprinkler irrigation system. The original system contemplated a depletion of 252,000 acre-feet and the 26,000 acre-foot difference is assumed by the Bureau of Reclamation to be available for other beneficial use on the Reservation. In addition, no depletions are shown for Winter's water rights of the Indians and these would be in addition to designated existing or proposed uses. The magnitude of these is unknown and subject to adjudication.

Using the total of 714,000 acre-feet per year as a base, it can be seen that the availability of water for the three estimates of water supply is as follows:

Department of Interior Estimate

671,000 - 714,000 = 43,000 acre-feet deficiency

Tipton and Kalmback Estimate

727,000 - 714,000 = 13,000 acre-feet surplus

Upper Colorado Region State-Federal Interagency Group Study

763,000 - 714,000 = 49,000 acre-feet surplus

In two of the three estimates there would be a surplus based on uses shown in the table. If the 26,000 acre-feet freed by the sprinkler system option is declared as a valid charge on use, only one estimate would show a surplus. Winter's rights charges against calculated surpluses or deficiencies are unknown and could further reduce any surplus or increase estimated deficiency.

The foregoing figures are based on current analyses of water supply availability and use. They indicate the general nature of the water budget of Upper Colorado River waters for New Mexico. All estimates

are subject to reliability of underlying assumptions and projections of future use. They are sufficiently representative, however, for assessing current and proposed allocations and policy.

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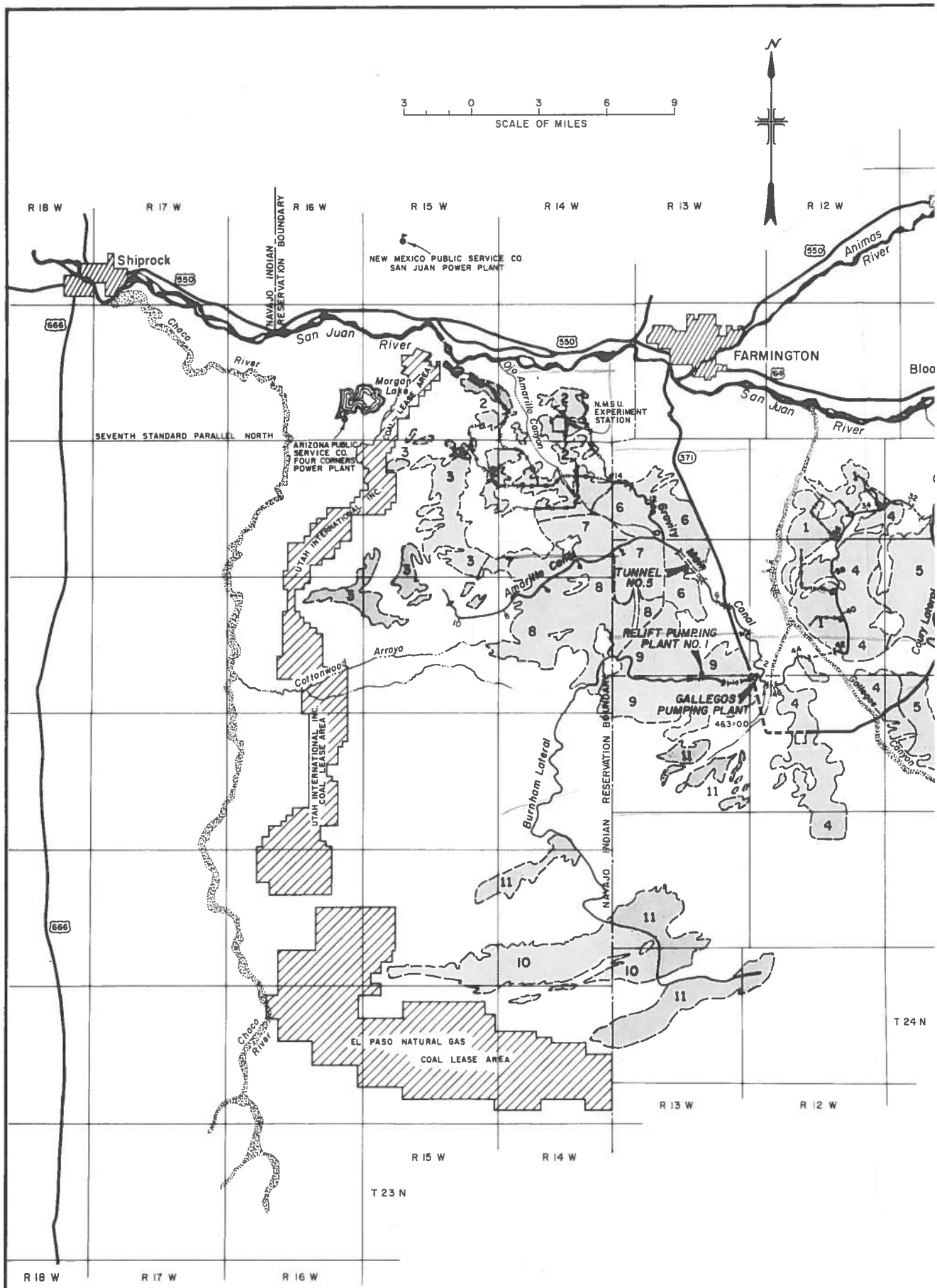
SCALE OF MILES
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R 12 W
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T 23 N
Shiprock
NAVAJO INDIAN RESERVATION BOUNDARY
NEW MEXICO PUBLIC SERVICE CO. SAN JUAN POWER PLANT
Animas River
San Juan River
FARMINGTON
Morgan Lake
COAL LEASE AREA
Ojo Amarillo Canyon
N.M.S.U. EXPERIMENT STATION
SEVENTH STANDARD PARALLEL NORTH
ARIZONA PUBLIC SERVICE CO. FOUR CORNERS POWER PLANT
UTAH INTERNATIONAL INC.
Gravity
TUNNEL NO.5
Amarillo Canal
RELIFT PUMPING PLANT NO. 1
Arroyo
Cottonwood
GALLEGOS PUMPING PLANT
463+00
Burnham Lateral
NAVAJO INDIAN RESERVATION BOUNDARY
UTAH INTERNATIONAL INC. COAL LEASE AREA
EL PASO NATURAL GAS COAL LEASE AREA
Chaco River
666
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64