82D CONGRESS
2d Session

SENATE

DOCUMENT
No. 106

FRYINGPAN-ARKANSAS PROJECT
COLORADO

LETTER

FROM

COMMISSIONER OF THE BUREAU OF RECLAMATION

TO

SECRETARY OF INTERIOR

TRANSMITTING

REPORT and LETTER

REQUESTING COMMENTS OF THE STATE OF COLORADO PURSUANT TO SECTION 1 (c) OF FLOOD CONTROL ACT OF DECEMBER 22, 1944 (58 STAT. 887)

AND

OFFICIAL COMMENTS OF THE STATE OF COLORADO ON REPORT MADE PURSUANT TO SECTION 1 (c) OF THE ACT OF DECEMBER 17, 1944 (58 STAT. 887)

PRESENTED BY MR. MILLIKIN

MARCH 6 (legislative day, FEBRUARY 25), 1952.—Referred to the Committee on Interior and Insular Affairs and ordered to be printed with an illustration

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1952

96229

AUTHENTICATED
U.S. GOVERNMENT
INFORMATION
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UNITED STATES DEPARTMENT OF THE INTERIOR

OSCAR L. CHAPMAN, Secretary

BUREAU OF RECLAMATION

MICHAEL W. STRAUS, Commissioner

Region 7—Denver, Colo.

AVERY A. BATSON, Regional Director

Initial Development

GUNNISON-ARKANSAS PROJECT

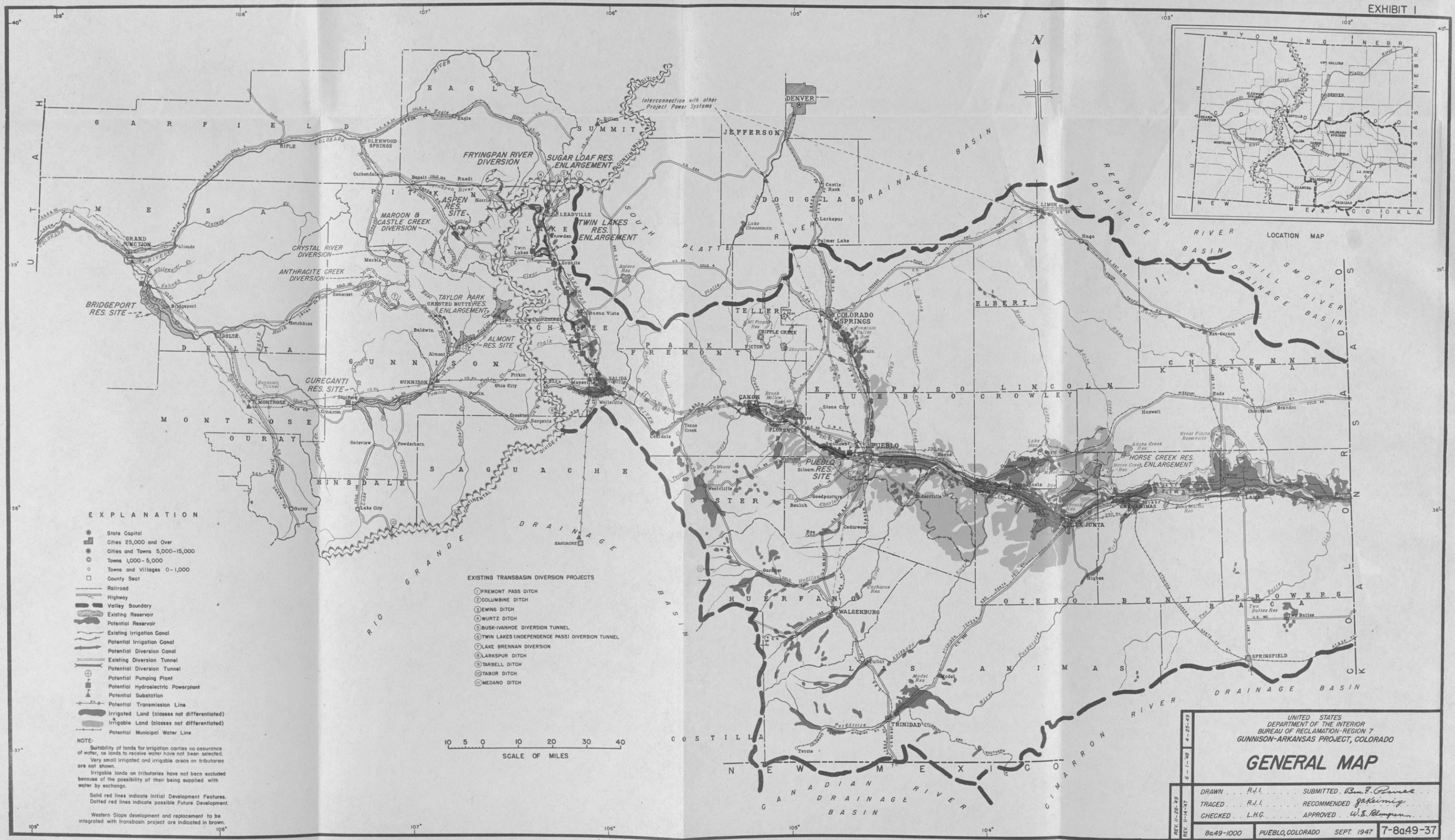
Roaring Fork Diversion

Colorado

Project Planning Report No. 7–8a.49–1

January 1950

EXHIBIT I



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION-REGION 7
GUNNISON-ARKANSAS PROJECT, COLORADO

GENERAL MAP

DRAWN	R.J.I.	SUBMITTED	Wm. F. Pierce
TRACED	R.J.I.	RECOMMENDED	J. A. Kemmerer
CHECKED	L.H.C.	APPROVED	W. E. Palmquist

REV. 11-28-49 | REV. 11-14-47 | 6-1-48 | 4-25-49

8a49-1000 | PUEBLO, COLORADO SEPT. 1947 | 7-8a49-37

DEPARTMENT OF THE INTERIOR,
BUREAU OF RECLAMATION,
REGIONAL OFFICE, REGION 7,
Denver, Colo., July 5, 1950.
(Revised February 23, 1951.)

To: The Commissioner, Bureau of Reclamation.

From: The Regional Director, Region 7, Denver, Colo.

Subject: [1] Report on the Initial Development, Roaring Fork Diversion, of the Gunnison-Arkansas Project, Colorado.

TRANSMITTAL AND AUTHORITY

1. This is my report on the initial development, Roaring Fork diversion, of the potential Gunnison-Arkansas project, Colorado. The initial development, a multiple-purpose project involving transmountain diversion of water, is designed as a major step in optimum utilization of water and related resources in the upper Arkansas River Basin. The report and substantiating documents are submitted for your approval and for departmental action with a view toward securing congressional authorization for development of the project.

2. Authority to make this report and supporting investigations is provided in the Federal reclamation laws (act of June 17, 1902, 32 Stat. 388, and acts amendatory thereof or supplementary thereto).

INTRODUCTION

3. From its origin on the snowcapped mountains of Lake County, Colo., the Arkansas River (pronounced Ar-kan-saw) flows eastward 1,500 miles to its confluence with the Mississippi. The river's drainage from the Continental Divide to Ellinwood, Kans., comprises the upper Arkansas River Basin. The economy of that semiarid section of the Nation is bound closely to its natural resources. Their conservation and development are essential if the economy of the basin is to be stabilized and expanded. Water is the key resource and its utilization for all beneficial purposes is of prime importance. The Arkansas River is the hydrologic artery of the basin. It furnishes municipal water, industrial water, and irrigation water. The behavior and the yield of the river are, therefore, of concern to all interested in irrigation agriculture, in the protection and expansion of business investments, and in the wise and orderly development of the resources of the basin.

4. The potential Gunnison-Arkansas project is a major unit in the comprehensive plan of development of the water resources of the upper Arkansas River Basin which is being investigated by the Bureau of Reclamation. The project is adaptable to construction by successive cumulative stages. The initial development is planned as

[1] "Initial Development, Roaring Fork Diversion, of the Gunnison-Arkansas Project, Colorado" was the original name used for project when the project report was prepared. It is now proposed to change the name of the project to the "Fryingpan-Arkansas Project."

a completely independent multiple-purpose unit that could be the first stage of a much larger project. The comprehensive project would require exportation of a relatively large amount of Colorado River water eastward through the Continental Divide to the Arkansas Valley of Colorado. The full potential uses of water in western Colorado have not been completely determined; therefore, only the amount of water assuredly beyond the requirements for development on the western slope is proposed for diversion at this time.

5. This report and attached substantiating report have been sponsored and prepared by the Bureau of Reclamation for the United States Department of the Interior. All agencies of the Department concerned with the development and administration of resources in the project area have made important contributions. Other Federal agencies, numerous State and local governmental agencies, water districts, civic organizations, corporate enterprises, and private individuals have given substantial aid in the development of the report. Preliminary drafts of the report were furnished to the States of Colorado and Kansas, and to the field offices of affected Federal agencies. These drafts were reviewed by the two States and at field level by the following agencies:

- Department of Agriculture:
  - Forest Service
  - Soil Conservation Service
- Department of the Army, Corps of Engineers
- Federal Power Commission
- Department of the Interior:
  - Bureau of Mines
  - Bureau of Land Management
  - Fish and Wildlife Service
  - Geological Survey
  - National Park Service

DESCRIPTION OF AREA

6. *Physical features.*—Two distinct areas are involved in the project. They are separated by the Continental Divide which exceeds an altitude of 12,000 feet. The western slope diversion area, where transmountain water would be obtained, is located in the Roaring Fork River Basin of the Colorado River drainage. Water would be diverted from tributaries of the Fryingpan River and from Hunter Creek—both tributaries of the Roaring Fork. The diversion area is mountainous and primitive. It is located within the bounadries of the White River National Forest at elevations above 10,000 feet. Most of the 100-square mile area is accessible only by trails.

7. The eastern slope project area extends from the headwaters of the Arkansas River, near Leadville, to the Colorado-Kansas boundary. The upper reaches of the Arkansas Valley are as rugged as the diversion area. The Rocky Mountains reach their highest elevation near Leadville at Mount Elbert, 14,431 feet above sea level. Close by are Mount Massive, 14,419 feet, and Mount Harvard, 14,399 feet. Elbert and Massive are the second and third highest peaks in the continental United States. Originating high above timberline, the Arkansas River flows south and east—successively through canyons

and foothills to the gently rolling high plains. Approximately 38 percent of the eastern slope project area is below an altitude of 5,000 feet, relatively level, and suitable for farming.

8. *Climate.*—The project area has a range of climate from subhumid in the high mountains to semiarid in the lower altitudes. On the western slope, the village of Nast, located just below the diversion area at an altitude of 8,800 feet, has a mean annual precipitation of 17.86 inches, an average temperature of 36.6° F., and a frost-free period averaging only 66 days. Corresponding data for representative weather stations on the eastern slope are—

Station	Altitude	Precipitation (inches)	Temperature (° F.)	Frost-free period (days)
Leadville	10,182	18.63	35.6	83
Canon City	5,343	12.98	53.4	168
Pueblo	4,808	11.67	52.0	173
Rocky Ford	4,117	12.30	52.1	165
Lamar	3,615	16.05	54.4	168

9. *Population.*—Unofficial estimates place the population of the upper Roaring Fork River Basin at about 1,000 permanent residents. Aspen, the largest community, had a population of 777 in 1940. Other residents live on ranches or at resorts or in the smaller villages. Few, if any, persons live in the diversion area proper.

10. The population of the eastern slope project area reached 278,000 in 1940. Unofficial local estimates placed the 1948 population at 362,000—a 35-percent increase over 1940. Preliminary unofficial returns of the 1950 census disclose that Pueblo's 1940 population of 52,162 had increased to 63,561 and Colorado Springs' population from 36,789 to 45,269. Other sizable communities in the valley and their 1940 populations are Leadville, 4,774; Salida, 4,969; Canon City, 6,690; La Junta, 7,040; and Lamar, 4,465.

11. *Present development.*—Livestock ranching and the recreational industry are the principal business activities in the upper Roaring Fork Basin. In times past, mining was extensive. This activity had diminished but the latent industry may be revived. Registered Hereford cattle from the western slope have received national recognition. Winter sports, vacationing, and sport fishing are becoming increasingly important throughout the basin. The diversion area proper has no farming although the forest is used for grazing.

12. The upper part of the Arkansas Valley is similar in many respects to the upper Roaring Fork Basin. Mining is important at and near Leadville and winter and summer sports bring many persons to the area. The city of Pueblo is the focal center for the varied industrial development of the valley. The most important industrial enterprises, based upon the 1939 census of business, included 1 steel mill, a cement plant, smelters, iron foundries, brick and tile plants, machine shops, and agricultural processing plants, including 23 grain elevators, 3 flour mills, 8 feed grinding and mixing plants, 9 alfalfa mills, 4 meat packing plants, 3 beet sugar factories, and 5 canning plants.

13. Agriculture, however, is the most important industry of the valley. More than 87 percent of the land area, including timberland,

is used for grazing. Cultivated lands comprise 10 percent of the area of which about one-fourth, or 322,000 acres, is irrigated. The irrigated land exerts an extremely significant influence on the economy of the valley. It stabilizes the economy of an area many times greater than that actually irrigated.

14. Many irrigated crops are grown successfully in the Arkansas Valley when water supplies are adequate. In the higher elevations hay, tame pasture, and small grains predominate. They are marketed chiefly through livestock. The foothills area in Fremont and Pueblo Counties, in addition to general irrigated crops, produce fruits, vine, and truck crops. Below Pueblo the principal irrigated crops are alfalfa, corn, grain sorghum, sugar beets, barley and wheat, truck crops, and dry beans. Cantaloups, onions, cucumbers, pickles, tomatoes, and red beets are highly successful truck crops. Dairying and poultry raising are important enterprises near market outlets.

15. The size of irrigated farms varies from small truck farms and orchards to general purpose farms of several hundred acres. In 1940 the average irrigated farm below Salida consisted of 356 acres of which 81 acres were irrigated. Irrigated land values range up to $250 an acre depending upon soils and water rights. Gross crop values also vary considerably. On the basis of 1939–44 crop prices, the average irrigated gross crop values ranged from $30 to $40 an acre over the critical 1930–41 period. Specialty crops and seed crops often provide gross returns many times the average.

16. Ninety-six percent of the irrigated land in the Arkansas Valley is identified as classes 1 and 2 according to Bureau of Reclamation standards. It is of high to medium productive capacity; consists of silty loam, clay loam, and clay soils; and generally has good surface drainage. Alkalinity and salinity are not serious problems.

NEED FOR DEVELOPMENT

17. The western slope diversion area proper is national forest land not suitable for irrigation. Other areas in the Colorado River Basin have irrigated and irrigable lands. Present water uses in western Colorado will undoubtedly expand and new uses may materialize. The increased uses may result from expansion of irrigation and from such potential industrial developments as mining, lumbering, wood pulp production, and oil shale refining. Investigations of the Gunnison-Arkansas project were based upon the principle that all present and potential uses of Colorado River water in the natural basin in Colorado must be protected. Extensive studies by the Bureau and by committees appointed by the Colorado Water Conservation Board confirm the existence of a plentiful supply of water in the diversion area. The studies also substantiate the conclusion that part of that water can feasibly be diverted without detriment to the diversion area or to other existing and potential water uses on the western slope—even though complete future water requirements for all possible uses cannot be foreseen for all of western Colorado. The relatively small diversions proposed for the initial development—replaced in time, quantity, and place by a reservoir near Aspen and by judicious operation of the project based on the operating principles hereinafter set forth—will not impair the future economic growth of the western slope, harm present water users, or

create a risk in meeting the Lee Ferry obligation of the Colorado River compact.

18. *Irrigation.*—The main agricultural part of the eastern slope project area is in the semiarid zone of 11 to 16 inches of annual precipitation. Seventy to eighty-six percent falls during the April to October growing season. Dry farming is and probably will continue to be practiced extensively. Livestock grazing on the ranges and in the forests is also an extensive enterprise. However, both types of agriculture require large land areas, and dry farming particularly depends upon the vagaries of the weather. General cultivated agriculture and specialty high-value crops, many of which are required to stabilize the agricultural economy of the area, require more water than typical dryland crops. Irrigation is the only means of providing a dependable supply.

19. Early irrigation in the Arkansas Valley coincided with available stream run-off. As ready markets developed, irrigation farming was expanded and a demand developed for late season water which could not be supplied by unregulated streamflow. Consequently, between 1890 and 1910, three reservoirs in the headwaters area and 11 off-stream reservoirs below Pueblo were constructed. In 1949 the John Martin Reservoir on the Arkansas River was completed by the Corps of Engineers for conservation storage and flood control. It also has an irrigation storage space of 420,000 acre-feet. The three headwaters reservoirs have a capacity of 84,400 acre-feet. The 11 off-stream reservoirs have a present capacity of 300,000 acre-feet which represents about 75 percent of the original capacity as a consequence of sedimentation. Eight privately owned transmountain diversion systems import about 48,000 acre-feet annually.

20. More than 40 canals and ditches supply irrigation water to lands in the valley between Canon City and the Colorado-Kansas boundary. Sediment deposition in canals and ditches has become a major irrigation problem in the Pueblo-Las Animas reach. In some instances long reservoir feeder canals have lost 50 percent of their capacity because of sedimentation.

21. The amount of irrigation water available for the 322,000 acres of irrigated land in the project area varies considerably from year to year. Seldom is the supply adequate for maximum crop production. Irrigation water shortages as high as 78 percent of crop requirements have occurred. The estimated average canal headgate diversion requirement is 3.19 acre-feet an acre. Allowing for tolerable shortages, that headgate requirement can be reduced to 3.10 acre-feet. The average amount of seasonal irrigation water historically available between Pueblo and the Kansas State line has ranged from 0.9 acre-feet an acre in 1934 to 2.7 acre-feet in 1942. The base flow of every stream in the valley is overappropriated. Enhancement of the irrigation water supply depends upon regulation of existing supplies for more efficient use, additional storage capacity for the conservation of excess flood flows, reservoir space for holdover storage, and new water supplies for which the only apparent source is transmountain diversion from the Colorado River drainage.

22. *Power.*—Power facilities of the initial development will be designed for integration with the power facilities of the Bureau's Colorado-Big Thompson project and with local utilities to serve a combined power market area. The combined area, which consists of the

entire eastern slope of Colorado and Grand and Summit Counties on the western slope, comprises roughly two-thirds of the State and contains a large majority of the State's population and industries. The area is served with electricity by 15 private utilities, 25 municipal organizations, 11 REA cooperatives, and the Bureau of Reclamation. Although not considered a permanent part of the power market area, loads in the vicinity of Gunnison and Saguache may be served originally by the initial development because of their proximity to the project power system. The Colorado-Big Thompson project has, among other features, the 21,600-kilowatt Green Mountain hydroelectric plant now in operation on the western slope, and, when completed, will also have hydroelectric plants on the eastern slope north of Denver.

23. In December 1948—the latest year of complete record—installed generating capacity in the combined power market area totaled 347,105 kilowatts. Of that total, 339,000 kilowatts were dependable capacity. Only about 20 percent of the installed capacity was hydrpower. Steam capacity comprised 73 percent. A number of industrial plants in the area have their own generating systems which, combined, have an installed capacity of about 85,000 kilowatts.

24. The noncoincident peak demand for power in the market area in 1948 reached 300,000 kilowatts—about 12 percent more than the net assured capacity of 267,000 kilowatts. Forecasts indicate that the dependable capacity requirements will be about 632,000 kilowatts by 1960 and 966,000 kilowatts by 1970. On the basis of 1948 installations, plus all known additions scheduled or projected, less normal or necessary retirements, the market area will still have a deficiency in power supply.

25. As of 1950, eastern Colorado does not have a high-voltage transmission system interconnecting all important load centers. Ties of utilities to enable interchange of power are essential for maximum efficiency of service and utilization.

26. *Municipal water.*—Most of the Arkansas Valley towns below Pueblo obtain municipal water from pumped wells. Other valley communities use water from streams and springs. In general, the quality is poor because of excessive hardness.

27. Colorado Springs obtains excellent water from the slopes of Pikes Peak. The city experienced water shortages prior to 1937. Since then, its water storage capacity has been doubled and all service connections have been metered. The city has indicated an urgent need of 4,000 acre-feet of supplemental municipal water immediately and a probable need for an additional 16,000 acre-feet by the year 2000. In 1949, Colorado Springs started drilling the Hoosier pass transmountain diversion tunnel which would import western slope water from the Blue River. The city has expressed interest in obtaining supplemental municipal water from the initial development by exchange methods.

28. Pueblo obtains its municipal water from the Arkansas River. During periods of low flows the water is of poor quality. The water is relatively hard and unpalatable. In 1938, Pueblo acquired the Wurtz ditch which imports annually about 2,000 acre-feet of water from the western slope. Much of the yield from that transmountain project is lost to municipal use for lack of storage space. The city has indicated an immediate need for 5,000 acre-feet of municipal

water (including the 2,000 acre-feet of Wurtz ditch water) and an ultimate additional need of 15,000 acre-feet by the year 2000. The city has also expressed interest in obtaining treatment of its present supply of 21,000 acre-feet.

29. Canon City and Rocky Ford obtain municipal water from the Arkansas River. Canon City has not requested project water.

30. The towns of Manzanola, Rocky Ford, La Junta, Las Animas, and Lamar, and the off-stream towns of Crowley, Wiley, and Eads have requested treated municipal water from the project to replace entirely their present supplies. Their immediate needs are about 8,000 acre-feet.

31. *Flood control.*—Few damaging floods of record have occurred in the diversion area and in the Arkansas Valley down to Canon City. From there eastward, however, damaging floods increase in frequency and volume to the mouth of the Purgatoire River. The largest flood of record in the project area occurred in June 1921. Intense rains caused flows at Pueblo estimated at 103,000 second-feet. Downstream tributaries contributed to the flood until the peak of 200,000 second-feet was reached at La Junta. The flood killed at least 78 persons; property damages exceeded $19,000,000, including $10,000,000 in Pueblo.

32. As a result of that disastrous flood, a barrier dam across the Arkansas River, 6 miles west of Pueblo, and an improved floodway channel through the city were completed in 1926. Another flood-control structure, the John Martin Reservoir, located on the Arkansas River near Lamar, Colo., was completed in 1949 by the Corps of Engineers. A multiple-purpose project, 281,000 acre-feet of its 701,000 acre-foot capacity are allocated to flood control.

33. A flood danger still exists from Pueblo downstream to the John Martin Reservoir. The Corps of Engineers has estimated that the annual damages along that reach of the river average $890,000. The initial development could eliminate about 66 percent of that probable damage.

34. *Associated needs.*—Sediment control, stream pollution abatement, enhancement of the environment for fish and wildlife, and provision for recreation are other needs of the project area associated with water development. Industrial expansion, conservation of forest and range lands, and stabilization of the entire economy by balanced diversification of interest are recognized as long-range objectives. The initial development could immediately ameliorate some of the problems stemming from those needs. Resolution of the long-range objectives will require coordinated and unselfish cooperation by all citizens, agencies, and entities concerned.

35. Mention has already been made of the acute sedimentation problem affecting irrigation in the main Arkansas Valley. At Pueblo the river annually transports about 944 acre-feet of sediment. Approximately 42 percent of that sediment is deposited in reservoirs, canals, and laterals; about 38 percent becomes undesired deposition on the irrigated lands. Aggradation of the river channel has made some irrigation diversion structures inoperative; other diversion structures have necessarily been raised. Removed sediment now lines some canal banks and further disposal has become very expensive. Canal sand traps have become inoperative. The only apparent immediate solution is provision of reservoir space specifically for the deposition of sediment.

36. Stream pollution has not reached dangerous or serious proportions in the Arkansas Valley. The most noticeable effects of industrial pollution are found below Leadville as a result of mine drainage and tailings.

37. Fishing is a summer sport of considerable financial significance in the diversion area and in the upper Arkansas Valley. The Fish and Wildlife Service has prepared a preliminary report on the subject and has made tentative recommendations concerning minimum flows needed to preserve fishery values in the diversion area. The project has been so planned and operating rules have been so formulated as to prevent the diversion of water which would reduce the flows below the specified minimum. Continued studies of the requirements of the fishery resources are needed to develop refinements under the terms of the operating rules.

38. The mountainous portions of both slopes of the project area—and especially the diversion area—combine such desirable qualities as scenic attractiveness, wilderness character, remoteness, water for fishing, and skiing facilities. Consequently, they are important recreational areas at all seasons. The National Park Service has made a preliminary report on the project area and on the recreational aspects of the initial development. Its recommendations will be followed to the fullest extent possible.

PLAN OF DEVELOPMENT

39. The initial development is keyed to transmountain diversion of water from the Colorado River drainage eastward to the upper Arkansas River Valley. The diverted water and reregulated native eastern slope water would provide for supplemental irrigation, furnish supplemental and new supplies of municipal water, and enable the generation of hydroelectric power. Other multiple-purpose aspects of the project include flood and sediment control, stream pollution abatement, and fish and wildlife conservation. All estimates, specifications, and description of features are necessarily preliminary and subject to some modification and refinement when detailed data becomes available.

40. As a result of the diversion of water from the Colorado River Basin, this potential initial development is consistent with the purposes of the Colorado River storage project. The extent of its relationship to the upper Colorado River Basin development and to the upper Arkansas River Basin development can be more firmly established as those developments proceed. In its plan for the Colorado River storage project the Bureau of Reclamation contemplates at least six major regulatory reservoirs in the upper Colorado River Basin. The need for the storage project stems from the compacts pertaining to Colorado River waters. The Colorado River compact apportions the use of 7.5 million acre-feet of water annually to the upper Colorado River Basin. It also provides that the States of the upper division (Colorado, New Mexico, Utah, and Wyoming) will not cause the flow of the river at Lee Ferry, Ariz., to be depleted below an aggregate of 75 million acre-feet for any period of 10 consecutive years. This compact was signed November 24, 1922, and made effective pursuant to the terms of the Boulder Canyon Act. The upper Colorado River compact in turn apportions the use of Colorado River water to the four States and Arizona, and provides

for the sharing of joint water obligations of the four States. The upper Colorado River compact was signed October 11, 1948, subsequently ratified by the upper basin States and approved by the Congress. Full consummation of the apportioned uses of Colorado River water in the upper basin States, consistent with the rights and obligations of the compacts and the Mexican Treaty of 1945, would require construction of major regulatory reservoirs in the upper basin.

41. *Western slope features.*—A system consisting of about 50 miles of canals and tunnels would enable the collection of water from Hunter Creek and the Fryingpan River—both tributaries of the Roaring Fork River. The water so collected would be diverted to the eastern slope through the potential Fryingpan-Arkansas Tunnel, about 6 miles in length. Since 1935, the Twin Lakes Reservoir & Canal Co. has diverted western slope water from the Roaring Fork drainage to its reservoir on the eastern slope. The company has a legal right to divert more water than it has diverted to date; but such increased diversions would be detrimental to fishery values in the Roaring Fork River and its tributaries above Aspen. In order to preserve those fishery values the project plan includes an extension of the collection system to the South Fork of Hunter Creek and enlargement of other project facilities to permit an exchange of water with the Twin Lakes Co. This plan hinges upon the execution of agreements whereby the company would refrain from certain diversions through its own system whenever the natural flow of the Roaring Fork River falls below a specified minimum in exchange for an equivalent supply delivered on the eastern slope through project facilities. The cost of these specific facilities and enlargements is estimated at $2,179,000 and is considered economically justifiable by the Fish and Wildlife Service on the basis of resulting benefits.

42. The Aspen Reservoir would be constructed near the town of Aspen to provide replacement water and also to provide water for future use in meeting demands in western Colorado. The reservoir, which would inundate about 650 acres and have an active capacity of 28,000 acre-feet, would be created by an earth-fill dam about 90 feet in height. A short supply canal would divert water from Hunter Creek to the reservoir.

43. The Aspen Dam site is at an altitude of 8,017 feet. The collection system for the transmountain diversion would be entirely above 10,000 feet altitude. The chief construction problems will be the short working season and transportation of materials.

44. The western slope features would enable the average annual diversion of an estimated 69,200 acre-feet of project water. As a result of eastern slope storage to be provided by the project, about 14,900 acre-feet of water could also be diverted annually by the Twin Lakes Co., which cannot now be diverted for lack of storage capacity. This would be in addition to its present average diversion of 38,000 acre-feet.

45. *Eastern slope supply and power features.*—In round figures, the major potential eastern slope project facilities include three earth-fill dams, 60 miles of power canal ranging in capacity from 300 to 1,000 second-feet, three diversion dams, over 10 miles of diversion canals, seven hydro-electric power plants and switchyards, three small forebays and two afterbays, nine substations, about 400 miles of transmission line, and a municipal water supply system. The latter system includes one diversion dam, 15 miles of reservoir supply canal for irri-

gation replacement water, three pumping plants, one small regulating reservoir, one treatment plant, and about 175 miles of pipelines. Other structures and equipment would be required for construction and operation such as one permanent camp, caretakers' residences and shops, warehouses, construction camps, offices and laboratories, and a communications system.

46. Imported and native water would be stored first in an enlarged Sugar Loaf Reservoir on the Lake Fork of the Arkansas River. Releases would flow about 20 miles south in the Elbert section of the Arkansas power canal, then through the Elbert hydroelectric power plant and into the enlarged Twin Lakes Reservoir. The 10-mile Snowden canal would divert additional Arkansas River water into the Twin Lakes Reservoir. From there, the water—increased by tributary interceptions and by the Wapaco diversion from the river—would flow south some 40 miles in the Arkansas power canal and be returned to the main stream near Salida. Power would be generated en route in the Granite, Wapaco, Princeton, Johnson, and Salida hydroelectric power plants. Forebays would be provided above the Princeton, Johnson, and Salida plants. The existing Clear Creek Reservoir (capacity about 11,400 acre-feet) would be adapted for use as an afterbay for the Granite power plant. An afterbay would be provided on the Arkansas River for the Salida plant. Near Salida and Canon City some water might be diverted for irrigation. The remainder would continue down the river to the potential Pueblo Reservoir. Most of the supplemental irrigation releases from that reservoir would be made through the Pueblo hydroelectric power plant.

47. Summarized data on the three major eastern slope dams and reservoirs are as follows:

Dam or reservoir	Present reservoir capacity (acre-feet)	Potential dimensions			
		Total capacity (acre-feet)	Active capacity (acre-feet)	Normal surface area (acres)	Height of dam (feet)
Sugar Loaf	17,000	117,000	117,000	1,550	140
Twin Lakes	56,000	260,000	260,000	4,160	105
Pueblo	----------	400,000	390,000	6,700	180
Total	73,000	777,000	767,000	12,410	----------

48. The Colorado Fuel & Iron Corp., owner and operator of the Sugar Loaf Reservoir, has informally requested 10,000 acre-feet of project reservoir storage space in addition to replacement of its present capacity. The Twin Lakes Reservoir & Canal Co. has made a similar request for 54,000 acre-feet of additional reservoir storage space. Both companies would pay a service charge. Capacities of the potential Eastern Slope reservoirs have been tentatively allocated as follows:

Function:	*Acre-feet*
Conservation	315,600
Power	135,000
Flood control (Pueblo Res.)	93,000
Sediment control (Pueblo Res.)	94,400
Dead storage (Pueblo Res.)	2,000
Colorado Fuel & Iron Corp	27,000
Twin Lakes Co	110,000
Total	**777,000**

49. The seven power plants would have a total installed capacity of 104,800 kilowatts and an annual average output of 505 million kilowatt-hours of which 400 million kilowatt-hours would be firm energy. Losses would reduce the salable energy to approximately 467.2 million kilowatt-hours of which 370 million kilowatt-hours would be firm. Associated major power facilities include seven switchyards with a combined capacity of 116,440 kilovolt-amperes and a transmission system consisting of about 400 miles of 115-kilovolt lines with nine substations. The transmission system would serve customers of the United States and would interconnect with other utilities and enable the interchange and wheeling of power from various sources. The Colorado Fuel & Iron Corp. intermittently produces waste-heat electric energy as a result of steel mill operations. If agreements could be reached, such energy might be fed into the project system on an exchange basis or under some other arrangement whereby more efficient project power operation would result. Additional generation in the Elbert power plant might accrue from the exchange of Twin Lakes water involved in the maintenance of fish flows in the Roaring Fork River.

50. The Pueblo Reservoir would inundate some 500 acres of irrigated land. All other lands in the Eastern Slope reservoir sites and for the canals are either low-value private land or public land. The eastern slope reservoirs would require the relocations of about 20 miles of State highway and 20 miles of railroad, but no unusually difficult construction problems have become apparent. The high altitude and short working season pose some problems for the Sugar Loaf and Twin Lakes enlargements and associated facilities. The dam and reservoir sites are situated over glacial moraines which may result in some seepage; however, tightness beyond stability is not necessary.

51. *Municipal water system.*—The project could provide supplemental municipal water for Colorado Springs and Pueblo. Complete replacement of existing municipal supplies has been requested by the valley towns of Manzanola, Rocky Ford, La Junta, Las Animas, Lamar, Crowley, Wiley, and Eads. Tentatively, 15,000 acre-feet of project water have been reserved annually for municipal use. Specific municipal supply facilities outlined hereinafter in paragraphs 52 and 56 are included in the project plan as a requested service. Such construction is proposed only if construction by the communities themselves proves to be infeasible. This phase of the project is flexible and susceptible of modification or elimination, in whole or in part, without rendering the remainder of the project economically infeasible.

52. A supplemental municipal supply for Colorado Springs would involve an exchange of irrigation water by means of project facilities. A pumping plant on upper Middle Beaver Creek would lift water to the city's system on Pike's Peak. En route to the city, the water would generate energy in two municipal power plants, the output of which would exceed the loss in the Skaguay hydroelectric power plant, on Middle Beaver Creek, owned by the Southern Colorado Power Co. Colorado Springs could reimburse the company for the lost power value. Replacement of the diverted water for irrigation use near Penrose would be accomplished by diverting water from Oil Creek to the existing Brush Hollow Reservoir. A diversion dam and

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a 15-mile supply canal would be necessary. Through a series of exchanges and coordinated operation of the Mount Pisgah Reservoir on Oil Creek and the Skaguay Reservoir, satisfactory replacement of irrigation water in the Arkansas Valley could be achieved.

53. Four thousand acre-feet of project water annually have been allotted to Colorado Springs for its immediate requirements. Of this 4,000 acre-feet, 2,700 acre-feet could be pumped into the city's system from Beaver Creek. Replacement of this 2,700 acre-feet for irrigation would require 3,200 acre-feet of project water due to transit and other losses. The remaining 800 acre-feet of project water represents reserve for replacement of possible diversions to the city from other tributaries of the Arkansas River.

54. Pueblo requires 3,000 acre-feet of project water annually. Project facilities would also enable the conservation of 2,000 acre-feet of Wurtz ditch transmountain water for municipal use and treatment of Pueblo's present supply of 21,000 acre-feet. Delivery of water to Pueblo would be accomplished from the Pueblo Reservoir through a central system for all valley towns.

55. The valley towns require 8,000 acre-feet of project water annually, of which 460 acre-feet represents a reserve for those communities and others. The water would entirely replace existing unsatisfactory supplies.

56. Specific facilities for supplying Pueblo and the valley towns with municipal water include a pumping plant at the Pueblo Reservoir, a water treatment plant, a dual pipeline to Pueblo and a small regulating reservoir, a trunk pipeline about 130 miles in length to Lamar, and about 36 miles of branch pipelines to Crowley, Wiley, and Eads.

57. The municipal water supply system would involve no unusual construction problems or difficulties in securing rights-of-way.

58. *Construction schedule.*—About 10 years would be required to construct the initial development. Early concurrent construction of the Aspen, Twin Lakes, and Pueblo Reservoirs, the Fryingpan-Arkansas tunnel, and several eastern slope canals is planned to facilitate filling the reservoirs. The western slope collection system would be expanded gradually from the transmountain tunnel. All hydroplants except Pueblo have been scheduled for simultaneous completion so their operation can be integrated as a unit.

59. *Water supply.*—The first phase of the Gunnison-Arkansas project (Roaring Fork diversion) contemplates the average annual consumptive use of water from the Colorado River Basin as follows (measured at points of diversion):

Explanation:	*Acre-feet*
Diversion from project collection system of project water	69, 200
Diversion for fish preservation purposes	3, 000
Losses from Aspen Reservoir and consumptive losses in collection conduit	3, 000
Total	75, 200

60. The water to be imported from the Colorado River watershed is to come out of Colorado's apportionment under the upper Colorado River Basin compact of October 11, 1948. Under that compact, the State of Colorado is apportioned the consumptive use of 51.75 percent of the water available for use in the upper Colorado River Basin, after deducting a use of not to exceed 50,000 acre-feet annually

in Arizona. Colorado's apportionment of Colorado River Basin water is estimated to be about 3,855,000 acre-feet annually. It is estimated that about 1,590,000 acre-feet will be required for use by existing and authorized projects, leaving 2,265,000 acre-feet annually for use by future projects. Of this amount it is estimated that 440,000 acre-feet should be reserved to meet Colorado's share of depletions caused by main stem reservoirs required for long-time hold-over storage to make the water available for use under the Colorado River compact. About 1,825,000 acre-feet annually would remain for use by potential projects. These figures indicate the availability of about 1,750,000 acre-feet of water annually, after full development of the proposed initial development, Gunnison-Arkansas project, to meet other potential uses of Colorado River water in Colorado.

61. The 1947 report on the Colorado River (H. Doc. 419, 80th Cong., 1st sess.) shows estimated uses by potential irrigation projects, within the natural Colorado River Basin in Colorado, of 870,000 acre-feet annually. Studies are under way to refine the estimate of potential within-basin uses in Colorado for all purposes including industrial uses. Review of available information shows that the total of all such potential uses will likely be less than the figure of 1,750,000 acre-feet.

62. Present and prospective uses from Fryingpan River would be supplied by the bypass of water from the collection canals. Storage releases from the Aspen Reservoir would replace water diverted that would otherwise be needed by present and prospective users along the Roaring Fork and Colorado Rivers.

63. During the 1911–44 period of study the natural water supply of the project area between Pueblo and the Colorado-Kansas boundary averaged 1,143,000 acre-feet annually, including return flows but excluding about 48,000 acre-feet from eight transmountain diversions. Disposition of the average annual supply was as follows:

Disposition:	*Acre-feet*
Summer irrigation	656, 000
Winter irrigation	160, 000
Reservoir evaporation	50, 000
Outflow to Kansas	277, 000
Total	1, 143, 000

64. The estimated ideal headgate diversion requirements during the irrigation season average 983,000 acre-feet. Reconstructed data showing the effect of Twin Lakes diversion and the John Martin Reservoir—had they been in operation for that entire period—disclose that the historical headgate diversions would have averaged 720,000 acre-feet seasonally, of which 643,000 acre-feet would be within the ideal irrigation schedule. The difference of 340,000 acre-feet represents the average annual headgate shortage. Through optimum utilization of all available supplies, new transmountain diversions, and reuse of return flows, the project could effectuate an estimated supply of 184,600 acre-feet of supplemental irrigation water at the canal headgates in the main valley. That supply would reduce the average annual headgate shortage to about 155,000 acre-feet—a reduction from 35 percent shortage of ideal requirements to about 16 percent shortage.

65. The total irrigation water supply to be made available by the project would consist of imported water, conserved flood flows, private supplies reregulated in project reservoirs, and usable return flows. Reregulated private supplies include some winter flows of the Arkansas River that are presently diverted for direct-flow use but which, by agreement, could be converted to more beneficial summer use through storage in the Pueblo Reservoir. Return flows of the project municipal water are estimated at 70 percent. The total irrigation headgate supply is estimated at 50 percent more than the initial supply, based upon successive reuses of the water at the rate of 40 percent return flow from each application. The next table shows the source of water to be made available for the Arkansas Valley, reconstructed as annual averages for the 1911–44 period of study.

[Thousands of acre-feet]

Source	Gross	Losses	Net	Headgate supply
Fryingpan diversion	69.2	15.5	53.7	----------
Arkansas River floods	50.0	32.0	18.0	----------
Total project water	119.2	47.5	71.7	----------
Less municipal water	15.0	----------	15.0	----------
Project irrigation supply	104.2	47.5	56.7	85.1
Municipal return flow, Arkansas Valley	7.0	2.5	4.5	6.7
Additional Twin Lakes diversion	14.9	2.4	12.5	18.8
Converted winter flow	93.0	19.0	74.0	74.0
Total valley irrigation supply	219.1	71.4	147.7	184.6
Tributary municipal return flow	----------	----------	3.5	5.2
Total usable irrigation supply	----------	----------	151.2	189.8

FINANCES AND PROJECT OPERATION

66. Based upon preliminary designs, and upon prices prevailing in October 1949, the estimated construction cost of the project is $147,440,000. About 25 percent of that cost would be for western slope structures and the transmountain tunnel. The annual operation, maintenance, and replacement expense is estimated to be $1,335,200.

Feature	Construction cost	Annual operation, maintenance, and replacement
Dams and reservoirs	$64,334,000	$30,760
Diversion canals and conduits	30,499,000	65,870
Power features	34,021,000	846,990
Municipal supply systems	18,050,000	391,580
Operation and maintenance during construction	536,000	0
Total	147,440,000	1,335,200

67. *Cost allocation.*—Construction costs have been allocated to the various project functions through use of the alternative justifiable expenditure method. That method utilizes the estimated cost of the most economical substitute single-purpose facility which would provide benefits equivalent to those accruing in a multiple-purpose development. The tentative allocation of construction costs and distribution of annual operation, maintenance, and replacement expenses are as follows:

Function	Construction cost	Annual operation, maintenance, and replacement
Irrigation	$59, 930, 000	$76, 080
Power	40, 032, 000	854, 050
Municipal water	29, 522, 000	405, 070
Total returnable	129, 484, 000	1, 335, 000
Flood control	15, 777, 000	(1)
Fish and wildlife	2, 179, 000	(1)
Total nonreturnable	17, 956, 000	----------
Total costs	147, 440, 000	1, 335, 200

[1] Included above.

68. *Project operation and return on investment.*—The plan of operation calls for the formation of a water conservancy district, under the Colorado Water Conservancy District Act of 1937, as amended, which would contract with the Government for payment of project services performed in the collection, storage, regulation, and release of water. Supplemental irrigation water at specified rates would be released to the district at reservoir outlets or possibly along the river, depending upon circumstances. The proposed basic rate of $3.60 per acre-foot at the Pueblo Reservoir has been determined to be within the payment capacity of the water users. The district would assume responsibility for delivery of irrigation water. This district, or possibly another entity, would contract with the Government for Federal construction of the specific municipal water system, for district operation and maintenance of that system, and for delivery of water from the joint water-supply system. The district would also have other sources of annual revenue: levies from an ad valorem tax on taxable property benefited by the project, a service charge for the storage of the additional Twin Lakes irrigation water, and a service charge for project storage of the additional Colorado Fuel & Iron industrial water which is included with municipal supplies for pay-out analysis. Estimated annual project revenues, exclusive of revenues expected from the regulation of winter water, are shown in the following table:

Function and source of revenue:	Annual value
Irrigation and district:	
Project water (56,700 acre-feet at $3.60)	$204, 120
Twin Lakes service (12,500 acre-feet at $2)	25, 000
District tax ($132 million at 1 mill minus 10 percent)	119, 000
Subtotal	348, 120
Less operation, maintenance, and replacement	76, 080
Net irrigation revenues	272, 040
Power:	
370,000,000 kilowatt-hours at 5.5 mills; 97,125,000 kilowatt-hours at 3.5 mills	2, 374, 938
Less operation, maintenance, and replacement	854, 050
Net power revenues	1, 520, 888
Municipal and industrial water:	
Municipal supplies (38,000 acre-feet at various rates)	1, 476, 410
Colorado Fuel & Iron (4,000 acre-feet at $2)	8, 000
Subtotal	1, 484, 410
Less operation, maintenance, and replacement	405, 070
Net municipal water revenues	1, 079, 340
Total annual net project revenue	2, 872, 268

69. Parts of the interest on return payments from power (3 percent) and municipal water (2 percent) would be applied to the irrigation investment. The sources of revenue for retirement of returnable costs are shown below.

Source	Project revenue	Cost allocation
Irrigation:		
Net revenue, irrigators and district, 40 years	$10, 881, 600	
From power revenue, 38 years	35, 478, 000	
From municipal water revenue, 38 years	13, 570, 400	
Retired allocation		$59, 930, 000
Power:		
Net revenue, 53 years	80, 324, 113	
Less interest to irrigation, 38 years	−35, 478, 000	
Less unapplied interest	−4, 570, 849	
Less earned surplus, fifty-third year	−243, 264	
Retired allocation		40, 032, 000
Municipal water:		
Net revenue, 40 years	43, 173, 600	
Less interest to irrigation, 38 years	−13, 570, 400	
Less unapplied interest	−72, 669	
Less earned surplus, fortieth year	−8, 531	
Retired allocation		29, 522, 000
Total allocation returned by revenues		129, 484, 000

70. If the value for the regulation of winter water is estimated at $1.25 per acre-foot, which is comparable to current costs for like services, an additional return of $3,700,000 or more can be expected from irrigation over the repayment period. The actual value remains to be determined. The value of this service must be an amount

substantially less than $3.60 per acre-foot which is the value at the Pueblo Reservoir established for a new supplemental water supply.

71. *Benefits.*—The economic justification of any project can be tested by a benefit-cost ratio which measures the benefits obtainable contrasted with the attendant Federal costs of bringing about those benefits. The net Federal project investment consists of the total construction cost plus interest at the rate of 2½ percent during construction less the present worth of the hundredth-year terminal salvage value of principal project works. That investment is translated into an annual equivalent by amortization over 100 years at 2½ percent. The annual project investment cost is obtained by adding to the annual equivalent the adjusted annual operation, maintenance, and replacement expense.

Annual benefits:	
Irrigation	$3, 339, 000
Power	4, 064, 000
Municipal water	1, 662, 000
Flood control	583, 000
Sediment control	141, 000
Total annual benefits	9, 789, 000
Annual costs:	
Project investment	4, 165, 000
Adjusted operation, maintenance, and replacement	1, 403, 000
Total annual costs	5, 568, 000
Benefit-cost ratio	1. 76:1. 00

72. The preceding calculation includes direct and indirect benefits for the initial development. It is significant that the sum of direct irrigation benefits to farmers of $1,065,000, direct power benefits of $2,375,000, and benefits to municipal water, flood control, and sediment control is sufficient to support the annual project costs.

73. The report on the Colorado River storage project and participating projects presents a plan for a system of regulatory reservoirs that would permit maximum development of the upper Colorado River Basin water resources for beneficial consumptive uses and assure the required deliveries of water at Lee Ferry to meet the requirements of the Colorado River compact. If it is assumed that the Colorado River storage project will be constructed, and if it is considered proper in analyzing the Gunnison-Arkansas project to assign an appropriate share of the cost of the Colorado River storage project, then the assignable annual cost to the Gunnison-Arkansas project is estimated at $2.35 per acre-foot of consumptive use of water. The net effect, so far as the Gunnison-Arkansas project is concerned, would be to alter slightly the economic justification. The annual cost would increase from $5,568,000 to $5,731,000, and the benefit-cost ratio would be reduced slightly from 1.76:1.00 to 1.71:1.00.

74. *Operating principles.*—On November 24, 1948, a policy and review committee was organized by the Colorado Water Conservation Board to study and review plans and reports on the first stage of the Gunnison-Arksnas project. The committee was composed of representatives of the board, the Colorado Game and Fish Commission,

western Colorado, the Arkansas Valley, and the city of Colorado Springs. The committee recommended the following principles of project operation on January 19, 1951:

The construction and operation of the project involve the diversion of water from the headwaters of the Fryingpan River and other tributaries of the Roaring Fork River to the Arkansas River Basin. The project contemplates—

(*a*) The maximum conservation and use of the diverted waters;

(*b*) The protection of western Colorado water uses, both existing and potential, in accordance with the declared policy of the State of Colorado; and

(*c*) The preservation of recreational values.

In order to accomplish such purposes the project shall be operated by the United States in compliance with the Federal reclamation laws, the laws of the State of Colorado relating to the appropriation, use, or distribution of water, and the following operating principles:

1. As used herein—

(*a*) "Project" means that certain enterprise planned and designed by the Bureau of Reclamation, Department of the Interior, for the transmountain diversion of water from the headwaters of the Fryingpan River and other tributaries of the Roaring Fork River to the basin of the Arkansas River, together with all of its appurtenant works and facilities in both eastern and western Colorado.

(*b*) "Eastern Colorado" means that portion of the State of Colorado lying within the natural drainage basin of the Arkansas River.

(*c*) "Western Colorado" means that portion of the State of Colorado lying within the natural drainage basin of the Colorado River and served by diversions made from the Colorado River, or its tributaries, above its confluence with the Gunnison River.

(*d*) "Eastern Colorado Conservancy District" means that entity to be hereafter created to contract for payment to the United States of an appropriate portion of project costs allocated to certain water uses in eastern Colorado.

(*e*) "Aspen Reservoir" means not only the reservoir presently planned for construction near the town of Aspen as part of the project but also, unless the context requires otherwise, any other reservoir that may be constructed in western Colorado above the town of Aspen in lieu of that reservoir for the purpose of protecting water uses in western Colorado.

(*f*) "C. f. s." means cubic feet of water per second of time.

2. The Aspen Reservoir shall be constructed and maintained on the Roaring Fork River above the town of Aspen, Colo., with an active capacity of about 28,000 acre-feet and with a reasonable expectancy that it will fill annually. The 28,000 acre-feet of water stored therein shall be available for replacement purposes in western Colorado. All of such stored water shall be released under the conditions and limitations hereinafter set forth.

3. The cost of construction and perpetual operation and maintenance of the Aspen Reservoir shall be a charge against the project and shall be paid from project revenues or as otherwise provided by the Congress of the United States.

4. The Aspen Reservoir shall be completed before any water is diverted to eastern Colorado by means of the project.

5. The primary purpose of Aspen Reservoir is to furnish, in like manner as if the project were constructed by a water conservancy district organized pursuant to the laws of the State of Colorado, the water required for the protection of western Colorado water users by the provisions of section 1, chapter 192, Colorado Session Laws, 1943, reading as follows: "*Provided, however*, That any works or facilities planned and designed for the exportation of water from the natural basin of the Colorado River and its tributaries in Colorado, by any district created under this chapter, shall be subject to the provisions of the Colorado River compact and the Boulder Canyon Project Act, as amended; that any such works or facilities shall be designed, constructed, and operated in such a manner that the present appropriations of water, and in addition thereto prospective uses of water for irrigation and other beneficial consumptive-use purposes, including consumptive uses for domestic, mining, and industrial purposes, within the natural basin of the Colorado River in the State of Colorado, from which water is exported, will not be impaired nor increased in cost at the expense of the water users within the said natural basin; and that the facilities and other means for the accomplishment of said purpose shall be incorporated in, and made a part of, any project plans for the exportation of water from said natural basin in Colorado."

6. The replacement capacity of the Aspen Reservoir is that portion of the total reservoir capacity required to protect existing rights to the use of water in western Colorado for domestic, irrigation, and manufacturing purposes (including power generation) and hereafter acquired rights to the use of water in western Colorado for domestic irrigation, and manufacturing purposes (excluding power generation) against any and all losses of needed water because of stream depletions resulting from project operations. In the determination of such replacement capacity, consideration shall be given to, but not necessarily limited to, needs for water for the following purposes, such needs, however, not to be for quantities in excess of those quantities of water which would have been available from the Roaring Fork River to supply such needs if the project had not been constructed:

(*a*) To supply existing rights below Aspen Reservoir;

(*b*) To irrigate new land and provide for supplemental irrigation in western Colorado;

(*c*) To satisfy the obligation of the Roaring Fork River to contribute its proportional share of the required winter flows at a point immediately below the confluence of the Roaring Fork River and the Colorado River; and

(*d*) To satisfy the obligation of the Roaring Fork River to contribute its proportional share of a demand of at least 300,000 acre-feet of water annually in the Colorado River below its confluence with the Roaring Fork River, for domestic and manufacturing uses. Said demand for use in western Colorado is to be met at the times and in the amounts required.

Water stored in the replacement capacity of the Aspen Reservoir shall be released by the United States, upon the request of the State administrative agency having responsible charge of the distribution of the water of the stream or streams affected, whenever the needs in the Colorado River Basin in western Colorado below the project diversion points for the uses covered by this paragraph 6 exceed the available supply of water; provided that the rate of release of such stored water shall be reasonable and proper with due regard for the needs in western Colorado for replacement water and with due regard, also, for the obligation of the project to supply such water.

No charge shall ever be imposed for water released from, or made available by reason of releases from, the replacement capacity of the Aspen Reservoir.

7. That portion of the total capacity of the Aspen Reservoir not needed as replacement capacity constitutes surplus capacity. Water stored in such surplus capacity may be sold or leased by the United States to water users in western Colorado. Charges for the use of such water shall be comparable to charges for use of project water for similar purposes in eastern Colorado with appropriate adjustment for the repayment ability of such water users. If it hereafter appears that the cost of procuring water, from sources other than the surplus capacity of the Aspen Reservoir, for the same uses as those to which water from the surplus capacity of the reservoir is to be made available shall have been increased by reason of the construction and operation of the project, then the charges for water released from the surplus capacity shall be diminished by the amount of such increase in cost.

8. Project diversions from Lime Creek shall be made only in the months of May and June of each year.

9. To protect recreational values, including fishing, no diversions from western Colorado will be made which reduce the remaining aggregate stream flows to less than either of the following minimum standards:

(*a*) The Fryingpan collection system at the points of diversion collectively, exclusive of Lime Creek—15 c. f. s. October 1 through March 31; 30 c. f. s. April 1 through September 30;

(*b*) Near Norrie (immediately below the junction of North Fork and Fryingpan River)—30 c. f. s. October 1 through March 31; 100 c. f. s. April 1 through April 30; 150 c. f. s. May 1 through May 31; 200 c. f. s. June 1 through June 30; 100 c. f. s. July 1 through July 31; 75 c. f. s. August 1 through August 31; 65 c. f. s. September 1 through September 30.

In maintaining the above minimum standards, the project diversions shall be regulated, so far as is practicable, in such a manner that the North Fork, the Fryingpan River, and each of the tributaries of those streams shall contribute to the residual stream flows required by those minimum standards quantities of water in proportion to their natural contributions.

10. An appropriate written contract shall be made whereby the Twin Lakes Reservoir & Canal Co. shall refrain from diverting water whenever the natural flow of the Roaring Fork River and its tributaries shall be only sufficient to maintain a flow equal to or less than that required to maintain the recommended

average flows in the Roaring Fork River at the head of the proposed Aspen Reservoir in a quantity proportionate to the respective natural contributions of those streams from which diversions are made to the natural flow of the Roaring Fork River. The recommended average flows above mentioned are flows in quantities equal to those recommended as a minimum at the head of the Aspen Reservoir according to the following schedule submitted by the United States Fish and Wildlife Service and the Colorado Game and Fish Commission:

Month	Average second-feet	Acre-feet (in thousands)	Month	Average second-feet	Acre-feet (in thousands)
October	44	2.7	May	100	6.2
November	35	2.1	June	120	7.1
December	29	1.8	July	100	6.2
January	26	1.6	August	63	3.9
February	25	1.4	September	44	2.6
March	24	1.5			
April	64	3.8	Total		40.9

In maintaining the above averages, at no time shall the flow be reduced below 15 c. f. s. during the months of August to April, inclusive, or below 60 c. f. s. during the months of May to July, inclusive, providing the natural flow during said period is not less than these amounts. The obligation to supply the minimum stream flow as set forth in the above table on the Roaring Fork River shall, to the extent of 3,000 acre-feet annually, be a project obligation to be supplied from any waters diverted from the south tributaries of Hunter Creek, Lime Creek, Last Chance Creek, or any of them.

The Twin Lakes Reservoir & Canal Co. shall not be required to refrain from diverting water under its existing decrees from the Roaring Fork River except to the extent that a like quantity of replacement water is furnished to said company without charge therefor through and by means of project diversions.

If by reason of storage capacity in the Aspen Reservoir, the Twin Lakes Reservoir & Canal Co. derives additional water or other benefits or advantages it would not have realized had this project not been constructed, then nothing herein contained shall prevent the project from making appropriate charges for such water or other benefits or advantages.

11. All lands acquired for project construction and operation and water surfaces of project reservoirs will be open to the public for recreational purposes, excepting those areas reserved by the operating agency.

12. The project will be operated in such a manner that those in eastern Colorado using project water imported from the Colorado River Basin for domestic purposes shall have preference over those claiming or using water for any other purpose.

13. The project is to be operated in such a manner as to secure the greatest benefit from the use and reuse of imported project waters within project boundaries in the State of Colorado.

14. Any and all benefits and rights of western Colorado water users in and to water stored in Green Mountain Reservoir, as described and defined in Senate Document 80, Seventy-fifth Congress, first session, shall not be impaired or diminished by this project.

15. The project, its operation, maintenance, and use shall be subject to the provisions of the upper Colorado River Basin compact of October 11, 1948 (Public Law 37, 81st Cong., 1 sess.), the Colorado River compact of November 24, 1922 (H. Doc. 605, 67th Cong., 4th sess.), and the Boulder Canyon Project Act of December 21, 1928 (45 Stat. 1057–1064). In the event any curtailment of use of Colorado River water in the State of Colorado is necessary to satisfy the provisions of the Colorado River compact or the upper Colorado River Basin compact, then the diversions by the project for use in eastern Colorado shall be curtailed before there is any curtailment of the right to store water in Aspen Reservoir in a quantity not in excess of the capacity of that reservoir for use in western Colorado in accordance with these operating principles.

16. The Secretary of the Interior shall at any time have the option to obtain or require the transfer to the United States of any and all rights initiated or acquired by the appropriation or use of water through the works of the project in eastern Colorado, except vested rights to present appropriations; provided, however, that the title so taken shall be subject to a beneficial use of such water as may be

provided in the payment contract or contracts. The rights to store water in Aspen Reservoir under the applicable laws of the State of Colorado shall be initiated and acquired by and held in the name of the United States pursuant to those laws.

17. To assure project operation in conformity with the operating principles heretofore stated, to provide a means for the collection and interchange of information, and to provide a method for the continued study of project operations to the end that, if the stated operating principles may be improved upon, recommendations for changes may be made to the contracting parties, a commission shall be created in an appropriate manner to be composed of one representative of the Eastern Colorado Conservancy District, one representative of the Colorado River Water Conservation District, two representatives of the United States, and one representative of the State of Colorado appointed by the Colorado Water Conservation Board after consultation with the Colorado Game and Fish Commission. The powers of such commission shall be limited to the collection of data, the making of findings of fact, and the suggestion of changes in operating principles.

CONCLUSIONS

75. The waters of the Arkansas River in the Colorado portion of the upper Arkansas River Basin are overappropriated. Serious distress is caused to the economy of the basin in short water years through loss in crop production. Supplemental irrigation water supplies are needed. The additional crop production would find a ready market in the urban centers of Colorado and the Nation.

76. No new sources of water within the means of the municipalities and industries are apparent. Present municipal supplies, even after substantial acquisition of irrigation rights, are barely adequate to supply existing requirements. Additional quantity and better quality of water are critically needed.

77. Normal uses of electric energy would expand rapidly in the power market area if not restricted by a limited supply. Resource development would be encouraged if energy were available in plentiful supply.

78. Floods in the upper Arkansas Valley threaten the loss of property and discourage investment. Sediment deposition chokes channels, increases flood threats, and raises maintenance costs of extensive irrigation systems. Stream pollution threatens health and destroys fish habitat. Flood, sediment, and pollution control would lower costs and remove threats.

79. Recreational, fish, and wildlife resources are valuable assets of Colorado and of the Nation. These resources should be protected and enhanced to the greatest extent practicable.

80. Misuse of forests and ranges reduces production and contributes to the sedimentation of streams. Tailings from mines add to the silt burden and pollution of otherwise usable water supplies. Better management practices and silt prevention methods should be encouraged.

81. The initial development of the Gunnison-Arkansas project would supply the most pressing and immediate needs of the Upper Arkansas River Basin.

82. The diversion area has a plentiful supply of water, part of which could feasibly be diverted without detriment to that area or to downstream users. Although all possible future water requirements for the entire western slope have not been fully determined, it is concluded that there is an adequate water supply from Colorado's allocated share of the Colorado River Basin water for the proposed

initial development of the Gunnison-Arkansas project, Roaring Fork diversion, over and above present and prospective consumptive uses within the natural basin of the Colorado River in Colorado. Western slope interests would be protected by the Aspen Reservoir, by special provisions for preservation of fish and wildlife, by equitable operation of the project, and by assurance of noninterference in the use of the replacement facilities provided by the Colorado-Big Thompson project.

83. The initial development is engineeringly feasible and economically justified. It represents the minimum practical project. It is designed as a self-contained unit and its construction would not imply a commitment for expansion, extension, or enlargement. Neither would it impair nor duplicate future development.

84. The estimated cost of the initial development of the Gunnison-Arkansas project based on October 1949 prices is $147,440,000.

85. The tentative allocation of this total cost among the various functions to be served is as follows:

Function:	*Allocated cost*
Irrigation:	
Probably can be returned in 40 years without interest through payments by the irrigation water users and district beneficiaries	$10, 881, 600
Probably can be returned without interest through application of interest on power and municipal water investment	49, 048, 400
Power: Probably can be returned in 50 years with interest at 3 percent	40, 032, 000
Municipal and industrial water supply: Probably can be returned in 40 years with interest at 2 percent	29, 522, 000
Flood control	15, 777, 000
Mitigation of losses to fish and wildlife resources: In accordance with Public Law 732, 79th Cong., 2d sess. (60 Stat. 1080)	2, 179, 000
Total	147, 440, 000

86. The project would provide other benefits for which allocations are not authorized under existing law. Subsequent allocation of project construction costs to such beneficial functions should be made in the event of future legislation.

87. Continued studies and investigations in the project area and in contiguous areas within the drainage of both slopes should be pursued vigorously on a departmental basis, in cooperation with other Federal, State, and local agencies, toward the objective of wise conservation and beneficial use of all natural resources.

RECOMMENDATIONS

88. It is my recommendation that—

A. The Secretary of the Interior approve this report and substantiating documents.

B. This report together with the substantiating documents be transmitted for review to all Federal agencies having an interest in the project, to the States signatory to the Colorado River compact and to the States of Kansas and Oklahoma.

C. This report and substantiating documents, together with such amendments as may be appropriate pursuant to review comments by the Federal agencies and States, be submitted to the President

and the Congress with the recommendation that the plan for the initial development of the Gunnison-Arkansas project including transmission facilities be approved and authorized.

D. The Congress authorize the appropriation of funds for construction, operation, and maintenance of the proposed works, under the direction of the Secretary of the Interior, in accordance with the Federal reclamation laws (act of June 17, 1902, 32 Stat. 388, and acts amendatory thereof or supplementary thereto) except to the extent otherwise specifically set forth in this report, with such modifications, omissions, or additions to the works as the Secretary may find proper from time to time for accomplishing the objectives of the project.

E. The project be operated under the direction of the Secretary of the Interior in accordance with the operating principles set forth in this report or as the principles may be modified in the future by agreement between the Secretary and the commission established by the State of Colorado.

F. All or any part of the specific municipal water-supply systems described in this report be constructed by the Secretary of the Interior, only after satisfactory evidence is presented to the Secretary of the Interior that it would be infeasible for the communities involved to construct or to finance the construction of such work themselves, singly or jointly.

G. In the event it is determined that said specific municipal water systems are to be constructed by the Secretary of the Interior, a contract, providing among other things for payment to the United States of the actual cost of construction over a period of 40 years from the year in which the municipal water is first delivered with interest at the rate of 2 percent per annum and providing that operation, maintenance, and replacement of the works be assumed by the contracting party or parties, be a condition precedent to the start of construction of such works.

H. The Secretary of the Interior be authorized to establish rates for collection, transportation, regulation, and delivery of water at a designated point or points in the supply system to the municipalities and industries at the lowest price consistent with sound business principles, including interest at the rate of 2 percent per annum, but in no case higher than the cost of an alternative single-purpose supply of equal quantity and quality. The contracts providing for such deliveries should be long term or short term but not to exceed 40 years. Each such contract should include appropriate provision for one or more renewals, the terms and conditions of the renewed contract or contracts to be determined in the light of the situation at the time of renewal.

I. The Secretary of the Interior be authorized, upon agreement with the water users, to make either short-term or long-term contracts for collection, transportation, regulation, and delivery of water for irrigation purposes at a designated point or points in the supply system. Such contracts should be for such period, not to exceed 40 years, and at rates, either fixed or variable, by the application of such formula as the parties shall have agreed upon to reflect improvement in, or deterioration of, the payment ability of the water users, and which will, in the Secretary's judgment, produce revenues at least sufficient to cover an appropriate share of the annual operation and mainte-

nance cost and an appropriate share of such fixed charges as the Secretary deems proper. Due regard being given to income from the contracting organization's other sources, the rates provided in such contracts should be such that the water users shall return within the shortest period, consistent with their ability, that part of the cost of construction of works connected with water supply and allocated to irrigation and assigned to be returned by the contracting organization. Such contracts should require payment of said rates each year in advance of delivery of water for said year. Such contracts should include provisions for the right of renewal thereof, once or more than once, under stated terms and conditions mutually agreeable to the parties and subject to increase or decrease in rates corresponding to increase or decrease of costs of construction and of operation and maintenance or improvement or deterioration in the payment ability of the water users. Such right of renewal should be exercised within such reasonable time prior to the expiration of the contract as the parties shall have agreed upon. All amounts paid to the United States in excess of operation and maintenance during the period of water deliveries thereunder should be credited to the payment of that appropriate share of the cost of construction of works connected with water supply and allocated to irrigation and, when the total of such credits equals the amount allocated to irrigation and assigned to be paid by the contracting organization, the charges should be reduced to cover only operation, maintenance, and replacement costs.

J. Contracts for the collection, transportation, regulation, and delivery of water supplies at designated points in the supply system be subject to section 8 of the Reclamation Act of June 17, 1902 (32 Stat. 388), provided that this provision be construed neither as vesting rights to the delivery of water in quantities greater than those specified in any such contract or vesting rights to continue to receive water in the event of default in payment thereunder, nor as preventing the delivery elsewhere of the water covered thereby in the event of default in payment continuing over a period of five consecutive years or the failure to renew such contract.

K. The Secretary of the Interior establish rates for the sale of power at the lowest price consistent with sound business principles but in no case higher than the cost of power from alternate sources in order to encourage the most widespread use of power throughout the area of service.

L. Suitable language be included in the authorizing document whereby assurance is given that any and all benefits and rights of western Colorado water users in and to water stored in Green Mountain Reservoir, as described and defined in Senate Document 80, Seventy-fifth Congress, first session, shall not be impaired or diminished by this project.

M. The Congress authorize the appropriation of such sums as may be necessary for the continued investigation of the comprehensive plan by the agencies of the Department of the Interior in cooperation with other Federal, State, and local agencies for the development of the natural resources of the upper Arkansas River Basin including importation of additional supplies of water into the basin which may be determined to be in excess of the present and potential requirements of the basin from which exportation may be proposed.

N. Suitable language be included in the authorizing document clearly stating that authorization or appropriation of funds for the project or for the continued investigations stated above shall not in any way constitute a commitment, real or implied, to further importations.

AVERY A. BATSON.

DEPARTMENT OF THE INTERIOR,
BUREAU OF RECLAMATION,
Washington 25, D. C., April 16, 1951.

The SECRETARY OF THE INTERIOR.

SIR: This is my proposed report on the initial development, Roaring Fork diversion, of the potential Gunnison-Arkansas project, Colorado. My report is based on and incorporates the accompanying report of the regional director, Bureau of Reclamation, Denver, Colo., dated February 23, 1951.

The potential Gunnison-Arkansas project is a major unit in the comprehensive plan of development of the water resources of the upper Arkansas River Basin. The initial development (Roaring Fork diversion) is a multiple-purpose project involving transmountain diversion of water from the Roaring Fork River, a tributary of the Colorado. This development is designed as a self-contained unit, and its construction would not imply a commitment for developing future water supplies in the Gunnison River Basin for diversion to the Arkansas River Basin. This development would provide (*a*) about 185,000 acre-feet of supplemental irrigation water at canal headgates in the Arkansas Valley through transmountain diversion, conservation of flood flows, reregulation of winter flow, and reuse of return flows for water-thirsty lands which, even with this additional supply, will experience an average annual headgate shortage of about 16 percent; (*b*) about 15,000 acre-feet of municipal water to supplement the municipal supply for Colorado Springs, Pueblo, and several Arkansas Valley towns where additional quantity and better quality water is critically needed; (*c*) about 467,000,000 kilowatt-hours of electric energy to help meet the critical need for electric power in the project service area and permit expansion of the normal uses of electric energy; (*d*) flood protection which would eliminate 66 percent of the probable annual flood damages between Pueblo and the John Martin Reservoir, estimated to be about $890,000; (*e*) sediment control, stream-pollution abatement, and preservation and propagation of fish and wildlife in certain areas; all of which are important and valuable contributions of the project.

These purposes would be accomplished through construction of (*a*) a system of about 50 miles of canals and tunnels on the western slope of the Continental Divide for the collection of water from Hunter Creek and Fryingpan River, tributaries of the Roaring Fork River; (*b*) Aspen Reservoir, with an active capacity of 28,000 acre-feet near the town of Aspen on the western slope to provide replacement water and water for future use in meeting the demands in western Colorado; (*c*) the Fryingpan-Arkansas tunnel, about 6 miles in length, for diverting water collected on the western slope to the eastern slope; (*d*) the Sugar Loaf Reservoir on the eastern slope of the upper Arkansas

Basin, enlarged from its present capacity of 17,000 acre-feet to 117,000 acre-feet for storage and regulation of water imported from the western slope; (*e*) the Snowden diversion dam on the Arkansas River above Snowden, Colo., and the Snowden diversion canal which would convey water from the Arkansas River to the enlarged Twin Lakes Reservoir; (*f*) the Twin Lakes Reservoir in the upper Arkansas Basin, a few miles south of Snowden, Colo., enlarged from its present active capacity of 56,000 acre-feet to 260,000 acre-feet, for storage and regulation of water imported from the western slope by the Fryingpan-Arkansas diversion, water imported by existing Twin Lakes diversion, and water diverted from the Arkansas River by the Snowden canal; (*g*) the Pueblo Reservoir on the Arkansas River west of Pueblo, Colo., with a capacity of 400,000 acre-feet to store water for irrigation and municipal use and for flood control; (*h*) a project power system comprising 60 miles of canals, seven power plants having an installed capacity of 104,800 kilowatts, seven switchyards, nine substations, and about 400 miles of transmission lines; (*i*) specific municipal water supply facilities for furnishing additional municipal water to Colorado Springs, Pueblo, and several Arkansas Valley towns, which supply facilities would be constructed by the United States only after construction by the communities themselves proves infeasible. These proposed works, which make up the initial development, are estimated to cost $147,440,000 on the basis of October 1949 price levels which are just slightly lower than present price levels. The cost of operation and maintenance, including reserves for replacement, is estimated to be $1,335,200 annually.

The initial development of the Gunnison-Arkansas project has engineering feasibility. It represents the minimum practical project. It is designed as a self-contained unit and its construction would not imply a commitment for expansion, extension, or enlargement; neither would it impair or duplicate future development. It would be operated in accordance with the principles set forth in the regional director's report. The Twin Lakes Reservoir & Canal Co. has expressed a willingness to execute the water exchange agreement which is prerequisite to the prevention of damage to the fisheries of the Roaring Fork River, and which is contemplated by the operating principles. The water to be imported from the Colorado River watershed is to come from Colorado's apportionment under the upper Colorado River Basin compact, and there is sufficient water supply for the project.

The initial development of the Gunnison-Arkansas project is economically justified and financially feasible. The ratio of annual benefits to annual costs is about 1.7 to 1.0. Net annual revenues would amount to about $2,870,000. It is estimated that all reimbursable costs would be returned to the United States in 50 years. The tentative allocation of costs among the various purposes and the estimated payments are summarized in the following tabulation:

Function	Allocation	Probable repayment
Reimbursable:		
Irrigation	$59, 930, 000	
Probably can be returned in 40 years without interest through payments by irrigation water users and district beneficiaries		$10, 881, 600
Probably can be returned in 40 years without interest through application of interest on power and municipal water investment		49, 048, 400
Power	40, 032, 000	
Probably can be returned in 50 years with interest at 3 percent		40, 032, 000
Municipal and industrial water supply	29, 522, 000	
Probably can be returned in 40 years with interest at 2 percent		29, 522, 000
Total, reimbursable	129, 484, 000	129, 484, 000
Nonreimbursable:		
Flood control	15, 777, 000	
Fish and wildlife	2, 179, 000	
Total, nonreimbursable	17, 956, 000	
Grand total	147, 440, 000	129, 484, 000

Irrigation repayment will be accomplished under a contract with a water conservancy district. Municipal and industrial water repayment will be accomplished under contracts with this district or possibly another entity. Separate contracts will cover specific municipal water supply works if they are constructed by the United States and will require repayment of the cost of these works with interest over a period of 40 years. Power payments will be accomplished under contracts for furnishing electric energy at the lowest prices consistent with sound business principles in order to encourage the most widespread use of power throughout the area of service.

I concur in and adopt the recommendations of the regional director as set forth in his report.

I recommend that you approve and adopt this report as your proposed report on the initial development, Roaring Fork diversion, Gunnison-Arkansas project, Colorado, and that you authorize me, in your behalf, to transmit it to the Secretary of the Army; to the States signatory to the Colorado River compact, and to the States of Kansas and Oklahoma in accordance with the provisions of section 1 of the Flood Control Act of 1944 (58 Stat. 887); to the head of the agency of the State of Colorado exercising administration over the wildlife resources of that State, in accordance with the provisions of the act of August 14, 1946 (60 Stat. 1080); and to other interested Federal agencies for their views and comments.

Respectfully,

MICHAEL W. STRAUS, *Commissioner.*

Approved and adopted May 4, 1951.

OSCAR L. CHAPMAN,
Secretary of the Interior.

DEPARTMENT OF THE INTERIOR,
BUREAU OF RECLAMATION,
Washington 25, D. C., May 8, 1951.

Hon. CLIFFORD H. STONE,
Director, Colorado Water Conservation Board,
Denver 2, Colo.

MY DEAR JUDGE STONE: In behalf of the Secretary of the Interior and in compliance with the provisions of section 1 (c) of the Flood Control Act of December 22, 1944, I am transmitting herewith for your information and such comments as you may wish to make, four copies of the Department of the Interior's proposed report on the initial development (Roaring Fork diversion), Gunnison-Arkansas project. These copies of the report are sent to you as the official representative of the State of Colorado designated by the Governor to receive them. This report will be sent to the President and to the Congress under the provisions of section 9 (a) of the Reclamation Project Act of 1939. I am sending a copy of this letter to Governor Thornton with copies of the report.

We shall be pleased to have your views and recommendations within 90 days of your receipt of this report.

Mr. A. A. Batson, our regional director in Denver, Colo., will be glad to render any assistance which you or other interested State officials may request in connection with your consideration of this report.

Sincerely yours,

MICHAEL W. STRAUS, *Commissioner.*

OFFICIAL COMMENTS AND RECOMMENDATIONS OF THE STATE OF COLORADO ON THE INITIAL DEVELOPMENT, GUNNISON-ARKANSAS PROJECT, ROARING FORK DIVERSION, COLORADO

(Project Planning Report No. 7–8a.49–1, Bureau of Reclamation, Department of the Interior, dated January 1950)

AUGUST 7, 1951.

The SECRETARY OF THE INTERIOR.

SIR: On behalf of the State of Colorado and pursuant to section 1 of the act of December 17, 1944 (58 Stat. 887), there are herewith transmitted the comments, views, and recommendations of the State of Colorado concerning the initial development of the Gunnison-Arkansas project, Roaring Fork diversion, being Project Planning Report No. 7–8a.49–1, Bureau of Reclamation, Department of the Interior, dated January 1950.

These comments, views, and recommendations are submitted under the authority of chapter 265, Session Laws of Colorado, 1937, creating the Colorado Water Conservation Board, and defining its functions in accordance with the designation of such Board by the Governor of the State of Colorado pursuant to section 1 of the act of December 17, 1944 (58 Stat. 887), as the official State agency to act in such matters.

The comments, views, and recommendations of Colorado submitted herewith are as follows:

1. Colorado recognizes that the waters of the Arkansas River in the Colorado portion of the upper Arkansas River Basin are overappropriated and that serious loss in crop production on presently irrigated farm land results. Stabilized agricultural economy in the area requires supplemental water supplies. Additional quantity and better quality of domestic and municipal water are critically needed in the Arkansas Valley, Colo., for the cities of Colorado Springs, Pueblo, and various valley towns. New sources must be found, if necessary, and dependable water supplies for a growing population are to be provided. The best economy and the most efficient use of limited sources of water require multiple-use project development which will serve the needs of agriculture, requirements for domestic and municipal water supplies, flood control, the preservation of recreational and fish and wildlife values, and the production of hydroelectric power. Neither further retirement of presently irrigated land to meet necessary and pressing municipal requirements for water nor project development designed to serve a single purpose would be consonant with the most desirable economic advancement of Colorado, or with the highest utilization of its limited water supplies.

2. Colorado concurs in the findings of the project report that the project described therein is engineeringly feasible, economically justified, and financially feasible, and that the proposed plan for the payment of reimbursable capital costs is in accordance with the Federal reclamation law.

3. The allocation of capital costs as between the various project features, including a nonreimbursable allocation to flood control and fish and wildlife preservation, is considered reasonable.

4. It is recognized that the allocation to the various project purposes of annual operation, maintenance, and replacement costs has been made to correspond to the allocation of capital costs. Colorado recommends that an authorization of the project shall not preclude a readjustment of operation, maintenance, and replacement charges as between municipal and domestic users and power and irrigation users which might more accurately reflect the actual use of water by said users.

5. It is also recommended that the authorization of the project include the valley pipline as referred to in said report for the use and benefit of the various valley towns.

6. Colorado calls attention to the fact that the project, its operation, maintenance, and the use of Colorado River water thereunder, must be subject to the provisions of the Colorado River compact of November 24, 1922 (H. Doc. 605, 67th Cong., 4th sess.), the upper Colorado River Basin compact of October 11, 1948 (Public Law 37, 81st Cong., 1st sess.), and the Boulder Canyon Project Act of December 21, 1928 (45 Stat. 1057–1064). Further reference to this matter appears in these comments in connection with the subject of "Operating Principles." The features of the project and their operation for the storage and reregulation of the native waters of the Arkansas River are subject to the provisions of the Arkansas River compact of December 14, 1948 (Public Law 82, 81st Cong., 1st sess.) between Colorado and Kansas. On July 24, 1951, the Arkansas River compact Administration, an agency created by the compact for its administration, after a review of the project report and consideration of the effect of the operation

of the proposed project on the administration of the provisions of the compact, adopted the following resolution:

Whereas there has been submitted to the States of Colorado and Kansas by the Secretary of the Interior, in accordance with provisions of section 1 of the 1944 Flood Control Act, a report of the Bureau of Reclamation on the proposed initial development, Gunnison-Arkansas project, Roaring Fork diversion, Colorado (Project Planning Report No. 7–8a.49–1), and such States are required to transmit to the Secretary of the Interior their respective official comments and recommendations on the report and proposed development; and

Whereas the Arkansas River Compact Administration, an official interstate body created by the Arkansas River compact and charged with the administration of such compact, is interested in the proposed development to the extent that its construction and operation shall not interfere with the rights, interests and obligations of Colorado and Kansas under the compact: Now be it

Resolved by the Arkansas River Compact Administration, That the following comments and recommendations relating to said report of the Secretary of the Interior, to wit:

The Arkansas River Compact Administration submits these comments and recommendations to the Governors of Colorado and Kansas respecting the proposed initial development, Gunnison-Arkansas project, Roaring Fork diversion, Colorado, namely:

1. The Administration understands that the project plan proposes:

(*a*) The importation by appropriate project works of approximately 70,000 acre-feet of water a year from the Colorado River Basin to the Arkansas River Basin for supplemental irrigation and domestic water supplies in Colorado and for the production of hydroelectric energy.

(*b*) In connection with such importation of water and its regulation in the Arkansas River Valley by project works, the reregulation of native waters of the Arkansas River (the term "native waters," as herein used, being those waters covered and defined by art. III–B of the Arkansas River compact).

2. The interstate water relations of Colorado and Kansas with respect to the Arkansas River do not justify any objection to the proposed project development for the importation of Colorado River water (described in sub par. (a) above).

3. The reregulation of native waters of the Arkansas River (native waters being as above mentioned) concerns the Arkansas River Compact Administration and both Colorado and Kansas in complying with the provisions of the Arkansas River compact and maintaining the benefits and obligations of the two States under that compact. To that end, it is recommended to the Governors of Colorado and Kansas, and expressed as a policy of the Arkansas River Compact Administration that the initial development, Gunnison-Arkansas project, Roaring Fork diversion, Colorado, as set forth in Project Planning Report No. 7–8a.49–1 of the Bureau of Reclamation, be approved; provided, however, that there shall be no reregulation of native waters of the Arkansas River as proposed in such report until a plan of operation, rules, regulations, procedures, and agreements in furtherance thereof, including any pertinent agreements between the Corps of Engineers and the Bureau of Reclamation, shall have been submitted to, and approved by, the Arkansas River Compact Administration and the affected water users.

4. It is the purpose and intent of these recommendations that the proposed project development shall not interfere with or defeat the rights, interests and obligations of Colorado and Kansas under the Arkansas River compact.

be transmitted to the Governors of the States of Colorado and Kansas and such Governors be and are hereby requested to submit the same to the Secretary of Interior with their official State comments and recommendations upon said proposed project and development.

Colorado interprets and understands that paragraph 3 of the resolution of the Arkansas River Compact Administration is controlled by paragraph 4 thereof; and that the words "affected water users" in said paragraph 3 mean only water users in the State of Colorado so long as Colorado complies with the terms of said compact.

7. Paragraph 74, pages 27 to 33, both inclusive, under the heading "Operating Principles," contains the operating principles which the report explains were recommended by a policy and review committee set up by the Colorado Water Conservation Board to study and review plans and reports on the first stage of the Gunnison-Arkansas project. This committee was composed of representatives of the board, the Colorado Game and Fish Commission, western Colorado, the Arkansas Valley, and the City of Colorado Springs. The report fails to explain that such committee was required to report to the Colorado Water Conservation Board and its recommendations would not be effective until approved by that board. The report on the project does not disclose what action was taken by the Board nor does it contain all of the recommendations of the Policy and Review Committee. Some of the matters contained in the report of the committee are not strictly concerned with project operation, but are related to, and constitute a material part of, such operating principles.

The recommendations of the Policy and Review Committee were revised and approved by the Colorado Water Conservation Board on February 22, 1951. (See letter with attachments of the director of the Colorado Water Conservation Board dated February 27, 1951, and addressed to the director of region 7, Bureau of Reclamation.) Paragraph 74, pages 27 to 33, both inclusive, of the report correctly sets forth that part of the report of the policy and review committee, designated "Article II. Operating Principles," as revised and approved by the Colorado Water Conservation Board, but it omits other material portions of the Committee's report as revised and approved by the Board, namely:

* * * * * * *

The action of the policy and review committee will be presented to the Colorado Water Conservation Board for such action as the board deems proper.

The action of the Colorado Water Conservation Board will be incorporated in the official comments of the State of Colorado, made pursuant to section 1 of the 1944 Flood Control Act.

The authorization of the project will recognize the operating principles approved by the Colorado Water Conservation Board.

Prior to commencement of project construction, the following conditions precedent must be satisfied:

(*a*) There will be executed a payment contract between the Eastern Colorado Conservancy District and the United States in which will be incorporated the approved operating principles.

(*b*) There will be executed such contract with the Twin Lakes Reservoir & Canal Co. as is necessary to make effective the approved operating principles.

(*c*) The Eastern Colorado Conservancy District will firmly bind itself to the operation of the project in accordance with the approved operating principles.

* * * * * * *

It is recommended that this project shall hereafter be referred to as the Fryingpan-Arkansas project. Approval of this provision by eastern Colorado representatives shall not be implied as an abandonment of their expressed intention to obtain approval of a project from the Gunnison River nor shall approval of this provision by western Colorado representatives be construed as any consent on their part to the authorization of a project for the exportation of water from the Gunnison River to eastern Colorado.

The committee recognizes that the approval of this report is not to serve as a precedent or example for the approval of any other transmountain diversion of major proportions not heretofore authorized.

The policy of the State of Colorado as initiated in State-wide meetings held under the auspices of the State planning commission at Denver and Grand Junction, and as evidenced by resolutions dated June 15, 1935, and February 28, 1936, was not adhered to because surveys of the character mentioned in said resolutions were not available to the committee. Nothing herein contained shall

be deemed or construed as a precedent for Federal projects not heretofore authorized until adequate surveys have been made and the necessary data are available so that a general allocation or apportionment of the waters of the Colorado River, allocated for consumptive use in the State of Colorado, under the upper Colorado River Basin compact, may be made between eastern Colorado and western Colorado, as distinguished from an attempt to execute such State policy by a piecemeal or series of partial allocations, any of which may seriously interfere with a complete, over-all State program.

Paragraph 88 of the report under the heading "Recommendations," states:

E. The project be operated under the direction of the Secretary of the Interior in accordance with the operating principles set forth in this report or as principles may be modified in the future by agreement between the Secretary and the Commission established by the State of Colorado.

It is understood that the operating principles, mentioned in this quotation from the report, are those set forth in paragraph 74, pages 27 to 33, both inclusive, and that the "Commission" mentioned therein is the Commission which may be created in the manner and for the purpose set forth in paragraph 17 of the operating principles. (See p. 33 of the report.)

Colorado's approval of the plans set out in the report and of the authorization of the project is conditioned upon compliance with the operating principles set forth in the report (see par. 74, pp. 27 to 33, both inclusive) and also full recognition and compliance with those portions of the policy and review committee's report, as revised and approved by the Colorado Water Conservation Board, which are omitted from the report and which are hereinabove set out; except that as to the name of the project, it is recommended and urged that in an appropriate manner the project should hereafter be known and referred to as the "Fryingpan-Arkansas project." It is noted from the letter of the Commissioner of Reclamation to the Secretary of the Interior, contained in the report, that it is stated:

* * * This development is designed as a self-contained unit, and its construction would not imply a commitment for developing future water supplies in the Gunnison River Basin for diversion to the Arkansas River Basin.

Colorado approves this statement but such a statement lends weight to the reason for changing the name of the project as herein recommended. Diversion from the Fryingpan River to the Arkansas River has no relation to the Gunnison River. It is not proposed under this "self-contained" project to divert water to the Arkansas Basin from the Gunnison River. The identification of the project on the cover of the report and used throughout the report—"Initial development, Gunnison-Arkansas project, Roaring Fork diversion, Colorado"—is a misnomer and misleading, and in the future may, in some manner, lead to unwarranted implications. In addition to the recommended change in project identification, Colorado requests that the project be authorized as the "Fryingpan-Arkansas project."

8. The Colorado River Water Conservation District is an agency created by State statute (ch. 20, p. 997, Session Laws of Colorado, 1937) for the conservation, use, and development of the water resources of the Colorado River and its principal tributaries. The area comprised within the district includes seven counties and a part of an eighth county within the natural drainage of the Colorado River in western Colorado. The Southwestern Water Conservation District

is an agency created by State statute (ch. 231, p. 866, Session Laws of Colorado, 1941) for the conservation, use, and development of the water resources of the San Juan and Dolores Rivers and their principal tributaries. The district comprises seven counties and a part of an eighth county within the natural basin of the Colorado River in western Colorado. When the board of directors of each of these two districts passed upon the report and recommendations of the policy and review committee, including the operating principles, as revised, their separate resolutions, among other things, contained the following language:

COLORADO RIVER WATER CONSERVATION DISTRICT BOARD

Be it further resolved, That in the opinion of the board of directors of the Colorado River Water Conservation District, the Colorado Water Conservation Board should adopt a resolution that no further federally financed transmountain diversions from the natural Colorado River Basin should be approved for authorization until the surveys described in said section IV above are completed and the need for the use of water in western Colorado has been determined. (Sec. IV, to which reference is made, is shown by the two paragraphs contained in the report of the policy and review committee, quoted on p. 5 of these comments, and commencing with the words "The committee recognizes" and "The policy of the State," respectively.)

SOUTHWESTERN WATER CONSERVATION DISTRICT BOARD

* * * this board feels it should interpose no objection to the proposed diversion, but with the clear and distinct understanding this consent shall not be considered as waiver of objections to any other federally financed transmountain diversion of the waters of the Colorado River; and with the further understanding that the State Water Conservation Board of the State of Colorado shall not approve of any other such federally financed diversion project until the studies of the needs of the western slope be fully completed so that an intelligent decision relative to such needs may be given. We feel that after the many and long delays in making such studies and the promises made by some high in authority in the Reclamation Service, the western slope is entitled to have such studies completed in the very near future, and that no further federally financed transmountain diversions should be made without the completion of such investigations.

At the meeting of the Colorado Water Conservation Board on February 22, 1951, when the revised report of the policy and review committee, including revised operating principles for this project, was approved by the Colorado Water Conservation Board, the board unanimously approved two motions which provided that the resolutions, above mentioned and partially quoted, submitted by the Colorado River Water Conservation District and the Southwestern Water Conservation District, be accepted and approved as a policy of the Colorado Water Conservation Board.

9. Paragraph 68, commencing on page 23, in about the middle thereof, states:

The proposed basic rate of $3.60 per acre-foot at the Pueblo Reservoir has been determined to be within the payment capacity of the water users.

It is respectfully requested that such proposed charge should not constitute either a maximum or a minimum charge nor should it indicate a uniform charge or indicate where water will be used or whether or not consideration in fixing charges can be given to return flows from such use. The figure is purely an estimated average charge per acre-foot and the district in allocating such water should be allowed complete latitude in connection therewith.

10. Paragraph 68 as contained on page 24 has the following sentence:

> The district would assume responsibility for delivery of irrigation water.

This responsibility is certainly not that of the United States, but neither should the district be responsible for patrolling every ditch. If water is turned out from the reservoir, it is immediately subject to the control of the State water officials, who should be advised of such rights in water and who are charged with the responsibility of delivering the same to the correct ditch. It is contemplated that each ditch will do its own policing.

11. Attention is directed to paragraph 68 on page 24 and the sentence reading:

> This district or possibly another entity would contract with the Government for Federal construction of the specific municipal water system * * *

It is contemplated that a proper repayment entity under Colorado laws such as a metropolitan water district may be created for this particular purpose or that a joint contract executed between the various municipalities utilizing this feature will be executed and the project's authorization should be sufficiently broad to authorize any such contract deemed desirable.

12. Page 24 in the tabulation on function and source of revenue contains the following:

District tax ($132 million, at 1 mill minus 10 percent) $119,000

Attention is directed to the fact that under Colorado law, three possible rates are in existence: one-half of 1 mill, being the rate prior to delivery of project water; 1 mill, being the rate after such project water becomes available, and prior to the time of any deficiency or default; and 1½ mills in the event of default or deficiency. Levies in any of these three categories may be less but cannot exceed these figures.

13. Attention is directed to page 24, the item captioned "Municipal and industrial water, municipal supplies (38,000 acre-feet at various rates)." It is respectfully pointed out that it may be some years before this amount of water is utilized and that the quantity indicated is but an estimate which may be exceeded ultimately. The authorization of the project should not preclude the possibility of charging municipalities lower rates during the period of time that such water is not actually required for the municipal needs. Pueblo might ultimately require 10,000 acre-feet and desire at the outset to commit herself for the immediate purchase of 5,000 acre-feet. Until such time as she actually requires 10,000 acre-feet of water, she should not be charged therewith at the proposed rates. The project authorization should permit charging lower rates until the water is used for municipal purposes.

14. Attention is directed to paragraph 70 on page 25. It is respectfully suggested that the report makes no reference to potential evaporation savings by moving shallow plains storage reservoirs upstream and storing the same quantities of water at higher altitudes.

15. Attention is directed to a statement in the middle of page 38, reading:

> Such contracts should include provisions for the right of renewal thereof once or more than once under stated terms and conditions mutually agreeable to the parties and subject to increase or decrease in rates corresponding to increase or decrease of cost of construction and of operation, maintenance, or improvement or deterioration in the payment ability of the water users.

This sentence must be reconciled with the existing Colorado law which is set forth in chapter 266 of the Session Laws of Colorado 1937, being section 19 thereof, which requires the petition for allocation of water filed by the water user and addressed to the conservancy district to contain therein the charge to be imposed for each acre-foot of water. The statute requires the petition to contain the following: (1) Name of applicant, (2) quantity of water to be purchased or otherwise acquired, (3) descriptions of lands upon which the water will be used and attached, (4) price per acre-foot to be paid, (5) whether payments will be made in cash or annual installments, (6) agreement that the annual installments and the charges for maintenance and operating shall become a tax lien upon the lands for which such water is petitioned and allotted and to be bound by the provisions of this act and the rules and regulations of the board. While it was contemplated initially that the price per acre-foot would be fixed, such as, in the case of the Colorado-Big Thompson project, $1.50 per acre-foot, it is believed that this statutory provision can be complied with by stating the price per acre-foot shall be not less than $—— nor more than $——.

Respectfully submitted.

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CLIFFORD H. STONE,
Director, Colorado Water Conservation Board.

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