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UPPER COLORADO RIVER COMMISSION

FIFTH ANNUAL REPORT

APRIL 1, 1954



UPPER COLORADO RIVER COMMISSION

520 Rood Avenue Grand Junction, Colorado

April 1, 1954

Mr. President:

Article VIII (d) (13) of the Upper Colorado River Basin Compact provides that the Upper Colorado River Commission shall make and transmit annually to the Governors of the signatory States and the President of the United States of America, with the estimated budget, a report covering the activities of the Commission for the preceding water year.

A copy of the Fifth Annual Report is enclosed. The budget is attached as Appendix B.

A printed copy of this report will be forwarded to you at the earliest possible date.

Respectfully yours,

/s/ JOHN GEOFFREY WILL

JOHN GEOFFREY WILL Secretary and General Counsel

The President The White House Washington 25, D. C.

Enclosure

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This report was, on the same date, transmitted to the Governors of each Upper Basin State.

FRONTISPIECE

LETTER OF TRANSMITTAL

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FIFTH ANNUAL REPORT

UPPER COLORADO RIVER COMMISSION

April 1, 1954

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Article VIII of the By-Laws of the Upper Colorado River Commission provides as follows:

1. The Commission shall make and transmit annually on or before April 1 to the Governors of the states signatory to the Upper Colorado River Basin Compact and to the President of the United States, a report covering the activities of the Commission for the water year ending the preceding September 30.

2. The annual report shall include, among other things, the following:

- (a) The estimated budget;
- (b) All hydrologic data which the Commission deems pertinent;
- (c) Estimates, if any, of the Commission forecasting water run-off;
- (d) Statements as to cooperative studies of water supplies made during the preceding water year;
- (e) All findings of fact made by the Commission during the preceding water year;
- (f) Such other pertinent matters as the Commission may require.

For data on the activities of the Commission during that part of the preceding water year to March 25, 1953, reference is hereby made to the Commission's Fourth Annual Report. In order that a more nearly recent account of the Commission's activities may be

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gained, the Commission has determined to include in this report an account of the activities of the Commission through March 25, 1954.

During the period covered by this report, the Commission consisted of the following:

*Harry W. Bashore	-Commissioner for the United States of America and Chair- man of the Commission
John R. Erickson	-Commissioner for the State of New Mexico and Vice Chair- man of the Commission
Jean S. Breitenstein	—Commissioner for the State of Colorado
Joseph M. Tracy	—Commissioner for the State of Utah until November 6, 1953
George D. Clyde	—Commissioner for the State of Utah from November 6, 1953
L. C. Bishop	—Commissioner for the State of Wyoming

The following have acted as advisers for each Commissioner from time to time:

United States of America:

Legal:

- E. W. Fisher, Chief Counsel, Bureau of Reclamation, Washington, D. C.
- T. Richard Witmer, Assistant Chief Counsel, Bureau of Reclamation, Washington, D. C.
- J. Stuart McMaster, Regional Counsel, Region IV, Bureau of Reclamation, Salt Lake City, Utah

Engineering:

J. R. Riter, Chief, Hydrology Division, Bureau of Reclamation, Denver, Colorado

*Resigned as of December 11, 1953

- H. P. Dugan, Head, River Regulation Section, Hydrology Division, Bureau of Reclamation, Denver, Colorado
- Cecil B. Jacobson, Area Engineer, Colorado River Storage Project, Bureau of Reclamation, Salt Lake City, Utah

Colorado:

Legal:

Charles Soller, Deputy Attorney General, Denver, Colorado

Omer Griffin, Deputy Attorney General, Denver, Colorado

Engineering:

Royce J. Tipton, Consultant, Colorado Water Conservation Board, Denver, Colorado

Frank C. Merriell, Engineer, Colorado River Water Conservation District, Grand Junction, Colorado

New Mexico:

Legal:

Fred E. Wilson, Attorney at law, Albuquerque, New Mexico

Engineering:

John H. Bliss, Santa Fe, New Mexico

I. J. Coury, Member, Interstate Stream Commission, Farmington, New Mexico

Utah:

Legal:

E. R. Callister, Jr., Attorney General, Salt Lake City, Utah

J. A. Howell, Attorney at law, Ogden, Utah

Engineering:

Joseph M. Tracy, State Engineer, Salt Lake City, Utah

Wyoming:

Legal:

Howard Black, Attorney General, Cheyenne, Wyoming Engineering:

H. T. Person, Dean, School of Engineering, University of Wyoming, Laramie, Wyoming

Earl Lloyd, Deputy State Engineer, Cheyenne, Wyoming

Alternates in absence of Commissioner: Joe L. Budd, Big Piney, Wyoming Norman W. Barlow, Cora, Wyoming

The staff of the Upper Colorado River Commission, as of the date of this report, consists of:

John Geoffrey Will, Secretary and General Counsel R. D. Goodrich, Chief Engineer Ival V. Goslin, Assistant Chief Engineer Barney L. Whatley, Treasurer Richard T. Counley, Assistant Treasurer Mrs. Lois S. Burns, Administrative Assistant Miss Jeanette Holland, Stenographer Mrs. Lois P. Crowder, Official Reporter

During the period March 26, 1953 to March 25, 1954, the Commission held nine meetings, as follows:

March 31, 1953	Regular Meeting Salt Lake City, Utah
June 29, 1953	Special Meeting Denver, Colorado
August 10, 1953	Special Meeting Ogden, Utah
September 21, 1953	Annual Meeting Denver, Colorado
October 2, 1953	Annual Meeting Denver, Colorado
October 5, 1953	Annual Meeting Denver, Colorado
November 6, 1953	Annual Meeting Denver, Colorado
December 12, 1953	Special Meeting Denver, Colorado
January 15-17, 1954	Special Meeting Washington, D. C.

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During this period also there were meetings from time to time of the standing committees. These committees and their membership, as of the date of this report, are as follows:

Engineering Committee:

J. R. Riter, Chairman	Frank C. Merriell
John H. Bliss	H. T. Person
Royce J. Tipton	Joseph M. Tracy
George D. Clyde	Earl Lloyd

Legal Committee:

Fred E. Wilson, Chairman E. R. Callister, Jr. J. Stuart McMaster Howard Black Charles Soller Omer Griffin

Budget Committee:

John H. Bliss, Chairman Joseph M. Tracy Ivan C. Crawford

J. R. Riter Norman W. Barlow

The following listed special committees were also active during the period March 26, 1953 to March 25, 1954:

Committee on Rules and Regulations:

E. R. Callister, Jr., Chairman

R. M. Gildersleeve Earl Lloyd Fred E. Wilson J. R. Riter

Finance Committee:

Norman W. Barlow, Chairman Joseph M. Tracy John H. Bliss

Committee to Consider What, If Any, Changes Should be made in the Draft of Bill to Authorize the Colorado River Storage Project and Participating Projects:

> E. R. Callister, Jr., Chairman John Geoffrey Will Howard Black Charles Soller I. J. Coury

The principal activities of the Commission and its staff have consisted of: (a) the final preparation and arrangements for introduction of and hearings on legislation to authorize the Colorado River Storage Project and participating projects; and (b) research looking to improved methods for the application of the Inflow-Outflow theory of measuring the consumptive use of water.

No findings of fact, pursuant to Article VIII of the Upper

Colorado River Basin Compact have been made by the Commission.

The Commission acknowledges with appreciation the assistance that it has had throughout the year from agencies of the Executive Branch of the Federal Government and the courtesies extended to it by the Legislative Branch.

Most encouraging progress has been made in connection with our efforts to secure the enactment of legislation to authorize the Colorado River Storage Project and Participating Projects. Since January 1, the Commission has maintained a temporary office at Washington, D. C. which has served as a base of operations in connection with the authorization of the Colorado River Storage Project and Participating Projects. Hearings have been held by the Irrigation and Reclamation Sub-Committee of the House Committee on Interior and Insular Affairs. A most impressive group of witnesses appeared at the hearings in support of legislation. Among the witnesses who appeared at these hearings are the following: Hon. Sam Akeah, Chairman, Navajo Tribal Council: Hon. Norman W. Barlow, President, Green River Development Co. and Assistant Interstate Streams Commissioner for the State of Wyoming; John B. Barnard, Esquire, Middle Park Water Conservancy District, Granby, Colorado; Hon. L. C. Bishop, Commissioner for Wyoming, Upper Colorado River Commission: Hon. J. S. Breitenstein, Commissioner for Colorado, Upper Colorado River Commission; Dr. J. E. Broaddus, Salt Lake City, Utah; Hon, Joe L. Budd, Assistant Commissioner (for Wyoming), Upper Colorado River Commission; Mr. George Cory, Montrose, Colorado; Hon. I. J. Courv. Member, Interstate Stream Commission, New Mexico: Frank Delaney, Esquire, Colorado River Water Conservation District, Glenwood Springs, Colorado; Hon. W. A. Dexheimer, Commissioner of Reclamation, Department of the Interior, Washington, D. C.; Hon. John R. Erickson, Commissioner for New Mexico. Upper Colorado River Commission; Hon. Howard Gorman, Chairman. Resources Committee, Navajo Tribal Council; Hon. Dan H. Hughes, Montrose, Colorado; Hon. C. B. Jacobson, Engineer in Charge, Colorado River Storage Project Studies, Salt Lake City, Utah; Clifford H. Jex, Engineer, Western Colorado Water Association, Grand Junction, Colorado; Hon. L. R. Kuiper, City Manager. Delta, Colorado; Hon. E. C. Larson, Regional Director, Region 4. Bureau of Reclamation, Salt Lake City, Utah; Angus Mac Donald Esquire, Legislative Representative, National Farmers Union, Washington, D. C.; Hon. F. C. Merriell, Chief Engineer, Colorado River Water Conservation District, Grand Junction, Colorado: Mr. David D. Moffatt, Jr., Assistant to the President, Utah Power & Light Co., Salt Lake City, Utah; Hon. Breck Moran, Wyoming Natural Resource Board, Cheyenne, Wyoming; Hon. John Pat-

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rick Murphy, Executive Secretary, Middle Rio Grande Flood Control Association, Albuquerque, New Mexico; Mr. L. R. Patterson, Assistant Vice-President, Public Service Company of Colorado; Hon. H. T. Person. Dean of the School of Engineering, University of Wyoming and Engineer-Adviser to Wyoming's Commissioner, Upper Colorado River Commission; Hon. George A. Pughe, Craig, Colorado, Member, Colorado Water Conservation Board; Hon. Glenn G. Saunders, Assistant City and County Attorney, Board of Water Commissioners, City and County of Denver, Colorado; Hon. Bryant H. Stringham, Chairman, Colorado River Development Association, Vernal, Utah; Hon. Ralph A. Tudor, Under Secretary of the Interior; Mr. G. E. Untermann, Director, Utah Field House of Natural History, Vernal, Utah; Hon. Maxwell Yazzie, Chairman of the Engineering Committee, Navajo Tribal Council; Hon. George D. Clyde, Commissioner for Utah, Upper Colorado River Commission.

The Secretary of the Interior has recommended a large part of our program. The President of the United States has issued a strong statement favoring our development; and the Bureau of the Budget has issued a letter approving the same in large part. The text of the President's statement of March 20, 1954 is as follows:

THE WHITE HOUSE

Statement by the President

"I have today approved recommendations for the development of the Upper Colorado River Basin.

"The general plan upon which these recommendations are based has been prepared by the Secretary of the Interior. The Secretary's recommendations have been reviewed by the Bureau of the Budget. Legislation embodying the Administration's recommendations is being prepared for introduction in the Congress.

"This is a comprehensive, well-planned development of a river basin. The close Federal-State cooperation upon which the Secretary's plan is based also carries out this Administration's approach to water resource development.

"The development will conserve water, enabling the region to increase supplies for municipal uses, industrial development, and irrigation. It will develop much-needed electric power.

"The development calls for sound financing. The leg-

islation now being drafted will set up a fund for the entire project so that it will be constructed and paid for as a basin program.

"Construction of the Echo Park and Glen Canyon dams, two of the large projects in the basin plan, is recommended. These dams are key units strategically located to provide the necessary storage of water to make the plan work at its maximum efficiency.

"The legislation being drafted will authorize a number of projects which will put to use the waters of the Upper Colorado. This authorization will become effective following further consideration by the Secretary of the Interior, with the assistance of the Secretary of Agriculture, of the relation of these projects to the wise use and sound development of the basin.

"I am deferring my recommendation on the Shiprock unit of the Navajo project until the Secretary has completed his study.

"I hope the Congress will give early consideration to enactment of the Administration's legislative proposal. I firmly believe development of the Upper Colorado River Basin, in accordance with its provisions, is in the national interest."

* * * * *

The members of the Senate and House of Representatives from Upper Colorado River Basin States have worked valiantly and ably. We look with hope and confidence to the enactment of legislation on the project by the present Congress.

During the past year considerable detailed technical work was done with respect to the Inflow-Outflow Method of measuring consumptive uses of water in the Upper Colorado River Basin and within the Upper Basin States in conformity with Article VI of the Upper Colorado River Basin Compact and as generally outlined in the Inflow-Outflow Manual of Appendix D, Vol. III of the Official Record of the Upper Colorado River Basin Compact Commission.

The general objective of the Inflow-Outflow studies has, of course, been to find methods of measuring stream depletions within a river basin, sub-basin, or State by utilizing the changes in relationship between the sum of virgin flows of certain key tributaries near the rim of the stream basin and the outflow station of the basin, sub-basin, or at a State line. The so-called "rim sta-

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tions" located high on the watershed, and preferably above points of man-made stream depletions, are called inflow-index stations, the flows at which are correlated with the observed flows at the outflow station in the derivation of equations from which future flows (after additional man-made depletions occur) can be estimated. The equations must be adjusted to portray virgin conditions of stream flow because Article VI of the Compact states, "The Commission shall determine the quantity of the consumptive use of water, which use is apportioned by Article III hereof, for the Upper Basin and for each State of the Upper Basin by the inflowoutflow method in terms of man-made delpetions of the virgin flow at Lee Ferry, _____."

More specifically, during the past year the Inflow-Outflow studies have been devoted to the derivation of equations from which can be estimated the virgin flow of the Green River in Wyoming, the Colorado River in Colorado, and a start has been made on studies of sub-basins of the Colorado River System in Utah.

It was realized early in the investigations of the applicability of the Inflow-Outflow method of measuring stream depletions, and subsequent studies have confirmed the belief, that there are factors other than flows at inflow-index stations which, as independent variables, affect the relationship between inflow-index stations and outflow stations at State lines. For this reason, in the derivation of hundreds of possible equations, it has been necessary to try as independent variables such factors as those pertaining to base stream flows, precipitation, temperature, winter flows, summer flows, summer precipitation on the valley floor, summer precipitation on the watershed, summer temperatures at valley stations, summer temperatures at watershed stations, factors which might be indicative of ground-water conditions, "soil priming" in autumn months, etc. in multiple correlations and in many different combinations with the flows at inflow-index and outflow stations.

As can be readily ascertained from the innumerable possibilities of combinations of factors affecting stream flows as independent variables in multiple correlation equations, the work on the Inflow-Outflow Method has been tedious and confining; and, although at this time, no claim can be made that this problem for any given sub-basin is solved, it is felt that the studies have been enlightening and that they must be continued in the future. For economy in both time and expense plans are now being made to have much of the detailed computation done on modern automatic computing equipment.

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A graduate student from the University of Colorado, Mr. Edward J. Currier, was employed on Inflow-Outflow studies during the summer of 1953.

Inflow-Outflow studies were temporarily dropped during the winter in order that the engineering staff could devote its time to a review of the Colorado River Storage Project and Participating Projects in preparation for the Congressional Committee Hearings on pending authorizating legislation.

Studies or reviews were made of several subjects which were covered by office memoranda while more detailed investigations were covered by special reports. Among these subjects were water supply, reservoir operation with holdover storage, power production after full development of uses of water in the Upper Basin, increased losses from reservoirs if substitute sites were to be used instead of Echo Park and research on evaporation from lakes and reservoirs. In general, all of these studies which, in a large part, were made in connection with the Congressional hearings on legislation to authorize the Colorado River Storage Project and Participating Projects confirm the accuracy of studies previously made in these fields by the Bureau of Reclamation.

Formulas are now proposed for estimating the evaporation losses from large reservoirs and reservoir sites in the Upper Colorado River Basin where complete weather data are not available for more accurate determination of losses.

The importance of the reservoir exaporation studies was recognized by the Commission by motion passed at its meeting of August 10, 1953, approving the recommendation contained in the following paragraph:

"From consideration of the results of the investigations made by the cooperative efforts reported and the evaporation studies made by the Engineering Department of the Commission it is recommended that the Upper Colorado River Commission use its best efforts to encourage the continuance of evaporation investigations by the Geological Survey to obtain more practical and reliable formulas for the estimation of reservoir evaporation since accurate estimates of losses from reservoirs by reason of evaporation will be essential under the provisions of the Upper Colorado River Compact."

While the Bureau of Reclamation and the Geological Survey had hoped and planned to continue their investigations at Granby Reservoir this has not yet been possible as explained by the following paragraph from a letter to the Chief Engineer from the Chief Development Engineer, Project Investigations Division, U. S. Bureau of Reclamation dated February 26, 1954:

"However, due to the current stringent conditions with regard to funds, neither the Geological Survey nor the Bureau of Reclamation are able to proceed with installation of equipment this fiscal year, and it appears that the Bureau of Reclamation will not be able to contribute funds for this purpose for the fiscal year beginning with July 1, 1954. Therefore, unless the Geological Survey succeeds in securing sufficient funds to start this work this summer, a year will be lost to this important program." With this letter there was enclosed the following statement which had been requested for inclusion in this annual report.

"Current Status of Evaporation Investigations in the Upper Colorado River Basin

February 25, 1954

"At this time the evaporation program in the Upper Colorado River Basin consists of the existing Class A pan installations operated cooperatively by various collaborators with the Weather Bureau. However, in the Lower Colorado River Basin, a detailed evaluation of evaporation loss was recently completed at Lake Mead. This evaluation was performed by the Geological Survey in cooperation with Region 2 of the Bureau of Reclamation and with the Weather Bureau. Techniques developed at Lake Hefner were used to determine evaporation from Lake Mead for a calibration period of 16 months. Provisional results indicate that annual evaporation loss from Lake Mead amounted to approximately 900,000 acre-feet. As a result of this investigation, monthly evaporation from Lake Mead is now being determined on a current basis.

"No comparable investigation has ever been performed in the Upper Colorado River Basin. Based upon experience at Lake Hefner and Lake Mead, preliminary plans have been prepared for a generally similar investigation, but of smaller scale, to be performed in the Upper Colorado River Basin.

"A consideration of existing reservoirs indicated that Granby Reservoir, at an elevation of 8,280 feet above sea level, is suitable for the proposed investigation, to be performed by the Geological Survey in cooperation with the Bureau of Reclamation.

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"Although most of the equipment needed is available as a result of the completion of the Lake Mead study, funds are not available for immediate initiation of work in the Upper Colorado River Basin, and it is not known when this work can be started. Estimated costs of evaporation investigations for the first year amount to about \$25,000, of which \$6,000 worth of instruments and equipment are on hand."

As stated in previous reports, the collection of stream flow records has continued in cooperation with the Water Resources Branch of the U. S. Geological Survey and State Offices, and all such records are readily available in the Commission's files. The Commission also receives, through the cooperation of the U. S. Weather Bureau, annual and monthly Climatological Data bulletins from Arizona, Colorado, New Mexico, Utah and Wyoming. Through the cooperation of the U. S. Soil Conservation Service, there are supplied reports on snow surveys made in cooperation with other agencies of federal and state governments. These reports cover the states of Utah and Arizona, the drainage basin of the Colorado River, the Rio Grande and the Platte and Arkansas Rivers. These data, now in the Commission's files, make possible all hydrologic investigations desired in the Engineering Department at the present time.

The table of gaging stations and stream discharges, which appeared in previous Annual Reports, is again given as Appendix F in this Fifth Annual Report. U. S. Geological Survey and certain other reports of gaging stations and stream discharges for the water year 1953 have been added to the previous table in so far as the provisional records for these stations have been received. The provisional records for the years 1950 and 1951 have been omitted since they are published in U. S. Geological Survey Water Supply Papers 1179 (1950) and 1213 (1951).

No forecasts of water supply were made by the Engineering Department of the Commission, because reviews and forecasts are available from several other sources.

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APPENDIX A

WHEREAS, Honorable Harry W. Bashore has presided over the meetings of the Upper Colorado River Commission, from the beginning of its existence until, owing to the pressure of other matters, he resigned December 11, 1953; and

WHEREAS, Honorable Harry W. Bashore, during the course of his long incumbency as Representative of the United States on and Chairman of the Upper Colorado River Commission, has contributed beyond measure to the Commission's progress and to the development of plans for the conservation and use of the water resources of the Upper Colorado River Basin:

NOW, THEREFORE, be it resolved by the Upper Colorado River Commission

1. That this Commission hereby expresses its deep appreciation to Honorable Harry W. Bashore for his great services to the Upper Colorado River Basin States.

2. That this Commission expresses the heartfelt hope that Honorable Harry W. Bashore may enjoy many more years of continued success, health, happiness and prosperity.



APPENDIX B

BUDGET

FISCAL YEAR ENDING JUNE 30, 1955

PERSONAL SERVICES

Administrative			
Secretary and			
General Counsel	\$13,750.00		
Administrative Assistant	3,772.95	\$17,552.95	
Engineering			
Chief Engineer	\$10,000.00		
Assistant Chief Engineer	9,350.00		
Summer Program	3,600.00		
Drafting and			
Miscellaneous	200.00	23,150.00	
Clerical			
Stenographer	2,640.00		
Clerk-Typist	2,000.00		
Indexing and Extra	300.00	4,940.00	
Social Security Tax		912.25	\$46,525.20
TRAVEL			\$11,000.00
OFFICE SUPPLIES			2,000.00
NFORMATION			\$6,500.00
CURRENT EXPENSE			
Reporting		\$ 2,500.00	
Telephone and Telegraph		1,200.00	
Insurance and Bonds		850.00	
Accounting		500.00	
Miscellaneous		250.00	
Printing (Office Forms)		350.00	
Printing (Annual Report)		2,000.00	7,650.00
CAPITAL OUTLAY			300.00

\$73,975.20

APPENDIX C

DALBY & MCNULTY CERTIFIED PUBLIC ACCOUNTANTS FIRST NATIONAL BANK BUILDING GRAND JUNCTION, COLORADO

Walter E. Dalby, C.P.A. John E. McNulty, C.P.A.

September 10, 1953

Upper Colorado River Commission Grand Junction, Colorado

We have examined the balance sheets of the General Fund and the Property and Equipment Fund of the Upper Colorado River Commission as of June 30, 1953, and the related statement of revenue and expense for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the accompanying balance sheets and revenue and expense statement present fairly the financial position of the Upper Colorado River Commission at June 30, 1953, and the results of its operations for the year then ended.

> /s/ DALBY & McNULTY Certified Public Accountants

BALANCE SHEET—GENERAL FUND

UPPER COLORADO RIVER COMMISSION

June 30, 1953

ASSETS		
CASH Office cash fund Demand deposit	\$ 24.95 60,173.28	\$60,198.23
RETURNABLE DEPOSIT—United Air I	Lines	425.00
		\$60,623.23
LIABILITIES, RESERVES, AND	FUND BALA	NCES
ACCOUNTS PAYABLE—for supplies an	d expenses	\$ 2,311.89
RESERVES For encumbrances For fiscal year 1953-1954 assessments received prior to June 30, 1953 For contingencies UNAPPROPRIATED FUND BALANCE Balance at July 1, 1952	\$ 206.95 8,856.67 1,124.12 \$21,311.13	10,187.74
Less: Appropriation for economic study	5,000.00	
Add:	\$16,311.13	
Excess provision for en- cumbrances for the fis- cal year ended June 30, 1952 \$ 766.30 Excess of revenues over expenditures for the fis- cal year ended June 30,	6	
1953 31,046.1	1 31,812.47	48,123.60

\$60,623.23

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BALANCE SHEET—PROPERTY AND EQUIPMENT FUND

UPPER COLORADO RIVER COMMISSION

June 30, 1953

ASSETS

PROPERTY AND EQUIPMENT—at cost Furniture and fixtures Automobile Engineering equipment	
	\$10,669.95

FUND BALANCE

FUND BALANCE

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Investment in property and equipment at July 1, 1952			\$	9,944.80
Transactions for the fiscal year ended				
June 30, 1953: Additions	\$	2,735.42		
Retirements		2,010.27		725.15
	-		-	

\$10,669.95

REVENUE AND EXPENSE STATEMENT UPPER COLORADO RIVER COMMISSION For the fiscal year ended June 30, 1953

Revenues:	BUDGET AMOUNT	ACTUAL AMOUNT	ACTUAL AMOUNT OVER- UNDER*
Assessments	\$83,200.00	\$83,200.00	\$ 0
Sale of reports	0	387.60	387.60
Miscellaneous refunds	0	28.95	28.95
Appropriated from surplus	5,000.00	5,000.00	0
TOTAL REVENUES	\$88,200.00	\$88,616.55	\$ 416.55
Expenses:			
Personal services:			
Administrative salary	\$17,179,96	\$17,179,96	\$ 0
Engineering salaries	20.174.77	14 455 06	571971*
Clerical salaries	2.420.00	2 158 97	261 03*
Social security tax	329.27	290.26	39.01*
Economic & geologic stud	ly 6,500.00	0	6,500.00*
	\$46,604.00	\$34,084.25	\$12,519.75*
Capital outlay	\$ 3,300.00	\$ 2,735.06	\$ 564.94*
Office supplies Information:	2,946.00	2,455.00	491.00*
Exhibits	\$ 2,000.00	\$ 303.04	\$ 1.696.96*
Publications	7,100.00	1.966.62	5.133.38*
Public relations	3,000.00	336.87	2,663.13*
	\$12,100.00	\$ 2,606.53	\$ 9,493.47*
Travel	\$14,000.00	\$10,822.97	\$ 3,177.03*
Reporting	\$ 4,000.00	\$ 1,186.50	\$ 2.813.50*
Telephone & telegraph	2,000.00	1,212.23	787.77*
Printing	1,750.00	1.317.00	433.00*
Accounting	500.00	365.00	135.00*
Insurance & bonds	750.00	557.00	193.00*
Miscellaneous	250.00	228.90	21.10*
	\$ 9,250.00	\$ 4,866.63	\$ 4,383.37*
TOTAL EXPENSES	\$88,200.00	\$57,570.44	\$30,629.56*
EXCESS OF REVENU OVER EXPENSES	ES	\$31,046.11	\$31,046.11*
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CASH RECEIPTS AND DISBURSEMENTS UPPER COLORADO RIVER COMMISSION For the fiscal year ended June 30, 1953

Balance of cash and demand deposit at July 1, 1952		\$ 38,522.25
Cash receipts:		
Assessments	\$82,696.67	
Sale of reports	387.60	
Miscellaneous refunds	28.95	83,113.22
		\$121,635.47
Cash disbursements:		
Personal services	\$34,072.80	
Travel	10,014.28	
Current expenses	3,515.93	
Capital outlay	2,488.00	
Information	2,606.53	
Office supplies	2,342.61	
Expenses of fiscal year ended June 30,		
1952 not paid until after July 1, 1952	6,397.09	61,437.24
Balance of cash and demand deposit at		
June 30, 1953		\$ 60,198.23

INSURANCE COVERAGE UPPER COLORADO RIVER COMMISSION June 30, 1953

	TYPE OF COVERAGE	AMOUNT OF COVERAGE
Furniture and fixtures	Fire and comprehensive	\$7,500.00
Automobile	Comprehensive Bodily injury and prop-	Actual cash value
	erty damage	\$5/100,000.00
Treasurer Assistant	Fidelity bond	\$40,000.00
Treasurer	Fidelity bond	\$40,000.00
Employees	Workmen's compensation	Various



APPENDIX D

RESERVOIR EVAPORATION

Not to be construed as findings.

The Third and Fourth Annual Reports of this Commission contain detailed accounts of the engineering department's investigations leading to the development of formulas by which estimates can be made of the probable average annual depth of evaporation from the open water surface of large reservoirs.

The earlier investigations demonstrated that between altitudes of about 1000 to 6000 feet, the simple formula (2) given in the Third Annual Report (page 44) was quite satisfactory.

$$E'' = 86.4 + 46 \cos 2X - 10A \tag{2}$$

Later research, described in the Fourth Annual Report, developed the fact that extrapolation above or below the altitudes of 6000 or 1000 gave results with larger and larger errors as the magnitude of the extrapolation beyond the given limits increased. It was found that a hyperbolic type of equation would fit the general trend of evaporation data for a much greater range of elevations and the last formula (4) derived from the data listed in the table (page 42) of the Fourth Annual Report was generally satisfactory for elevation from about 300 feet below sea level to altitudes as great as 10,000 feet. Formula (4) is:

 $E'' = 108\cos 2X + 2830 (A+9.0)^{-1} - 11660 (A+9.0)^{-2} - 120$ (4) In these formulas

- E" = average annual depth of evaporation from open water surface in inches.
- X =latitude of the site for which evaporation is to be estimated. This may be taken from a map.
- A = altitude or elevation of the site in units of 1000 feet.

In the following formulas

E' = depth of evaporation in feet instead of inches.

$$E' = 7.2 + 3.83\cos 2X - .833A$$
 (2')

 $E' = 9\cos 2X + 236 (A+9.0)^{-1} - 970 (A+9.0)^{-2} - 10.0$ (4')

For formula (2) the square of the coefficient of correlation is 98.5% and the standard error is ± 2.5 inches. For formula (4) the square of the coefficient of correlation is 98% and the standard error is nearly ± 4 inches. Considering the very wide range in area and conditions attempted to be covered using only two variables, latitude and altitude, the results obtained are believed to be very good.

It is true that in three cases the difference between the observed and computed value of annual average evaporation is about twice the standard error, which means that one or more conditions as to average wind velocity, temperature, precipitation, and relative humidity are quite different from the general averages for the Colorado River Basin. It should be remembered also that the variation in the amount of evaporation from year to year may be even greater than the standard errors found for these formulas.

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The table of basic data used to derive these formulas as given in the Fourth Annual Report is repeated here for convenient reference.

No.	Station	Reservoir Evaporation E''(In.)	Altitude (Ft.)	Latitude (Degrees)
1.	Salton Sea, California	95.0	-230	33° 00′
2.	Bartlet Dam, Arizona	84.8	1650	33° 49'
3.	Lake Mead, Arizona	84.1	1200	36° 07'
4.	Davis Dam, Arizona	80.0	530	35° 59'
5.	Boulder City, Nevada	79.2	2530	35° 59'
6.	Inner Canyon, Arizona	80.0	2490	36° 06'
7.	Overton, Nevada	77.5	1280	36° 33'
8.	Lees Ferry, Arizona	62.8	3140	36° 50'
9.	Hite, Utah	61.0	3300	37° 50'
10.	Bluff, Utah	53.0	4320	$37^{\circ} 17'$
11.	Grand Junction, Colorado	50.3	4730	39° 05'
12.	Moab, Utah	51.0	4000	38° 35'
13.	Green River, Utah	50.0	4090	39° 00'
14.	Fruita, Colorado	48.0	4530	39° 09'
15.	Farmington, New Mexico	44.5	5370	36° 44'
16.	Grand Valley, Colorado	41.0	5090	39° 25'
17.	Myton, Utah	40.9	5030	40° 12'
18.	Ouray, Utah	40.5	4660	$40^{\circ} 07'$
19.	Montrose, Colorado	40.0	5810	38° 29'
20.	Glenwood Springs, Colorado	38.0	5820	39° 34'
21.	Jensen, Utah	36.3	4740	40° 23'
22.	Ft. Duchesne, Utah	35.6	4940	40° 18'
23.	Green River, Wyoming	34.0	6110	41° 32′
24.	Linwood, Utah	33.0	6000	40° 59'
25.	East Portal (Strawberry			
	Reservoir), Utah	32.0	7600	40° 10′
26.	Lower Wagon Wheel Gap, Colo.	29.2	8500	37° 48'
27.	Sugar Loaf Reservoir, Colo.	21.8	10000	39° 16'
28.	Upper Wagon Wheel Gap, Colo.	21.5	9610	37° 43'

EVAPORATION DATA USED FOR FINAL EQUATION

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In the following appendix are included, on page 2, tabulations of the STORAGE UNITS of the Colorado River Storage Project and Participating Projects showing: (a) the STORAGE UNITS in the ultimate plan of development of water storage on the Colorado River and its major tributaries in the Upper Colorado River Basin as it appears in the Bureau of Reclamation Project Planning report of December, 1950, (b) the STORAGE UNITS, proposed to be authorized in the initial phase of development in bills pending before Congress, (c) the STORAGE UNITS recommended for initial stage authorization by the Upper Colorado River Commission, and (d) the STORAGE UNITS recommended by the Department of Interior for first stage authorization in the Secretary of the Interior's letter to the President, dated December 10, 1953.

Pages 3 through 13 show some of the important data pertaining to eleven dams and reservoirs that have been considered as units of the Colorado River Storage Project.

Page 14 is a listing of PARTICIPATING PROJECTS by States, proposed for authorization in the initial stage by: (a) bills now pending before the Congress, (b) as recommended by the Upper Colorado River Commission, and (c) as recommended by the Department of the Interior in the supplement accompanying the Secretary's letter of December 10, 1953.

On pages 15 through 30 are itemized some of the factual data and information pertaining to sixteen projects which have been considered as PARTICIPATING PROJECTS. All of these, except the LaPlata Project, show a benefit-cost ratio greater than unity under the criteria followed by the Department of the Interior in its analysis of projects for authorization.

Page 31 shows a General Breakdown of Costs of the Colorado River Storage Project and Participating Projects, as recommended by the Upper Colorado River Commission.

Page 32 shows a General Breakdown of Costs of the Colorado River Storage Project and Participating Projects, as recommended by the Department of the Interior in Supplemental Reports released with the Secretary's letter of December 10, 1953.

Page 33 is a Financial Summary of the PARTICIPATING PROJECTS, as recommended by the Upper Colorado River Commission.

STORAGE UNITS

Colorado River Storage Project and Patricipating Projects

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Ultimate Plan from USBR Project Planning Report, 12/10/50	n Proposed in S. 15 H. R. 4449 and Related Bills	555 Recommended by Upper Colorado River Commission	Recommended by Department of Interior in Suppl. Rpt. 12/10/53
Echo Park	Echo Park	Echo Park	Echo Park
Glen Canyon	Glen Canyon	Glen Canyon	Glen Canyon
Navajo	Navajo*	Navajo	
Curecanti	Curecanti	Cross Mountain	
Cross Mountain	Flaming Gorg	eFlaming Gorge	
Flaming Gorge		Kendall	
Split Mountain		Three million ac.	-ft.
Gray Canyon		storage on upper	
Crystal		reaches of Colora	ado
Whitewater		and Gunnison Riv	vers
		in Colorado**	

* Originally the Department of the Interior's report proposed Navajo Dam and Reservoir as a unit of the Storage Project, complete with power features. The Department now recommends Navajo as part of the Shiprock Division of the Navajo participating project.

** The Curecanti Reservoir on the Gunnison River and the DeBeque Reservoir on the Colorado River have been suggested. The Department of Interior has found Curecanti Reservoir to be infeasible. Local groups, after intensive investigation, now believe a feasible plan can be developed. DeBeque Reservoir has to this date been subject to reconnaissance surveys only.

ECHO PARK DAM AND RESERVOIR

irrigation

Location:

Green River, 3 miles upstream from Yampa River, 3 miles east Utah-Colorado boundary, Moffat County, Colorado, 222 miles upstream from Green River, Utah.

River regulation, power production,

Concrete, curved gravity

5,575525

> 690 920

3.263.000 ac.-ft.

22,800

81.500 sec.-ft.

Purpose (primary):

Type of Dam: Elevation of crest Ht. above streambed (ft.) Ht. above foundation (ft.) Length of crest (ft.) Spillway capacity

Present Modified Avg. Annual River flow at Dam: Drainage area (sq. mi.)

Reservoir: Capacity (initial ac.-ft.) Live Dead Capacity in 200 years

Area (full) acres Length (miles)

Evaporation (annual ac.-ft.) R-O-W to purchase

Present river eleva. at dam Max. & normal res. elevation Min. res. elevation

Electric Power:

Installed capacity (kw.)	200,000
Avg. salable annual (kwhr.)	1,017,000,000
Ultimate " " "	677,000,000
Static head max. (ft.)	520
Mean operating head (ft.)	475

Cost Estimates:	
Total costs	\$176,400,000
Allocation of costs:	
*Irrigation	\$ 43,700,000
*Power	\$132,700,000
O.M. & R. (annual)	\$ 1,155,000
C	

Cost of Investigations to 6/30/53:

\$ 128,600

* Irrigation and power allocations from supplemental report of U.S.B.R. released 12/10/53 with Curecanti Reservoir capacity 940,000 ac.-ft. as in pending Congressional bills.

6,460,000 5,460,000 1,000,000 5,169,000 Live 753,000 Dead 42,400

63 miles on Green River; 44 miles on Yampa River.

87,000

No oil wells, no operating mines. 17,000 acres private & state owned; minor improvements.

5,050	
5.570	
5.362	

GLEN CANYON DAM AND RESERVOIR

Location .

Colo, River, 15.3 miles upstream from Lees Ferry, 1 mile dowstream from Wahweap Creek, 12.4 miles downstream Utah-Arizona line, in Coconino County, Arizona,

River regulation, power production,

aid irrigation with revenues, sediment deposition, flood control.

Purpose (primary):

Type of Dam: **Elevation** of crest Ht. above streambed (ft.) Ht. above foundation (ft.) Length of crest Spillway capacity

Present Modified Avg. Annual River flow at Dam: 13,064,000 ac.-ft. Drainage area (sq. mi.)

Reservoir: Capacity (initial ac.-ft.) Live Dead Capacity in 200 years

Area (full) acres Length (miles)

Evaporation (annual ac.-ft.) R-O-W to purchase

Present river eleva, at dam Max, & normal res. elevation Min. res. elevation

Electric Power: Installed compositer (lever)

Installed capacity (kw.)	800,000
Avg. salable annual (kwhr.)	3,813,000,000
Ultimate " " "	2,992,000,000
Static head max. (ft.)	575
Mean operating head (ft.)	480

Cost Estimates: Total costs \$421,300,000 Allocation of costs: *Irrigation \$ 55,700,000 \$365,600,000 *Power \$ 4.802,000 O.M. & R. (annual)

Cost of Investigations to 6/30/53:

\$ 293,400

* Irrigation and power allocations from supplemental report of U.S.B.R. released 12/10/53 with Curecanti Reservoir capacity 940,000 ac.-ft. as in pending Congressional bills

1.400 253.000 sec.-ft.

Concrete, curved gravity. 3,715

580 +

700 +

108.335

26.000.000 20.000.000 6.000.000 10.456.000 Live 0 Dead 153,000

86 miles on Colorado River: 71 miles on San Juan River.

526.000 No improvements nor improved lands.

3,135
3,700
3.490

NAVAJO DAM AND RESERVOIR

As originally planned and considered at the time the underlying basin report of the Bureau of Reclamation (December, 1950) was submitted the Navajo Dam and Reservoir were regarded as one of the units of the Storage Project for initial authorization. It was realized, however, that ultimately it would be needed to assure continuous water supply for the Shiprock Indian Irrigation Project and South San Juan Development, and as replacement storage for the San Juan-Chama Diversion Project, and that its use would be restricted to supplying participating projects.

Subsequent recommendations of the Department of Interior have eliminated the Navajo Reservoir as a unit of the Storage Project, eliminated its power features, and made it a part of the Shiprock Indian Irrigation Project, with portions of its cost to be charged later against the potential South San Juan and San Juan-Chama Projects.

(See more detailed tentative information under New Mexico Participating Projects.)

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CURECANTI DAM AND RESERVOIR

940,000 acre-feet reservoir-U.S.B.R. Recommendation

Location:

Purposes (primary):

Type of Dam: **E**levation of crest Ht. above streambed (ft.) Ht. above foundation (ft.) Length of crest (ft.) Spillway capacity

Present Modified Avg. Annual River flow at Dam: Drainage area (sq. mi.)

Reservoir: Capacity (initial ac.-ft.) Live Dead Capacity in 200 years Area (full) acres Length (miles) Evaporation (annual ac.-ft. R-O-W to purchase

Sapinero, Gunnison County, Colo. Irrigation, power production, flood control.

Gunnison River, Blue Mesa Damsite, $3\frac{1}{2}$ miles downstream from

С	oncrete, gravity.
	7.525
	360
	395
	850
	48,000 secft.
	1.142.000 acre-feet
	3,500 estimated
	940.000
	500,000
	110 000

Dead	440,000
Capacity in 200 years	
Area (full) acres Length (miles)	9,400
Evaporation (annual acft.)	18,000
R-O-W to purchase	Estimated cost \$6,950,000 for much farm land
	Highway 50 and Railroad relocation
Present river eleva. at dam	7,165
Max. & normal res. elevation Min. res. elevation	7,520

1

Electric Power:		
Installed capacity (kw.)		40,000
Avg. salable annual (kwhr.)	195	,000,000
Ultimate " " "		
Static head max. (ft.)		355
Mean operating head (ft.)		295
Cost Estimates:		
Total costs	\$49	.300,000
Allocation of costs:		
*Irrigation	\$ 8	,100,000
*Power	\$41	,200,000
O.M. & R. (annual)	\$	280,000
Cost of Investigations to		
6/30/53:	\$	33,400

* Irrigation and power allocations from supplemental report of U.S.B.R. released 12/10/53 with Curecanti Reservoir capacity 940,000 ac.-ft. as in pending Congressional bills.

CROSS MOUNTAIN DAM AND RESERVOIR

Location:

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n

Yampa River, 581/2 miles upstream from mouth, 7 miles upstream from Little Snake River, Moffat County in NW Colorado.

Power production, river regulation.

Concrete, gravity.

6,095

295

355

550

3,410

440

45.000 sec.-ft.

1.180.000 acre-feet

Purposes (primary):

Type of Dam: Elevation of crest Ht. above streambed (ft.) Ht. above foundation (ft.) Length of crest (ft.) Spillway capacity

Present Modified Avg. Annual River flow at Dam: Drainage area (sq. mi.)

Reservoir: Capacity (initial ac.-ft.) Live Dead Capacity in 200 years

Area (full) acres Length (miles) Evaporation (annual ac.-ft.) R-O-W to purchase

Present river eleva. at dam Max. & normal res. elevation Min. res. elevation

Electric Power: Installed capacity (kw.) Avg. salable annual (kw.-hr.) 376,000,000 Ultimate " 99 Static head max. (ft.) Mean operating head (ft.)

5,200,000 4,200,000 1,000,000 4.030,000 Live 887,000 Dead 52.200 76 miles, almost to Craig, Colorado 70,000U. S. Highway 40; 3,500 acres farm land; 3 small towns; oil pipeline. 5.800 6,090 5.96360.000310,000,000

> 400 (power plant at end of 11,700 ft. tunnel, tailwater at elev. 5,650)

Cost Estimates: Total costs	\$50,200,000
Allocation of costs: *Irrigation *Power O.M. & R. (annual)	\$14,000,000 \$36,200,000 \$296,000
Cost of Investigations to 6/30/53:	\$ 25,400

* Irrigation and power allocations from supplemental report of U.S.B.R. released 12/10/53 with Curecanti Reservoir capacity 940,000 ac.-ft. as in pending Congressional bills.

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FLAMING GORGE DAM AND RESERVOIR

Location:

Green River, 32 miles downstream from Utah-Wyoming line, 40 miles north of Vernal, $\frac{3}{4}$ mile below Carl Creek, in Daggett County, Utah.

Purposes (primary):

Type of Dam: Elevation of crest Ht. above streambed (ft.) Ht. above foundation (ft.) Length of crest (ft.) Spillway capacity

Present Modified Avg. Annual River flow at Dam: Drainage area (sq. mi.)

Reservoir:

Capacity (initial ac.-ft.) Live Dead Capacity in 200 years

Area (full) acres Length (miles)

Evaporation (annual ac.-ft.) R-O-W to purchase Present river eleva. at dam Max. & normal res. elevation Min. res. elevation

Electric Power:

Installed capacity (kw.)72,000Avg. salable annual (kw.-hr.)388,000,000Ultimate ""105,000,000Static head max. (ft.)435Mean operating head (ft.)395 (tailwater elevation

Cost Estimates:

Total costs Allocation of costs: *Irrigation *Power O.M. & R. (annual)

Cost of Investigations to 6/30/53:

\$ 61,500

\$ 83,000,000

\$30,900,000

\$52,100,000

364.000

* Irrigation and power allocations from supplemental report of U.S.B.R. released 12/10/53 with Curecanti Reservoir capacity 940,000 ac.-ft. as in pending Congressional bills.

Power production, river regulation, irrigation aid.

Ashley Dam-concrete, gravity.

6,045 440 491 900 85,000 sec.-ft.

1,615,000 acre-feet 15,000

3,940,000 2,950,000 990,000 2,550,000 Live 11,000 Dead 40,800 91 miles to 3 or 4 miles from Green River, Wyoming. 56,000 Relocation one secondary road. 5,605 6,040 5,935

5.605)

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SPLIT MOUNTAIN DAM AND RESERVOIR

Location:

Green River, 201 miles upstream from Green River, Utah, 14 miles east Vernal, Utah, Uintah County, Utah.

Purposes (primary):

Type of Dam: Elevation of crest Ht. above streambed (ft.) Ht. above foundation (ft.) Length of crest (ft.) Spillway capacity Power generation only, regulation for Echo Park.

Concrete, gravity. 5,055 245 305 990

112,000 sec.-ft.

335,000

4,250

8,000

5.050

5.040

 $\begin{array}{c} 0\\ 335,000 \end{array}$

About same as original

21 miles to tailwater at Echo Park

Some privately owned land in Is-

Present Modified No record. About same as at Echo Avg. Annual River flow at Dam:Park. Drainage area (sq. mi.)

Dam

land Park. 4.810

Reservoir: Capacity (initial ac.-ft.) Live Dead Capacity in 200 years Area (full) acres Length (miles)

Evaporation (annual ac.-ft.) R-O-W to purchase

Present river eleva. at dam Max. & normal res. elevation Min. res. elevation

Electric Power:

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Installed capacity (kw.)	100,000
Avg. salable annual (kwhr.)	643,000,000
Ultimate " " "	441,000,000
Static head max. (ft.)	315
Mean operating head (ft.)	300

9	
0	(240 ft. in dam, 60 ft.
~	in turnel) toilwator
	in tunnel) tanwater
	elevation 4,735

Cost Estimates: Total costs Allocation of costs:	\$84,400,000	
*Irrigation *Power O.M. & R. (annual)	\$84 \$	4,400,000 644,000
Cost of Investigations to 6/30/53:	\$	13,200

* Irrigation and power allocations from supplemental report of U.S.B.R. released 12/10/53 with Curecanti Reservoir capacity 940,000 ac.-ft. as in pending Congressional bills.
GRAY CANYON DAM AND RESERVOIR

Location:

Green River, 21.7 miles upstream from Green River, Utah, 4 miles upstream from Price River, below mouth Rattlesnake Creek. Emery & Grand Counties, Utah.

Purposes (primary):

Power production, river regulation.

Type of Dam: Elevation of crest Ht. above streambed (ft.) Ht. above foundation (ft.) Length of crest (ft.) Spillway capacity

Present Modified

Avg. Annual River flow at Dam: Drainage area (sq. mi.)

Reservoir:

Capacity (initial ac.-ft.) Live Dead Capacity in 200 years

Area (full) acres Length (miles) Evaporation (annual ac.-ft.) R-O-W to purchase Present river eleva. at dam Max. & normal res. elevation Min. res. elevation

Electric Power:

 Installed capacity (kw.)
 210,000

 Avg. salable annual (kw.-hr.)
 1,186,000,000

 Ultimate """
 826,000,000

 Static head max. (ft.)
 440

 Mean operating head (ft.)
 400

Cost Estimates:

Total costs Allocation of costs: *Irrigation *Power O.M. & R. (annual)

Cost of Investigations to 6/30/53:

* Irrigation and power allocations from supplemental report of U.S.B.R. released 12/10/53 with Curecanti Reservoir capacity 940,000 ac.-ft. as in pending Congressional bills.

\$

Concrete, gravity. 4,595 445 575 2,100 190.000 sec.-ft.

4,447,000 acre-feet 39,100

2,000,000 1,390,000 610,000 698,000 Live 0 Dead 10,750 53 miles, maximum width ½ mile. 0 30,000 One ranch. No relocation problems. 4,150 1 4,590

4,420

\$190,900,000

\$181,400,000

\$ 1,212,000

9,500,000

440 400 (tailwater elevation 4,150)

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CRYSTAL DAM AND RESERVOIR

Location:

Gunnison River 1¼ miles below mouth Crystal Creek, 3 miles upstream from upper end Black Canyon National Monument, in Montrose County, Colorado.

Purposes (primary):

Power production.

Concrete, gravity

6.875

305

355

620

3,980

40.000

40,000

10 miles.

0

About same as original

No problems of significance.

560 in narrow gorge.

6.570

6,870

6,870

1,322,000 acre-feet

48,000 second-feet

Type of Dam: Elevation of crest Ht. above streambed (ft.) Ht. above foundation (ft.) Length of crest (ft.) Spillway capacity

Present Modified

Avg. Annual River flow at Dam: Drainage area (sq. mi.)

Reservoir:

Capacity (initial ac.-ft.) Live Dead Capacity in 200 years Area (full) acres Length (miles) Evaporation (annual ac.-ft.) R-O-W to purchase Present river eleva. at dam Max. & normal res. elevation Min. res. elevation

Electric Power:

 Installed capacity (kw.)
 48,000

 Av. salable annually (kw.-hr.)
 210,000,000

 Ultimate """
 206,000,000

 Static head max. (ft.)
 300

 Mean operating head (ft.)
 300 (tailwater elev. 6,570)

Cost Estimates:

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Cost of Investigations to 6/30/53:

\$ 2,980

* Irrigation and power allocations from supplemental report of U.S.B.R. released 12/10/53 with Curecanti Reservoir capacity 940,000 ac.-ft. as in pending Congressional bills.

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WHITEWATER DAM AND RESERVOIR

Location:

Gunnison River, 2 miles south of Whitewater, $9\frac{1}{2}$ miles SE Grand Junction, Mesa County, Colorado, 15 miles upstream from junction of Gunnison and Colorado Rivers.

Purposes (primary):

Type of Dam:

Elevation of crest Ht. above streambed (ft.) Ht. above foundation (ft.) Length of crest (ft.) Spillway capacity

Present Modified Avg. Annual River flow at Dam: Drainage area (sq. mi.)

Reservoir: Capacity (initial ac.-ft.) Live Dead Capacity in 200 years

Area (full) acres Length (miles) Evaporation (annual ac.-ft.) R-O-W to purchase

Present river eleva. at dam Max. & normal res. elevation Min. res. elevation

Electric Power:

	Installed capacity (kw.)	48,000			
	Av. salable annually (kwhr.)	220,000,000			
	Ultimate " " "	187,000,000			
1	Static head max. (ft.)	240			
	Mean operating head (ft.)	220	(tailwater	elev.	4,635)
7-	at Eatimation				

Total costs	\$44,300,000
Allocation of costs:	\$ 4 900 000
*Power	\$39,400,000
O.M. & R. (annual)	\$ 360,000
Cost of Investigations to 6/30/53:	\$ 30,000

* Irrigation and power allocations from supplemental report of U.S.B.R. released 12/10/53 with Curecanti Reservoir capacity 940,000 ac.-ft. as in pending Congressional bills.

Power production, irrigation water exchanges.

Rolled, earth fill embankment, also 3 dikes.

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4,890	
255	
335	
1.830	
75,000	secft.

2,034,000 acre-feet 8,000 approximately

880,000 470,000 410,000 326,000 Live 92,000 Dead 10,250

35 miles to 4 miles from Delta. 21,000

Some farm lands. Relocation of Railroad, Highway 550 20 miles; secondary roads, telephone line, telegraph line.

4,635
4,880
4,760

KENDALL DAM AND RESERVOIR

fill.

Location:

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of

s; le, Green River, 120 miles northeast of Green River, Wyoming.

Purposes (primary):

Irrigation, power production, river regulation.

To be determined, probably earth-

Type of Dam:

Elevation of crest Ht. above streambed (ft.) Ht. above foundation (ft.) Length of crest (ft.) Spillway capacity

Present Modified Avg. Annual River flow at Dam:

Drainage area (sq. mi.)

Reservoir:

Capacity (initial ac.-ft.)500,000Live340,000 approximateDead340,000 approximateCapacity in 200 years13,000Area (full) acres13,000Length (miles)15,000Evaporation (annual ac.-ft.)15,000R-O-W to purchase15,000Present river eleva. at damMax. & normal res. elevationMin. res. elevation15,000

Electric Power:

Installed capacity (kw.) Av. salable annually (kw.-hr.) Ultimate """ Static head max. (ft.) Mean operating head (ft.)

Cost Estimates:

Total costs Allocation of costs: Irrigation Power O.M. & R. (annual)

Cost of Investigations to 6/30/53:

135

\$20 - 25 million to be added to cost of Seedskadee participating project allowing an adjustment for substituted diversion works and main canal.

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nd-

5)

5.000

PARTICIPATING PROJECTS **Colorado River Storage Project and Participating Projects**

Proposed in S. 1555	Recommended by Upper	Recommended by
H.R. 4449 and Related Bills	Colorado River Commission	Department of Interior
Colorado Florida Paonia* Pine River Extension** La Plata** Silt Smith Fork	Colorado Florida Paonia* Pine River Extension** La Plata** Silt Smith Fork \$75 million loan to City & County of Denver for Denver-Blue Riv- er Div.	Colorado Florida Paonia* Pine River Extension** Silt Smith Fork
New Mexico	New Mexico	New Mexico
Hammond	Hammond	Hammond
San Juan-Chama***	San Juan Chama***	Shiprock Div. of Navajo Project
Shiprock-South San Juan***	Shiprock-South San Juan***	incl. Navajo Res. & canal capa-
Pine River Extension**	Pine River Extension**	city for South San Juan Div.***
La Plata**	La Plata**	Pine River Extension**
Utah	Utah	Utah
Central Utah (initial phase)	Central Utah (initial phase)	Central Utah (initial phase)
Emery County	Emery County	Emery County
Gooseberry	Gooseberry	Gooseberry
Wyoming	Wyoming	Wyoming
La Barge	La Barge	La Barge
Lyman	Lyman	Lyman
Eden* (now under const.)	Eden*	Eden*
Seedskadee	Seedskadee****	Seedskadee
* Now being constructed under previo	ous authorizing legislation	

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Now being constructed under previous authorizing legislation.
 ** Partly in New Mexico; partly in Colorado.
 *** Conditional authorization requested.
 ****Provision for Kendall Reservoir will make possible an additional 15,000 acres of new land in the proposed Seedskadee Project.

FLORIDA PROJECT

Location:

Purposes:

Principal Structural Features:

Southwestern Colorado — Florida River Valley and Florida Mesa. Upper Colorado River Basin.

Irrigation of Florida Mesa, flood control.

Lemon Dam on Florida River earthfill — Capacity 23,300 acrefeet (3,300 acre-feet dead) Enlargement of Florida Farmers Ditch and build new diversion dam. Laterals to 6,300 acres project lands. Drainage facilities.

Diversion from River (ac.-ft.):

Depletion to Colorado River (ac.-ft.):

Irrigation:

Total acres New land

Supplemental

Municipal Water Supply(ac.-ft):

Electric Power:

Installed capacity (kw.) Annual production (kw.-hr.)

Financial:

Total cost	11		
Reimbursable			

From irrigation

From power Municipal

Other Non-reimbursable Flood control Fish & Wildlife Recreation

Annual O. M. & R.:

Benefit-Cost Ratio:

23,200

12,900

18,950 6,300 (incl. 900 Indian owned) 12,650 (incl. 100 Indian owned)

January, 1953 Cost Basis

6,941,500 6,503,600 (Indians \$618,000; non-Indians \$5,885,600) 1,711,500 (Indians \$126,000; non-

Indians \$1,585,500)

- 4,792,100 Note: The Indians share of reimbursable construction costs and O&M may be readjusted under Leavitt Act.)
- $\begin{array}{r} 437,900\\ 229,200\\ 208,700\end{array}$
 - 12,600 (Indians \$1,100; non-Indian \$12,100 \$500 non-reimbursable.)

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Location:

West central Colorado on North Fork Gunnison River; 50 miles SE Grand Junction. Upper Colorado River Basin.

Purposes:

Irrigation.

18,500

Principal Structural Features:

Diversion from River (ac.-ft.):

Spring Creek Dam on Muddy Creek -Reservoir capacity 18,000 acre-feet (11,000 active, 7,000 dead). Enlarge Fire Mountain Canal from North Fork now under construction. Enlarge Overland Canal. Minnesota Siphon 12,000 feet long to carry water across North Fork to existing Minnesota Canal.

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Depletion to Colorado River	
(acft.):	9,000
Irrigation:	
Total acres	17,040
New land	2,210
Supplemental	14,830

Municipal Water Supply (ac.-ft): (This project authorized by Act June 25, 1947 Public Law 117, 80th Congress, 1st session (61 Stat. 181) -now under construction.)

Electric Power:

Installed capacity (kw.) Annual production (kw.-hr.)

Financial:		January, 1953 Cost Basis			
Total cost	\$	6,936,500			
Reimbursable	\$	6,791,600			
From irrigation	\$	2,414,000	(Repayment period 68 years defined by Act of reauthoriza- tion.)		
From power Municipal Other	\$	4,377,600			
Non-reimbursable	\$	144,900			
Flood control	\$	74,100			
Fish & Wildlife Recreation	\$	70,800			
Annual O. M. & R.:		11,100	(irrigation)		
Benefit-Cost Ratio:		1.6:1			

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PINE RIVER PROJECT EXTENSION

Location:

Southwestern Colorado and northwestern New Mexico on Pine River; 20 miles east Durango, Colorado.

Purposes:

Irrigation.

45,450

Principal Structural Features:

Enlargement of 8 major canals and ditches. New diversion dam. New laterals for distribution system. Storage water is to be obtained from existing Vallecito Dam and Reservoir on Pine River authorized for construction in 1937.

28,300 (Colo. 27,200; New

Mexico 1.100)

ico 630)

dian 13,210)

15,150 (Colo. 14,520; New Mex-

15,150 (Indian 1,940; non In-

Diversion from River (ac.-ft.):

Depletion to Colorado River (ac.-ft.):

Irrigation: Total acres

New land

Supplemental

Municipal Water Supply(ac.-ft):

Electric Power: Could Installed capacity (kw.) er at Annual production (kw.-hr.) now.

Financial: Total cost

> Reimbursable From irrigation

> From power Municipal Other Non-reimbursable Flood control Fish & Wildlife Recreation

Annual O. M. & R.:

Benefit-Cost Ratio:

Could produce non-firm power later at some canal drops. No market now.

January, 1953 Cost Basis \$5,027,000 644,000 Indians 4,383,000 Non- Indians

\$5,027,000 \$ 262,000 Indians \$1,783,000 Non-Indian \$2,982,000

- Note: The \$262,000 construction costs and \$2,400 annual O &M assigned as repayable by Indian irrigators may be readjusted under the Leavitt Act.
- \$ 18,950 (Indians \$2,400; Non-Indians \$16,550)

2.2:1

LAPLATA PROJECT

Location:

Purposes:

Southwestern Colorado and northwestern New Mexico near LaPlata River.

Irrigation.

Principal Structural Features:

12,000 acre-foot reservoir at Long Hollow. 17,000 acre-foot reservoir at State Line with 12,000 acre-feet active & 5,000 dead storage (15,000 acre-feet to be used for flood control.) 400 second-foot canal to take surplus water from LaPlata River to Long Hollow Reservoir. 70 second-foot canal to deliver storage from reservoir to existing canals.

Diversion from River (ac.-ft.):

Depletion to Colorado River (ac.-ft.):

Irrigation:

Total acres New land Supplemental 12,000

9,000 (5,800 Colorado; 3,200 New Mexico)

9,800

9,800 (6,000 Colorado; 3,800 New Mexico)

Municipal Water Supply(ac.-ft):

Electric Power:

Installed capacity (kw.) Annual production (kw.-hr.)

Financial:	January, 1953 Cost Basis
Total cost	\$9,958,500
Reimbursable	\$9,184,700
From irrigation	\$1,245,000
From power	\$7,939,700
Municipal	
Other	
Non-reimbursable	\$ 773,800
Flood control	\$ 773,800
Fish & Wildlife	
Recreation	
Annual O. M. & R.:	\$ 14,080
Benefit-Cost Ratio:	0.8:1

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An Ber Location:

West central Colorado between Rifle & Elk Creeks. Near towns of Rifle and Silt.

Purposes:

Irrigation.

Principal Structural Features:

Rifle Gap Reservoir on Rifle Creek. Capacity 7,000 acre-feet. Initial capacity 10,000 acre-feet of which 1,000 is dead storage, 2,000 acrefeet will be for sediment. Pumping Plant to Davie Ditch. Reconstruct Davie Ditch for 920 acres new land. Rehabilitate Grass Valley Canal.

10,100
5,800
7,300
5,400
1,900

Diversion from River (ac ft). 10100

Municipal Water Supply(ac.-ft):

Electric Power:

Installed capacity (kw.) Annual production (kw.-hr.)

Financial:	January, 1953 Cost Basis		
Total cost	\$3,	356,000	
Reimbursable	\$3,	282,400	
From irrigation	\$1,	020,000	
From power	\$2,	262,400	
Municipal			
Other			
Non-reimbursable	\$	73,600	
Flood control			
Fish & Wildlife	\$	73,600	
Recreation			
Annual O. M. & R.:	\$	8,400	
Benefit-Cost Ratio:		1.71:1	

Location:

West Central Colorado along Smith Fork near Crawford, Colorado; 73 miles SE Grand Junction; Delta County

Purposes:

Irrigation.

Principal Structural Features:

Crawford Reservoir & Dam on Iron Creek a tributary of Smith Fork of Gunnison River. Capacity 13,000 acre-feet active and 1,000 acre-feet dead. Earth fill. Smith Fork Diversion Dam on Smith Fork headworks, sluiceway. Smith Fork Feeder Canal 2-3/4 miles long from diversion dam to Crawford reservoir. Aspen Canal-Crawford reservoir to project lands, 6.6 miles.

Diversion from River (acft.):	13,650
Depletion to Colorado River (acft.):	7,500
Irrigation:	
Total acres	10,430
New land	2,270
Supplemental	8,160

Municipal Water Supply(ac.-ft):

Electric Power:

Installed capacity (kw.) Annual production (kw.-hr.)

Financial:

Total cost Reimbursable From irrigation From power Municipal Other Non-reimbursable Flood control Fish & Wildlife Recreation

Annual O. M. & R.: \$ 8,400

Benefit-Cost Ratio:

1.27:1

\$3,343,000

\$1,045,000 \$2,298,000

January, 1953 Cost Basis \$3,343,000

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HAMMOND PROJECT

Location:

Northwestern New Mexico along south bank of San Juan River, opposite towns of Blanco, Bloomfield, Farmington. Upper Colorado River Basin.

Purposes:

Irrigation.

Principal Structural Features:

Hammond Diversion Dam on San Juan River. Main gravity canal. Pumping Plant, Laterals, canals, drains.

Diversion from River (ac.-ft.): 18,400

Depletion to Colorado River (ac.-ft.):

7,900

Irrigation: Total acres 3,670 New land 3,670 Supplemental

Municipal Water Supply(ac.-ft):

Electric Power:

Installed capacity (kw.) Annual production (kw.-hr.)

Financial: Total cost Reimbursable From irrigation From power Municipal Other Non-reimbursable Flood control Fish & Wildlife Begreation	January, 1953 Cost Basis \$2,302,000 \$2,302,000 \$ 370,000 \$1,932,000
Annual O. M. & R.:	\$ 16,100
Benefit-Cost Ratio:	2.8:1

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SAN JUAN-CHAMA PROJECT

Location:

Purposes:

Northern New Mexico with project features in San Juan Basin of southern Colorado and northern New Mexico and in Rio Grande and Canadian River Basins in northern New Mexico.

Irrigation, municipal, industrial, power.

Principal Structural Features: 1

1. Three reservoirs on West Fork, East Fork, Rio Blanco tributary of San Juan River—total capacity 190,000 acre-feet. Feeder Canal and conduit to Willow Creek in Rio Grande Basin—1,000 cfs tunnel through mountains.

2. Three reservoirs on Willow Creek and Rio Chama for regulation when coordinated with existing and authorized reservoirs and for power generation. Capacities of reservoirs 228,000, 400,000, 40,000 acre-feet. Existing ElVado Res. 198,000; authorized Chamita Res. 85,000.

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3. Regulatory reservoirs; rehabilitation and extension of present irrigation systems—no provision in plan for delivery of municipal and industrial water.

> 235,000 Trans-Mountain diversion.

Diversion from River (ac.-ft.):

Depletion to Colorado River (ac.-ft.):

235,000

Irrigation: Total acres New land Supplemental

200,000+

200.000 +

Municipal Water Supply(ac.-ft):

Electric Power: Installed capacity (kw.)

Annual production (kw.-hr.)

145,000 (95,000 peaking; 50,000 base.)

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Financial: Total cost January 1953 Cost Basis

\$234,565,000 (Including interest but not including replacement for storage cost required for Navajo Project.) \$234,565,000

\$142,828,000 (\$75.855,000 power;

\$ 59,402,000 (50 years)

\$66,973,000 irrig.)

Reimbursable From irrigation From power

> Municipal Other

Non-reimbursable Flood control Fish & Wildlife Recreation

Annual O. M. & R.:

\$ 1,272,000

\$ 32,335,000

Benefit-Cost Ratio:

1.6:1

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NAVAJO PROJECT

Shiprock (Indian) Division of Navajo Project and South San Juan

Irrigation.

Location:

In northwestern New Mexico, along south side of San Juan River near Bloomfield, Farmington, Shiprock.

Purposes:

Principal Structural Features:

Navajo Reservoir. Size depends upon size of San Juan Project still undetermined.

Canal capacity for South San Juan Division—28 miles from dam to drop through turbine pumping plant to lower main canal which extends westerly for 60 miles to project lands by gravity. Part of water at pump lifted to higher lands. Distribution system and drains are included.

Diversion from River (ac.-ft.):

630,000

Depletion to Colorado River (ac.-ft.):

Irrigation:

Total acres

New land Supplemental

Municipal Water Supply(ac.-ft):

Electric Power:

Installed capacity (kw.) Annual production (kw.-hr.)

Financial:

Total cost Reimbursable From irrigation From power Municipal Other Non-reimbursable Flood control Fish & Wildlife Recreation

Annual O. M. & R.:

Benefit-Cost Ratio:

341,000

151,000 (122,000 Indian Res., 29,000 outside.)

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January, 1953 Cost Basis \$232,650,000 \$232,650,000

\$213,210,000

Note: Construction costs allocable to Indian - owned lands which could be repaid from farm income would be deferred under the provision of the Leavitt Act.

\$ 563,000

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1.2:1 (approximately)

CENTRAL UTAH PROJECT

Initial Phase

Location:

Eastern Bonneville Basin in Central Utah and in Uinta Basin part of the Colorado River Basin in NE Utah.

Irrigation, municipal water, indus-

trial, water exchanges.

Purposes:

Principal Structural Features:

Rock Creek & Uinta Basin streams west of Rock Creek diverted into Bonneville Basin — development limited to areas between Salt Lake City and Nephi — in Uinta Basin Jensen Vernal, Upalco areas & lands along Duchesne River to be developed — 36.8 miles of aqueducts to collect Rock Creek, Hades Creek, Wolf Creek W. Fork Duchesne River, Currant Creek, Layout Creek, Water Hollow. Soldier Creek Dam to enlarge Strawberry Res. from 283,000 to 1,370, 000 acre-feet. Many small reservoirs, dams, etc.

Diversion from River (ac.-ft.): (Trans-mountain diversions initially 141,400; ultimately 560,200.)

Depletion to Colorado River (ac.-ft.):

Irrigation: Total acres

New land

Supplemental

Municipal Water Supply (ac.-ft): 48,800 (incl. industrial and

Electric Power: Installed capacity (kw.) Annual production (kw.-hr.)

(Trans-mountain diversions initially 189,400; ultimately 800,600.)

160,500

- 28,500 (21,650 Bonneville Basin, 6,890 Uinta Basin.
- 132,000 (97,350 Bonneville Basin, 34,490 Uinta Basin.

48,800 (incl. industrial and misc uses.)

61,000

49-

Annual production (kw.-hr.) 373,000,000 (2.2 million kw.-hr. for drainage and irrigation pumping.

CENTRAL UTAH PROJECT—(Continued)

Financial:

Total cost	
Reimbursable	
From irrigation	
From power	
Municipal	
Other	
Non-reimbursable	

Flood control Fish & Wildlife Recreation

January	1953	Cost	Basis
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\$231,647,000 \$225.053,000 \$127,354,000 \$46,699,000 \$45,500,000

\$ 6,594,000 (incl. \$603,000 investigations)

\$ 3,113,000

\$ 2.878,000 (incl. \$48,000 for Forest resource development)

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Annual O. M. & R.:

1.2:1

768,990

Benefit-Cost Ratio:

EMERY COUNTY PROJECT

Location:

East central Utah near Huntington, Castle Dale, Orangeville — an east slope Wasatch Plateau Upper Colorado River Basin.

Purposes:

Irrigation.

Principal Structural Features:

Joes Valley Dam & Res. — on Cottonwood Creek — earth and rock fill — capacity 57,000 acre-feet; 2,000 acre-feet dead. Swasey Div. Dam at head of Cottonwood Creek Huntington Canal with capacity of 250 second-feet. Cottonwood Creek Huntington Canal to deliver water to existing canals — length 17 miles capacity 250-175 second-feet.

Diversion from River (ac.-ft.):

Depletion to Colorado River (ac.-ft.):

Irrigation: Total acres

> New land Supplemental

Municipal Water Supply(ac.-ft):

Electric Power:

Installed capacity (kw.) Annual production (kw.-hr.)

Financial:

Total cost	\$9	865,500		
Reimbursable	\$9	0,636,500		
From irrigation	\$3	3,715,000		
From power	\$5	5,921,500		
Municipal				
Other				
Non-reimbursable	\$	229,000		
Flood control				
Fish & Wildlife				
Recreation	\$	229,000		
Annual O. M. & R.:	\$	36,980	(\$21,870	irrigators)
				0
Benefit-Cost Ratio:		1.38:1		

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15,500

24,080 not including lands in Bonneville Basin. 3,630

January 1953 Cost Basis

32,400 (1,000 acre-feet transmt. diversion.)

20,450

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GOOSEBERRY PROJECT

Irrigation.

Location:

In Central Utah; north part Sanpete Valley.

Trans. Mt. Div. from Price River of Colorado River Basin to Cottonwood Creek of Bonneville Basin.

Mammoth Res. on Gooseberry Creek a tributary of Price River to

regulate flow of Gooseberry Creek Capacity 17,200 incl. 16,000 acrefeet active —earthfill. Mammoth Tunnel through Colorado - Great Basin Divide to Cottonwood Creek — 2.4 miles long. Improve Channel of Cottonwood Creek. Gooseberry High Line Canal to lands — 10.4 miles. Drains for project lands. Improve San Pitch River Channel. Rehabilitate 50 miles of

Purposes:

Principal Structural Features:

Diversion from River (ac.-ft.):

Depletion to Colorado River (ac.-ft.):

Irrigation:

Total acres New land Supplemental

Municipal Water Supply(ac.-ft):

Electric Power:

Installed capacity (kw.) Annual production (kw.-hr.)

Financial:

I manual.		ound	., TOO	o cobe b		
Total cost	\$5.	760,500				
Reimbursable	\$5	727,500				
From irrigation	\$2	,375,000				
From power	\$3	352,500				
Municipal						
Other						
Non-reimbursable	\$	33,000				
Flood control						
Fish & Wildlife						
Recreation	\$	33,000				
Annual O. M. & R.:	\$	13.560	(incl.	\$2,540	non	re-
	т		imbur	sable)		
Benefit-Cost Ratio:		1.2:1				
Louis Const Atterior						

12,500 Trans-Mountain

12,500

canals.

16.400 in Bonneville Basin.

January 1953 Cost Rasis

16,400

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LABARGE PROJECT

Location:

Southwestern Wyoming along west bank Green River, 50 miles NE Kemmerer, Wyoming. Upper Colorado River Basin

Purposes:

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Irrigation.

Principal Structural Features:

Green River Canal Headworks. Green River Canal — capacity 175 second-feet, 38.5 miles long. Drainage system.

Diversion from River (ac.-ft.): 24,300

Depletion to Colorado River (ac.-ft.):

14,200

Irrigation:	
Total acres	7.970
New land	7,670
Supplemental	300

Municipal Water Supply(ac.-ft):

Electric Power:

Installed capacity (kw.) Annual production (kw.-hr.)

Financial: Total cost Reimbursable From irrigation From power Municipal Other Non-reimbursable Flood control Fish & Wildlife Recreation	January 1953 Cost Basis \$1,673,300 \$1,673,300 \$495,000 \$1,178,300
Annual O. M. & R.:	\$ 14,700
Benefit-Cost Ratio:	2.12:1

Location:

Southwestern Wyoming — On Blacks Fork and tributary and Willow Creek, 40 miles NE Evanston. Upper Colorado River Basin.

Purposes:

Irrigation.

Principal Structural Features:

Bridger Dam and Reservoir on Willow Creek — earthfill capacity 43,000 acre-feet, dead 1,000 acrefeet — system of canals to divert water from Blacks Fork and W. Fork Smiths Fork to reservoir and back to streams when needed

F

Drainage system. Improvements to Willow Creek channel and present irrigation system.

Drainage system.

Diversion from River (ac.-ft.):

Depletion to Colorado River (ac.-ft.):

- 32,500 Bridger Reservoir releases.
 - 0 due to changes in irrigation practice, drainage of uncropped areas to prevent evap. and transpiration.

Irrigation:

Total acres New land Supplemental 40,600

40,600

Municipal Water Supply(ac.-ft):Project is dependent on more efficient irrigation. Adjustment in water rights required to permit storage of surplus spring flows now accruing to direct flow rights. Amendment to Wyoming water laws required to permit transfer of water from one tract of land to another.

Electric Power: Installed capacity (kw.) Annual production (kw.-hr.)

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Financial:	January 1953 Cost Basis
Total cost	\$10,564,000
Reimbursable	\$10,564,000
From irrigation	\$ 2.255,000
From power Municipal Other	\$ 8,309,000
Non-reimbursable Flood control Fish & Wildlife Recreation	
Annual O. M. & R.:	\$ 45,900

Benefit-Cost Ratio:

1.01:1

Location:

Near Rock Springs, Wyoming in southwestern Wyoming. Upper Colorado River Basin.

Purposes:

Irrigation.

Principal Structural Features:

Big Sandy Dam on Big Sandy Creek.

Capacity 39,700 acre-feet.

Means Canal to convey reservoir water to existing Eden Canal. Enlargement of extension of lateral system.

Diversion from River (ac.-ft.):

Depletion to Colorado River (acft.):	17,800
Irrigation:	20.200

Total acres	
New land	
Supplemental	

Municipal Water Supply(ac.-ft):(This project originally authorized 1940 — WPB stopped it 1942 reauthorized by Act June 28, 1949 (63 Stat. 277) — now under construction.)

 $10,660 \\ 9,540$

Electric Power:

Installed capacity (kw.) Annual production (kw.-hr.)

Financial:

Total cost Reimbursable From irrigation

January 1953 Cost Basis \$7,287.000 \$1,500,000 (Repayment period 60 years defined by act of reauthorization.)

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\$5,787,000

From power Municipal Other Non-reimbursable Flood control Fish & Wildlife Recreation

Annual O. M. & R.:

Benefit-Cost Ratio:

SEEDSKADEE PROJECT

Location:

Southwestern Wyoming along Green River; 14 miles from Green River, Wyoming; 35 miles from Kemmerer.

Purposes:

Irrigation.

Principal Structural Features:

Seedskadee Diversion Dam on Green River.

System of canals and headworks. Two hydraulic turbine-powered pumps. Lateral system. Drainage system.

Diversion from River (ac.-ft.):

225,800

110,400

Depletion to Colorado River (ac.-ft.):

Irrigation: Total acres New land

9

0 f Supplemental

Municipal Water Supply(ac.-ft):

Electric Power: Installed capacity (kw.) Annual production (kw.-hr.)

Financial: Total cost Reimbursable From irrigation From power Municipal Other Non-reimbursable Flood control Fish & Wildlife Recreation

Annual O. M. & R.: Benefit-Cost Ratio:

60,720 60.720 (includes 9,030 acres community pasture.)

January 1953 Cost Basis

\$23,272,000 \$23,272,000 \$4,785,000 \$18,487,000

1.46:1

136,600

57

\$

GENERAL COST BREAKDOWN

Colorado River Storage Project and Participating Projects (as recommended by Upper Colorado River Commission)

Project		Cost	Non-Reimbursable		Repayable	
Storage Units		Number of				(A PARTY)
Echo Park	\$	176,400,000	\$	0	\$	176,400,000
Glen Canyon Navajo*		421,300,000		0		421.300,000
Cross Mountain		50,200,000		0		50,200,000
Flaming Gorge Kendall**		83,000,000		0		83,000,000
Total	\$	730,900.000	\$	0	\$	730,900,000
Participating Proje	ects	***				
Florida	\$	6,941,500	\$	437,900	\$	6,503,600
Paonia		6,936,500		144,900		6,791,600
Pine River Ex.		5.027,000		0		5,027,000
La Plata		9,958,500		773,800		9,184,700
Silt		3,356,000		73,600		3,282,400
Smith Fork		3,343,000		0		3,343,000
Hammond		2,302,000		0		2.302,000
Central Utah		231,647,000	(5,594,000		225,053,000
Emery County		9,865,500		229.000		9,636,500
Gooseberry		5,760,500		33.000		5,727,500
La Barge		1,673,300		0		1,673.300
Lyman		10,564,000		0		10,564,000
Eden		7,287,000		0		7,287,000
Seedskadee		23,272.000	4	0		23,272,000
Total	\$	327,933,800	\$8	3,286,200	\$	319,647,600
Grand Total	\$1	,058,833,800	\$8	3,286.200	\$1	1,050,547,600

- * No up-to-date cost data available for reservoir alone. Department of Interior recommendations omit power features and make Navajo a participating project.
- ** No up-to-date cost data available. Kendall Reservoir would probably increase costs of Seedskadee Project \$20-\$25 million, but would add 15,000 additional acres to the project.

***The San Juan-Chama Project and Shiprock South San Juan Project have been eliminated from the above listing because only conditional authorization is being requested for them in pending legislation.

(Cost figures are from supplemental statements of U.S.B.R. of Jan. 4, 1954 using Jan. 1953 prices.)

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GENERAL COST BREAKDOWN

Colorado River Storage Project and Participating Projects (as recommended by Department of Interior in Suppl. reports released Dec. 10, 1953)

Project		Cost Non-J		Reimburs	able	Repayable
Storage Units						
Echo Park	\$	176,400,000	\$	0	\$	176,400,000
Glen Canyon		421,300,000		0		421,300,000
Total	\$	597,700.000	\$	0	\$	597,700,000
Participating Proje	cts	3				
Florida	\$	6,941,500	\$	437,900	\$	6,503,600
Paonia		6,936,500		144,900		6,791,600
Pine River Ex.		5.027,000		0		5,027,000
Silt		3,356.000		73,600		3,282,400
Smith Fork		3,343,000		0		3,343,000
Hammond		2,302,000		0		2,302,000
Central Utah		231,647,000	(6.594,000		225,053,000
Emery County		9,865,500		229,000		9,636,500
La Barge		1,673,300		0		1,673 300
Lyman		10,564,000		0		10,564,000
Eden		7,287,000		0		7,287,000
Seedskadee		23 272,000		0		23,272,000
Shiprock (Indian) Division of Nav) 7a-					
jo Project, incl. Navajo Res. an	d					
canal capacity i South San Juar	for					
Division		232,650,000		0		232,650,000
Total	\$	544,864 800	\$7	7,479,400	\$	537,385,400
Grand Total	\$1	,142,564,800	\$7	479,400	\$1	,135,085,400

Note: Non-reimbursables amount to only 0.7% of the total cost.

(Cost figures are from Suppl. statements of U.S.B.R. of Jan. 4, 1954 using Jan., 1953 prices.)

PARTICIPATING PROJECTS—FINANCIAL SUMMARY (As recommended by Upper Colorado River Commission)

			To Be	
Project	Cost	Irrigators	Municipal Water	
Colorado				
Florida	\$ 6,941,500	\$ 1,711,500	\$ 0	
Paonia	6,936,500	2,414,000**	0	
Pine River Ext.	5,027,000	2,045,000	0	
La Plata	9,958,500	1,245,000	0	
Silt	3,356,000	1,020,000	0	
Smith Fork	3,343,000	1,045,000	0	
Totals	\$ 35,562,500	\$ 9,480,500	\$ 0	
New Mexico****				
Hammond	\$ 2,302,000	\$ 370,000	\$ 0	
Totals	\$ 2,302,000	\$ 370,000	\$ 0	
Utah				
Central Utah	\$231.647.000*	\$127.354.000	\$45,500,000	
Emery County	9.865.500	3.715.000	0	
Gooseberry	5,760,500	2.375,000	0	
Totals	\$247,273,000*	\$133,444,000	\$45,500,000	
Wyoming				
La Barge	\$ 1 673 300	\$ 495,000	\$ 0	
Lyman	10.564.000	2 255 000	φ 0	
Eden	7.287.000	1,500,000	0	
Seedskadee	23,272,000	4,785,000	0	
Totals	\$ 42,796,300	\$ 9,035.000	\$ 0	
Grand Totals	\$327,933,800*	\$152,329,500	\$45,500,000	

* Includes \$5,500,000 ultimate phase allocation and \$603,000 from nonreimbursable Colo. River Development Fund for Central Utah Project.

** 68 years, by previous authorizing legislation.

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Re	paid By						
				Non-Rein	nbursabl	е	
	Power	Fis	h &	Flo	bod		
	Revenues	Wild	dlife	Con	trol	Recre	eation
\$	4 792 100	\$205	2 700	¢ 99	0 200	æ	0
Ψ	4 377 600	φ200	800	φ 44	4 100	φ	0
	2,982,000		0		1,100		0
	7,939,700		0	77	3.800		0
	2,262,400	73	600		0		0
	2,298,000		0		0		0
\$	24,651,800	\$353	3,100	\$1,07	7,100	\$	0
\$	1,932,000	\$	0	\$	0	\$	0
\$	1,932,000	\$	_ 0	\$	0	\$	0
\$	46.699,000	\$	0	\$3,11	3,000	\$2,87	8,000
	5,921,500		0		0	22	9,000
	3,352,500		0		0	3	3,000
\$	55,973,000	\$	0	\$3,11	.3,000	\$3,14	0.000
\$	1,178,300	\$	0	\$	0	\$	0
-	8,309,000		0		0		0
	5,787,000***		0		0		0
	18.487,000		0		0		0
\$	33,761,300	\$	0	\$	0	\$	0
\$1	16.318.100	\$355	3.100	\$4.19	0.100	\$3.14	0.000

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*** 60 years, by previous authorizing legislation.

****The San Juan-Chama Project and Shiprock South San Juan Project have been eliminated from the above listing because only conditional authorization is being requested for them in pending legislation.

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APPENDIX F

UPPER COLORADO RIVER COMMISSION

Key Gaging Stations

Derived from reports of U. S. Geological Survey and others. Not to be construed as findings.

Unit of flow—1000 acre-feet

	Stream (2)	Drainage	Flow	Flows in Water Years			
Ref. (1)		Sq. Miles (3)	1951 (4)	1952 (5)	1953 (6)		
1.	Animas River near			Walk where			
	Cedar Hill, N.M.	1,092	372.9	985.4	442.3		
2.	Animas River at						
	Durango, Colorado	692	324.4	813.0	391.9		
3.	Animas River at						
	Farmington, N.M	1,360	294.6	935.2	373.6		
4.	Ashley Creek near -						
	Jensen, Utah	386	31.5				
5.	Ashley Creek at Sign						
	of the Main, near						
	Vernal, Utah	241	75.8				
6.	Ashley Creek near						
	Vernal, Utah	101	59.6	23.3			
7.	Big Sandy Creek						
	at Leckie Ranch, Wyo.	94	76.6	73.6	48.0		
8.	Blacks Fork near						
	Millburne, Wyo.	156	111.6	151.2	114.8		
9.	Blacks Fork near						
	Green River, Wyo.	3,670	307.8	460.1	177.4		
10.	Blue River at						
	Dillon, Colorado	129	102.0	88.3	78.6		
11.	Boulder Creek below						
	Boulder Lake, Wyo.	130	194.9	162.8	117.9		
12.	Bloomfield Canal						
	(See Citizens Ditch)						
13.	Brush Creek near						
	Jensen, Utah	255	7.6				
14.	Brush Creek near						
	Vernal, Utah	82	19.7				
15.	Burnt Fork near						
	Burnt Fork, Wyo.	53	18.7	30.1	19.8		
16.	Carter Creek near						
	Manila, Utah		5.5	11.1	5.2		

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Ref.	Stream	Drainage Area Sq. Miles	Flo 1951	ws in Water Y (Prov 1952	(ears visional) 1953	
(1)	(2)	(3)	(4)	(5)	(6)	
17.	Carter Creek at mouth					
	near Manila, Utah	110	321	68.2	33.6	
18.	Citizens Ditch (Bloom-					
	field Canal) near Tur-					
	ley, N. M. Diverting					
	water around Blanco					
10	gage		51.3	70.4		
19.	*Colorado River near	0.055	0.010 5			
90	Cameo, Colorado	8,055	2,910.7	4,130.4	2572.8	
20.	Colorado River near	04 100	0.001.0	F 400 0	10050	
91	Cisco, Utan	24,100	3,921.0	7,699.0	4,037.0	
41.	Utah State line	20 620	9 097 0	C 947 0	9 779 0	
22	*Colo Biver at Clon	20,080	2,851.0	0,847.0	3,113.0	
	wood Springs Colo	1 560	1 8/8 0			
23.	Colorado River at	4,000	1,040.0			
-0.	Hite. Utah	76 600	8 784 0	14 780 0	7 767 0	
24.	Colo, River at Hot Sul-	10,000	0,101.0	14,100.0	1,101.0	
	phur Springs, Colo.	782	239.6	345.6	164 2	
25.	(A) Colorado River at		-0010	010.0	101.2	
	Lee Ferry, Ariz. @	109,889	9,830.6	17.975.4	8.822.4	
26.	Colorado River at					
	Lees Ferry, Ariz. @	108,335	9,816.7	17,956.6	8,804.6	
27.	Cottonwood Creek near	c				
	Orangeville, Utah	200	57.8		62.1	
28.	Crystal River near					
	Redstone, Colorado	225	256.2	356.2	211.4	
29.	#Dirty Devil River					
	near Hite, Utah					
30.	Dolores River					
	near Cisco, Utah		153.8	1,067.0	290.8	
31.	Dolores River at					
	Dolores, Colorado	556	138.5			
32.	Dolores River at					
	Gateway, Colorado	4,350	158.2		293.4	
33.	Duchesne River at					-
	Myton, Utah	2,705	349.2	797.2		
34.	Duchesne River near					
	Randlett, Utah	3,820	434.8	1,041.0		
35.	Duchesne River near					1
	Tabiona, Utah	352	184.5	252.5		

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		Drainage Area	Flows in Water Years (Provisional)			
Ref. (1)	Stream (2)	Sq. Miles (3)	1951 (4)	1952 (5)	1953 (6)	
36.	Eagle River below					
	Gypsum, Colorado	957	464.2	580.7	402.9	
37.	East River at					
	Almont,Colorado	295	234.8	353.8	200.8	
38.	East Fork of Smith					
	Fork near Roberson,					
	Wyoming	53	31.4	51.0	30.2	
39.	#East Fork of Beaver					
	Creek near Lonetree,					
10	Wyoming		4.5	5.8	6.7	
40.	Elk River at	202	222.1			
4.1	Clark, Colorado	206	233.1	276.4	178.1	
41.	Escalante River near	015				
19	Escalante, Utan	315	3.3			
42.	Escalante River		CO 4			
19	Florido Divor poor		60.4			
40.	Durange Colorado	06	20.1	0.2 0	97 9	
11	Eantanalla Croale nonr	90	50.1	98.9	51.5	
44.	Fontenelle Wyo	991	88 2	62.0	22 5	
45	#Fontenelle Creek neg	224	00.0	02.5	00.0	
10.	Herschler Banch	.1				
46	Green River near					
10.	Greendale IItah		2 336 0		1 288 0	
47	Green River at		1,000.0		1,200.0	
	Green River, Utah	40.920	4.722.0	6.844.0	3.395.0	
48.	Green River near		-,	0,011.0	0,000.0	
	Green River, Wvo.	7.670			1.086.8	
49.	Green River near				_,	
	Jensen, Utah	**	3,673.0		2.492.0	
50.	Green River near					
	Linwood, Utah	14,300	2,262.0	2,016.0		
51.	Green River near					
	Ouray, Utah	**	4,718.0		3,399.0	
52.	Green River at					
	Warren Bridge, Wyo.	468	488.5	396.4	358.7	
53.	Gunnison River and					
	Redlands Power Canal					
	near Grand Junction,					
	Colorado	8,020	1,127.0	2,625.0	1,331.0	
54.	Gunnisson River near					
	Gunnison, Colorado	1,010	460.1	740.3	480.8	

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		Drainage Area	Flov	vs in Water Y (Prov	ears isional)
Ref. (1)	Stream (2)	Sq. Miles (3)	1951 (4)	1952 (5)	1953 (6)
55.	Gunnison River below				
	Gunnison Tunnel,				
	Colorado	3,980	569.1	1,457.0	668.8
56.	Hams Fork near				
	Frontier, Wyo.		167.9	147.2	74.0
57.	Henrys Fork at				
	Linwood, Utah	530	45.9	109.2	58.1
58.	Henrys Fork near				
	Lonetree, Wyo.	55	28.2	42.9	28.4
59.	LaPlata River at				
	Colorado-New Mexico				
	State line	331	8.0	45.3	11.4
60.	LaPlata River at				
	Hesperus, Colorado	37	17.9	53.4	22.3
61.	Little Snake River				
	near Dixon, Yyo.	1,028	291.2	611.8	258.8
62.	Little Snake River				
	near Lily, Colorado	3,680	294.6	728.5	268.7
63.	Little Snake River				
00.	near Slater Colo	285	153.1	226.6	113.0
61	Log Pinog River	-00	10011		
04.	noor Bayfield Colo	281	145 5	399 5	175 9
05	(C) I D' D'	204	140.0	022.0	110.0
65.	(C) Los Pinos River at		99.0	000 9	000
	LaBoca, Colorado		32.0	282.3	62.2
66.	Los Pinos River at			050.0	
	Ignacio, Colorado	448	26.7	259.2	44.7
67.	#Mancos River near				
	Towoac, Colorado	550	2.0	60.7	11.8
68.	#McElmo Creek near				
	Colorado-Utah				
	state line		7.5	24.9	20.0
69.	McElmo Creek near				
	Cortez, Colorado	233	13.8	28.4	21.9
70.	#Middle Fork Beaver				
	Creek near Lonetree.				
	Wyoming		12.7	23.9	14.2
71	#Minnie Maud Creek				
(1.	# Minine Madu Creek	221	17		
70	Neurois Discourt	201	1.1		
72.	Navajo Kiver at	105	50.0	150.0	CE O
	Edith, Colorado	105	52.2	190.0	05.2
		CC			
		00			

	said the state of the	Drainage Area	Flow	ws in Water Y (Prov	ears isional)
(1)	Stream (2)	Sq. Miles (3)	1951 (4)	1952 (5)	1953 (6)
73.	North Fork Gunnison				
	River near Somerset,				
	Colorado	521	256.1	474.7	248.0
74.	#North Fork White				
	River at Buford, Colo.	240		274.8	208.6
75.	North Piney Creek				
	near Mason, Wyoming	58	75.2	49.8	38.8
76.	Paria River at Lees				
	Ferry, Arizona	1,550	13.9	18.8	17.8
77.	#Pine Creek near				
	Fremont Lake, Wyo.				
78.	Pine Creek at				
	Pinedale, Wyoming	118	130.4	81.3	87.2
79.	Plateau Creek near				
	Cameo, Colorado	604	71.5		
80.	Price River near				
	Heiner, Utah	430	72.6	225.3	79.9
81.	Price River at				
	Woodside, Utah	1.500	60.1	247.8	60.1
82.	Rio Blanco River	_,			
	near Pagosa Springs.				
	Colorado	58	33.2		44.4
83.	Roaring Fork at				
00.	Aspen, Colorado	109	59.2	81.3	59.4
84.	Roaring Fork at	200		0110	0011
01.	Glenwood Springs Col	0 1 460	872.7		
85	San Juan River	0. 1,100	012.1		
00.	near Blanco N M	3 558	331.4	1 490 1	509.9
86	San Juan River	0,000	001.4	1,400.1	000.0
00.	near Bluff IItah	23 010	668 2	2 542 0	0247
87	San Juan River at	20,010	000.0	2,042.0	394.1
01.	Farmington N M	7 945	651.0	2 401 0	2117
88	San Juan River at	1,240	091.0	2,401.0	041.1
00.	Pagoga Springs Colo	208	120.7	415.1	109 7
80	San Juan Bivor at	230	100.1	410.1	105.7
00.	Bose N M	1 000	997 0	1 994 0	450.7
00	Rosa, N. M.	1,990	541.9	1,234.9	459.7
30.	San Juan River at	19 076	0000	0 101 0	079 4
01	Simprock, N. M.	12,070	000.2	2,481.8	873.4
91.	Disconvillo Colorado	200	05.0	017.0	100.0
00	C D C L D'	506	95.9	217.3	138.8
92.	San Rafael River near	1 000			
	Green River, Utah	1,690	68.3	314.8	
		67			

		Drainage	Flow	vs in Water Y	ears
Ref. (1)	Stream (2)	Sq. Miles (3)	1951 (4)	(Prov 1952 (5)	(6)
93.	Savery Creek near				
0.4	Savery, Wyoming	330	55.8	147.9	59.0
94.	Sheep Creeek near	40	2.0	00.4	= 0
05	Shoop Crook at month	40	2.9	20.4	7.0
95.	near Manila, Utah	111	10.8	30.7	14.8
96.	(B) Sheep Creep Upper				
	Canal, near Manila, Uta	ah	3.4	4.2	3.1
97.	(B) Sheep Creek Lower				
	Canal, near Manila, Ut	tah	12.0	11.3	8.8
98.	Slater Fork near				
	Slater, Colorado	161	39.1	79.6	42.0
99.	#Snake River near				
	Montezuma, Colorado	59		57.1	44.9
100.	#South Fork White				
	River at Buford, Colo.			259.2	188.6
101.	(C)Spring Creek at				
	LaBoca, Colorado near		0.55	20.1	
100	Colorado-Utan state im	e	11.0	22.1	21.5
102.	Strawberry River at	1.040	101 5	000.0	
109	Touler Diver at	1,040	101.5	292.8	
105.	Almont Colorado	110	204.0	201 1	945 9
101	Amont, Colorado	440	204.0	304.4	245.3
104.	Tenmile Creek at	110		101.0	00 5
105	Dillon, Colorado	115	114.1	104.8	90.5
105.	Tomichi Creek at	1.000			
	Gunnison, Colorado	1,020	89.5	197.1	124.6
106.	Uinta River near	101			
	Neola, Utah	181	114.6		
107.	Uncompangre River at				
	Colona, Colorado	437	93.6	219.5	144.1
108.	West Fork Beaver				
	Creek near Lonetree,				
	Wyoming		10.7	17.4	12.6
109.	West Fork Smith Fork				
	near Robertson, Wyo.	37	16.6	19.2	14.2
110.	White River near				
	Meeker, Colorado	762	440.2	606.0	455.4
		00			

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		Drainage		Flows in Water Years	
Ref. (1)	Stream (2)	Sq. Miles (3)	1951 (4)	1952 (5)	1953 (6)
111.	White River near				
	Watson, Utah	4,020	467.8	694.4	475.9
112.	Whiterocks River near Whiterocks, Utah	115	73.0		
113.	Willow Creek near Ouray Utah	967	12.8		
114.	Yampa River near Maybell, Colorado	3,410	1,016.0	1,447.0	829.2
115.	Yampa River at Steamboat Springs, Col	o. 604	346.0	447.1	285.3
be in	The following Gaging Statio cluded in succeeding Annua	n Records ll Reports.	are being u	sed regularly,	and will
116.	Arapaho Creek at Monarch Lake Outlet,	15.1	00.0	00.0	
	Colorado	47.1	69.6	80.9	53.2
117.	Colorado River near Grand Lake, Colo.	10.3	66.9	80.8	44.0
118.	Fraser River near Winter Park, Colo.	27.6	27.4	14.9	6.36
119.	Ranch Creek near Fraser, Colorado	19.9	15.2	20.2	8.61
120.	Vasquez Creek near Winter Park, Colo.	27.8	9.58	17.6	4.79

* This is a U. S. G. S. station but is not required at the present time for administration by the Upper Colorado River Commission.

** Drainage area not shown in latest U. S. G. S. water supply paper available.

This station is to be installed or reestablished and operated by the U.S.G.S.

(A) Lee Ferry one mile down stream from the mouth of the Paria River is the 1922 "Compact Point," and the discharge at this point is taken as the sum of Nos. 25 and 76.

(B) Discharge measurements reported in U. S. G. S. Water Supply Paper 1059 (1946) p. 384.

(C) Add Spring Creek to Los Pinos River at LaBoca to give flow at Colorado-Utah state line.

@ Area from Final Report of Engineering Advisory Committee to Upper Colorado River Compact Commission, November 1948.
TRANSMOUNTAIN DIVERSIONS IN UTAH

Not to be construed as findings.

		Acre	e-feet
Ditch or Tunnel	Location	1952 Y	ear 1953
Ephraim Tunnel	Near Ephraim	3,920	3,720
Reeder Ditch	Near Spring City	138	45
Twin Creek Tunnel	Near Mt. Pleasant	463	
Horseshoe Tunnel	Near Ephriam	1,000	
Cedar Creek Tunnel	Near Spring City	718	
Spring City Tunnel	Near Spring City	1,660	1,960
Fairview Ditch	Near Fairview	2,060	
Candland Ditch	Near Mt. Pleasant	583	
Black Canyon Ditch	Near Spring City	500	
Larsen Tunnel	Near Ephriam	2,280	
Madsen Ditch	Near Ephriam	13	20
John August Ditch	Near Ephriam	206	235
Coal Fork Ditch	Near Mt. Pleasant	630	
Lower Hobble Creek Ditch	Near Heber	173)
Upper Hobble Creek Ditch	Near Heber	378	(1,260)
Strawberry River and Willow Creek Ditches	Strawberry River, Willow Creek	2,480	1,990
Strawberry Tunnel	Strawberry River	45,780	80,970
	Total	62,982	

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TRANSMOUNTAIN DIVERSIONS IN COLORADO

Not to be construed as findings.

	Location	Acre-feet Year	
Ditch or Tunnel		1952	1953
Alva B_ Adams Tunnel (East Portal)	Shadow Mountain Reservoir	56,021	180,000
Berthoud Pass Ditch	Fraser River Tributaries	732	594
Eureka Ditch	Tonahutu Creek	103	26
Grand River Ditch	Colorado River Tribs.	21,382	19,750
Moffat Tunnel (East Portal)		31,228	35,070
Independence Pass Tunnel	Roaring Fork Tribs.	51,363	40,300
Williams Fork Tunnel (Jones Pass)	Williams River	6,810	7,420
Boreas Pass Ditch	Blue River	13	273
Hoosier Pass Tunnel	Blue River	2,381	
Columbine Ditch	Tenmile Creek Tribs.	1,020	1,040
Fremont Pass Ditch	Tenmile Creek	none	none
Ewing Ditch	Eagle River	1,821	1,140
Wurtz Ditch	Eagle River	2,951	2,010
Busk-Ivanhoe Tunnel	Fryingpan River	6,335	5,080
Larkspur Ditch	Tomichi Creek	422	217
Tabor Ditch	Gunnison River	308	182
Fuchs Ditch	N. Fork Los Pinos River	536	381
Raber-Lohr Ditch	Los Pinos River	1,726	1,340
Treasure Pass Ditch	San Juan River	198	96
Squaw Pass Ditch	San Juan River	240	192
Piedra Ditch	San Juan River	none	42

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APPENDIX G

ATTENDANCE AT MEETINGS OF THE COMMISSION

January 30, 1953

- John R. Erickson, Engineer, New Mexico Interstate Stream Commission, Santa Fe, New Mexico.
- Jean S. Breitenstein, Attorney, Colorado Water Conservation Board, Denver, Colorado.
- Joseph M. Tracy, State Engineer, State Capitol, Salt Lake City, Utah.
- L. C. Bishop, State Engineer, State Capitol, Cheyenne, Wyoming.
- John Geoffrey Will, Secretary and General Counsel.
- R. D. Goodrich, Chief Engineer.

Ival V. Goslin, Assistant Chief Engineer.

- R. J. Tipton, Consulting Engineer, Colorado Water Conservation Board, Denver, Colorado.
- R. M. Gildersleeve, Acting Director, Colorado Water Conservation Board, Denver, Colorado.
- H. Lawrence Hinkley, Deputy Attorney General, Denver, Colorado.
- Frank C. Merriell, Colorado River Water Conservation District, Grand Junction, Colorado.
- John L. Heuschkel, Colorado River Water Conservation District, Carbondale, Colorado.
- William Nelson, Chamber of Commerce, Grand Junction, Colorado.
- George Cory, Montrose, Colorado.
- Garner L. McKnight, President, Chamber of Commerce, Delta, Colorado.
- Doyle L. Davidson, Secretary-Manager, Chamber of Commerce, Delta, Colorado.

Charles J. Beise, Southeastern Colorado Water Users Association, Denver, Colorado.

William R. Kelly, Attorney, Northern Colorado Water Conservancy District, Greeley, Colorado.

Glenn G. Saunders, Attorney, Denver Water Department, P. O. Box 600, Denver, Colorado.

T. P. Campbell, Manager, Improvements and Parks, Denver, Colorado.

C. Paul Harrington, Member, City Council, Denver, Colorado. James Fresquez, Member, City Council, Denver, Colorado.

T. A. Dines, Vice President, Chamber of Commerce, Denver, Colorado.

- A. P. Gumlick, Member, Denver Board of Water Commissioners, Denver, Colorado.
- E. L. Mosley, Manager, Denver Water Department, Denver, Colorado.
- H. L. Potts, Water Engineer, Denver Water Department, Denver, Colorado.
- Nicholas R. Petry, President, Denver Board of Water Commissioners, Denver, Colorado.
- John H. Bliss, State Engineer, Santa Fe, New Mexico.
- Fred E. Wilson, Legal Advisor to Commissioner, Albuquerque, New Mexico.
- I. J. Coury, New Mexico Interstate Stream Commission, Farmington, New Mexico.
- Ed. H. Foster, President, San Juan Reclamation Association, Farmington, New Mexico.
- Orval Ricketts, San Juan Reclamation Association, Farmington, New Mexico.
- Walter O. Berger, Gov. Mechem Water Policy Committee, Albuquerque, New Mexico.
- E. R. Callister, Attorney General, State Capitol, Salt Lake City, Utah.
- William R. Wallace, Utah Water and Power Board, Salt Lake City, Utah.
- J. A. Howell, Utah Water and Power Board, Salt Lake City, Utah.
- Thomas W. Jensen, Utah Water Users Association, Salt Lake City, Utah.
- B. Frank Ward, Secretary-Manager, Chamber of Commerce, Vernal, Utah.
- Dale Jensen, Vice Chairman, Colorado Development Committee, Vernal, Utah.
- Harry S. Harnsberger, Attorney General, Cheyenne, Wyoming.
- Norman W. Barlow, Assistant to Commissioner, Cora, Wyoming.

Joe L. Budd, Assistant to Commissioner, Big Piney, Wyoming. Earl Lloyd, Deputy State Engineer, Cheyenne, Wyoming.

Sam Ahkeah, Chairman, Window Rock, Arizona.

Howard Gorman, Chairman, Resources Committee, Window Rock, Arizona.

Charles M. Tansey, Jr. Attorney, Farmington, New Mexico.

H. T. Person, Consulting Engineer, Laramie, Wyoming.

- J. R. Riter, Chief Hydrologist, Hydrology Division, Denver, Colorado.
- C. B. Jacobson, Regional Hydrologist, Region 4, Salt Lake City, Utah.

Francis M. Bell, District Engineer, Denver, Colorado.

Geraint Humpherys, Indian Irrigation Legal Counsel, Los Angeles, California.

Murray L. Crosse, Area Counsel, Window Rock, Arizona.

W. L. Miller, Chief of Branch of Irrigation, Washington, D. C.

G. B. Keesee, Area Irrigation Engineer, Gallup, New Mexico.

- G. M. Goudie, Jr., Assistant Area Irrigation Engineer, Gallup, New Mexico.
- C. V. Marmaduke, Jr., Special Assistant to the Attorney General, Denver, Colorado.

February 26, 1953

Harry W. Bashore, Mitchell, Nebraska.

- John R. Erickson, Engineer, New Mexico Interstate Stream Commission,
- Jean S. Breitenstein, Attorney, Colorado Water Conservation Board, Denver, Colorado.
- Joseph M. Tracy, State Engineer, State Capitol, Salt Lake City, Utah.
- L. C. Bishop, State Engineer, State Capitol, Cheyenne, Wyoming.
- John Geoffrey Will, Secretray and General Counsel.

Barney L. Whatley, Treasurer

R. D. Goodrich, Chief Engineer

Ival V. Goslin, Assistant Chief Engineer

Ivan C. Crawford, Director, Colorado Water Conservation Board, Denver, Colorado.

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- R. M. Gildersleeve, Engineer, Colorado Water Conservation Board, Denver, Colorado.
- H. Lawrence Hinkley, Deputy Attorney General, Denver, Colorado.
- Frank C. Merriell, Colorado River Water Conservation District, Grand Junction, Colorado.
- George Cory, Montrose County Chamber of Commerce, Montrose, Colorado.
- J. M. Dille, Northern Colorado Water Conservation District, Greeley, Colorado.

Glenn G. Saunders, Attorney, Denver Water Department, P. O. Box 600, Denver, Colorado.

- H. H. Christy, Southeastern Colorado Development Association, Pueblo, Colorado.
- William Nelson, Chamber of Commerce, Grand Junction, Colorado.

Reed Hixson, Radio Station KFXJ, Grand Junction, Colorado. John H. Bliss, State Engineer, Santa Fe, New Mexico.

Fred E. Wilson, Legal Adviser to Commissioner, Albuquerque, New Mexico.

- E. R. Callister, Attorney General, State Capitol, Salt Lake City, Utah.
- Harry Ratliff, Engineer, Vernal, Utah.
- Glen H. Cooper, President, Chamber of Commerce, Vernal, Utah.
- Jack C. Turner, Vice President, Chamber of Commerce, Vernal, Utah.
- Hugh W. Colton, Director, Utah Water Users Association, Vernal, Utah.
- E. J. Bancroft, Vernal, Utah.
- Howard Black, Deputy Attorney General, Cheyenne, Wyoming.
- H. T. Person, Dean of the School of Engineering, University of Wyoming, Laramie, Wyoming.
- Breck Moran, Chief of Resource Development, Natural Resource Board, Cheyenne, Wyoming.
- W. K. Snyder, Reporter, Cheyenne Tribune, Cheyenne, Wyoming.
- J. R. Riter, Chief Hydrologist, Hydrology Division, Denver, Colorado.
- J. Stewart McMaster, Regional Counsel, Region 4, Salt Lake City, Utah.
- C. V. Marmaduke, Jr., Special Assistant to the Attorney General, Denver, Colorado.

John J. Cooney, Denver, Colorado.

March 7, 1953

Harry W. Bashore, Mitchell, Nebraska.

- John R. Erickson, Engineer, New Mexico Interstate Stream Commission, Santa Fe, New Mexico.
- Jean S. Breitenstein, Attorney, Colorado Water Conservation Board, Denver, Colorado.
- Joseph M. Tracy, State Engineer, State Capitol, Salt Lake City, Utah.
- L. C. Bishop, State Engineer, State Capitol, Cheyenne, Wyoming.
- John Geoffrey Will, Secretary and General Counsel, Grand Junction, Colorado.
- R. D. Goodrich, Chief Engineer, Grand Junction, Colorado
- Ival V. Goslin, Assistant Chief Engineer, Grand Junction, Colorado.
- Wayne M. Akin, Chairman, Arizona Interstate Stream Commission, Phoenix, Arizona.
- J. H. Moeur, General Counsel, Arizona Interstate Stream Commission, Phoenix, Arizona.
- John Henley Eversole, Chief Assistant Attorney General, Phoenix, Arizona.

Edwin C. Johnson, United States Senator, Denver, Colorado. Eugene D. Millikin, United States Senator, Denver, Colorado. Byron G. Rogers, United States Representative, Denver, Colo-

rado.

- J. Edgar Chenoweth, United States Representative, Trinadad, Colorado.
- Wayne N. Aspinall, United States Representative, Palisade, Colorado.
- Ivan C. Crawford, Director, Colorado Water Conservation Board, Denver, Colorado.
- H. Lawrence Hinkley, Deputy Attorney General, Denver, Colorado.
- George Cory, Member, Colorado Conference Committee, Montrose, Colorado.
- Glenn G. Saunders, Attorney, Denver Water Department, Denver, Colorado.
- Dan B. Hunter, Colorado Water Board, Dove Creek, Colorado.
- Charles R. Neill, Colorado River Water Conservation District, Hotchkiss, Colorado.

Barney Rogers, Denver Post, Denver, Colorado.

- Clinton P. Anderson, United States Senator, Albuquerque, New Mexico.
- Antonio M. Fernandez, United States Representative, Santa Fe, New Mexico.
- John J. Dempsey, United States Representative, Santa Fe, New Mexico.
- Frank Burnett, Administrative Assistant to U. S. Senator Dennis Chavez of Albuquerque, New Mexico.
- John H. Bliss, State Engineer, Santa Fe, New Mexico.
- Fred E. Wilson, Legal Advisor to Commissioner, Albuquerque, New Mexico.
- I. J. Coury, New Mexico Interstate Stream Commission, Farmington, New Mexico.

Jack Cline, Fruitland, New Mexico.

- J. P. Murphy, N.R.G. Flood Control Association, Albuquerque, New Mexico.
- W. Carlos Powell, Santa Fe, New Mexico.

Arthur V. Watkins, United States Senator, Orem, Utah.

- Douglas Stringfellow, United States Representative, Ogden, Utah.
- William A. Dawson, United States Representative, Ogden, Utah.
- Lyle M. Ward, Administrative Assistant to U. S. Senator Wallace F. Bennett of Salt Lake City, Utah.
- E. R. Callister, Attorney General, State Capitol, Salt Lake City, Utah.

Ma

Thomas W. Jensen, Utah Water Users Association, Salt Lake City, Utah.

Frank A. Barrett, United States Senator, Cheyenne, Wyoming.

Norman W. Barlow, Assistant to Commissioner, Cora, Wyoming.

Joe L. Budd, Assistant to Commissioner, Big Piney, Wyoming.

Breck Moran, Chief of Resource Development, Natural Resource Board, Cheyenne, Wyoming.

- Harvey F. McPhail, Assistant Commissioner of Reclamation, Washington, D. C.
- N. B. Bennett, Jr., Assistant Director, Branch of Project Planning, Washington, D. C.

Edward W. Fisher, Chief Counsel, Washington, D. C.

T. Richard Witmer, Assistant Chief Counsel, Washington, D. C.

J. R. Riter, Chief Hydrologist, Hydology Division, Denver, Colorado.

- E. O. Larson, Regional Director, Region 4, Salt Lake City, Utah.
- J. Stuart McMaster, Regional Counsel, Region 4, Salt Lake City, Utah.
- C. B. Jacobson, Regional Hydrologist, Region 4, Salt Lake City, Utah.
- John L. Mutz, Area Engineer, Albuquerque, New Mexico.

Harry A. Sellery, Jr., Chief Counsel, Washington, D. C.

Samuel J. Flickinger, Assistant Chief Counsel, Washington, D. C.

W. L. Miller, Chief of Branch of Irrigation, Washington, D. C.G. B. Keesee, Area Irrigation Engineer, Gallup, New Mexico.Sam Ahkeah, Chairman, Window Rock, Arizona.

Howard Gorman, Chairman, Resources Committee

J. M. McCabe, Secretary-Treasurer, Window Rock, Arizona.

Norman M. Littell, Counsel, Washington, D. C.

Charles M. Tansey, Jr., Assistant Counsel, Farmington, New Mexico.

William E. Welch, Secretary-Manager, Washington, D. C.

March 16, 1953

- John R. Erickson, Commissioner for New Mexico, Santa Fe, New Mexico.
- John H. Bliss, Engineering Adviser for New Mexico, Santa Fe, New Mexico.
- John Geoffrey Will, Secretary and General Counsel, Grand Junction, Colorado.

March 31, 1953

Harry W. Bashore, Chairman of the Commission, Mitchell, Nebraska.

John R. Erickson, Engineer, New Mexico Interstate Stream Commission, Santa Fe, New Mexico.

- Jean S. Breitenstein, Attorney, Colorado Water Conservation Board, Denver, Colorado.
- Joseph M. Tracy, State Engineer, State Capitol, Salt Lake City, Utah.
- L. C. Bishop, State Engineer, State Capitol, Cheyenne, Wyoming.
- John Geoffrey Will, Secretary and General Counsel, Upper Colorado River Commission, Grand Junction, Colorado.
- R. D. Goodrich, Chief Engineer, Upper Colorado River Commission, Grand Junction, Colorado.
- Ival V. Goslin, Assistant Chief Engineer, Upper Colorado River Commission, Grand Junction, Colorado.
- H. Lawrence Hinkley, Deputy Attorney General, Denver, Colorado.
- H. L. Potts, Water Engineer, Denver Water Department, Denver, Colorado.
- J. M. Dille, Northern Colorado Water Conservancy District, Greeley, Colorado.
- John H. Bliss, State Engineer, Santa Fe, New Mexico.
- I. J. Coury, New Mexico Interstate Stream Commission, Farmington, New Mexico.
- E. R. Callister, Attorney General, State Capitol, Salt Lake City, Utah.
- J. A. Howell, Chairman, Utah Water and Power Board, Ogden, Utah.
- John P. Stevens, Member, Utah Water and Power Board, Henefer, Utah.
- Wallace D. Yardley, Member, Utah Water and Power Board, Beaver, Utah.
- J. R. Bingham, Member, Utah Water and Power Board, Springville, Utah.
- L. B. Johnson, Member, Utah Water and Power Board, Randolph, Utah.
- Hugh W. Colton, Member, Utah Water and Power Board, Vernal, Utah.
- Orson Christensen, Member, Utah Water and Power Board, Brigham City, Utah.
- Thomas W. Jensen, Utah Water Users Association, Salt Lake City, Utah.
- B. H. Stringham, Chairman, Colorado Development Committee of 21 Counties, Vernal, Utah.

Francis Feltch, Chamber of Commerce, Vernal, Utah.

Dewey Ross, Chamber of Commerce, Vernal, Utah.

- Jack Turner, Vice President, Chamber of Commerce, Vernal, Utah.
- Lawrence Siddoway, Executive Manager, Chamber of Commerce, Vernal, Utah.
- Curtis Dudley, County Commissioner, Uintah County, Vernal, Utah.
- H. B. Millecam, Mayor, Vernal, Utah.
- Sterling Price, Executive Secretary and Manager, Greater Utah Valley, Inc., Springville, Utah.
- Henry Roberts, President, Greater Utah Valley, Inc., Goshen, Utah.
- Glen Davis, Greater Utah Valley, Inc., Genola, Utah.
- Dr. A. L. Curtis, Greater Utah Valley, Inc., Payson, Utah.
- Frank Earl, Chamber of Commerce, Provo, Utah.
- Harry Ratliff, Engineer, Hymphreys Engineering, Vernal, Utah.
- H. T. Person, Dean of the School of Engineering, University of Wyoming, Laramie, Wyoming.
- E. O. Larson, Regional Director, Region 4, Bureau of Reclamation, Salt Lake City, Utah.
- J. Stuart McMaster, Regional Counsel, Region 4, Bureau of Reclamation, Salt Lake City, Utah.
- H. P. Dugan, Head of the River Regulation Section, Hydrology Branch, Bureau of Reclamation, Denver, Colorado.
- C. B. Jacobson, Regional Hydrologist, Region 4, Bureau of Reclamation, Salt Lake City, Utah.
- G. B. Keesee, Area Irrigation Engineer, Office of Indian Affairs, Gallup, New Mexico.
- H. T. Person, Navajo Tribal Council, Laramie, Wyoming.

June 29, 1953

- Harry W. Bashore, Chairman, Upper Colorado River Commission, Mitchell, Nebraska.
- John R. Erickson, Engineer, New Mexico Interstate Stream Commission, Santa Fe, New Mexico.
- Jean S. Breitenstein, Attorney, Colorado Water Conservation Board, Denver, Colorado.
- Joseph M. Tracy, State Engineer, State Capitol, Salt Lake City, Utah.
- L. C. Bishop, State Engineer, State Capitol, Cheyenne, Wyoming.

John Geoffrey Will, Secretary and General Counsel, Upper Colorado River Commission, Grand Junction, Colorado.

- R. D. Goodrich, Chief Engineer, Upper Colorado River Commission, Grand Junction, Colorado.
- Ival V. Goslin, Assistant Chief Engineer, Upper Colorado River Commission Grand Junction, Colorado.
- Ivan C. Crawford, Director, Colorado Water Conservation Board, Denver, Colorado.
- R. J. Tipton, Engineer, Colorado Water Conservation Board, Denver, Colorado.
- H. Lawrence Hinkley, Deputy Attorney General, Denver, Colorado.
- H. H. Christy, Colorado Conference Committee, Pueblo, Colorado.
- George Cory, Colorado Conference Committee, Montrose, Colorado.
- E. L. Mosley, Manager, Denver Water Department, Denver, Colorado.
- H. L. Potts, Water Engineer, Denver Water Department, Denver, Colorado.
- Glenn G. Saunders, Attorney, Denver Water Board, Denver, Colorado.
- Dan B. Hunter, Colorado Water Board, Dove Creek, Colorado.
- A. B. Toner, Southwestern Water Conservation District, Pagosa Springs, Colorado.
- William R. Kelly, Attorney, Northern Colorado Water Conservancy District, Greeley, Colorado.
- John H. Bliss, State Engineer, Santa Fe, New Mexico.
- Fred E. Wilson, Legal Adviser to the Commissioner, Albuquerque, New Mexico.
- I. J. Coury, New Mexico Interstate Stream Commission, Farmington, New Mexico.
- E. R. Callister, Attorney General, State Capitol, Salt Lake City, Utah.
- J. A. Howell, Chairman, Utah Water and Power Board, Ogden, Utah.
- J. R. Bingham, Member, Utah Water and Power Board, Springville, Utah.
- Hugh W. Colton, Member, Utah Water and Power Board, Vernal, Utah.
- B. H. Stringham, Chairman, Colorado Development Committee of 21 Counties, Vernal, Utah.
- Curtis Dudley, County Commissioner, Uintah County, Vernal, Utah.

H. B. Millecam, Mayor, Vernal, Utah.

A. B. Gibson, Greater Utah Valley, Inc., Pleasant Grove, Utah. Howard Black, Attorney General, Cheyenne, Wyoming.

- J. R. Riter, Chief Hydrologist, Hydrology Division, Bureau of Reclamation, Denver, Colorado.
- E. O. Larson, Regional Director, Region 4, Bureau of Reclamation, Salt, Lake City, Utah.
- J. S.McMaster, Regional Counsel, Region 4, Bureau of Reclamation, Salt Lake City, Utah.
- H. P. Dugan, Head of the River Regulation Section, Hydrology Division, Bureau of Reclamation, Denver, Colorado.
- Ben Powell, Area Engineer, Bureau of Reclamation, Pueblo, Colorado.

Francis M. Bell, District Engineer, United States Geological Survey, Denver, Colorado.

August 10, 1953

Harry W. Bashore, Mitchell, Nebraska.

- John R. Erickson, Engineer, New Mexico Interstate Stream Commission, Santa Fe, New Mexico.
- Jean S. Breitenstein, Attorney, Colorado Water Conservation Board, Denver, Colorado.
- Joseph M. Tracy, State Engineer, State Capitol, Salt Lake City, Utah.
- L. C. Bishop, State Engineer, State Capitol, Cheyenne, Wyoming.
- John Geoffrey Will, Secretary and General Counsel, Grand Junction, Colorado.
- R. D. Goodrich, Chief Engineer, Grand Junction, Colorado.
- Ival V. Goslin, Assistant Chief Engineer, Grand Junction, Colorado.
- Ivan C. Crawford, Director, Colorado Water Conservation Board, Denver, Colorado.
- Charles W. Soller, Assistant Attorney General, Denver, Colorado.
- H. H. Christy, Colorado Conference Committee, Pueblo, Colorado.
- George Cory, Colorado Conference Committee, Montrose, Colorado.
- Glenn G. Saunders, Attorney, Denver Water Board, Denver, Colorado.
- Dan B. Hunter, Colorado Water Board, Dove Creek, Colorado.

Charles R. Neill, Director, North Fork Water Conservancy District, Hotchkiss, Colorado.

- John R. Neill, Secretary-Treasurer, North Fork Water Conservancy District, Hotchkiss, Colorado.
- F. M. Peterson, Colorado River Water Conservation District, Delta, Colorado.

H. R. Holliday, Chairman, Delta County Water Advisory Board, Delta, Colorado.

William Nelson, Chamber of Commerce, Grand Junction, Colorado.

John H. Bliss, State Engineer, Sana Fe, New Mexico.

Fred E. Wilson, Legal Adviser to the Commissioner, Albuquerque, New Mexico.

- I. J. Coury, New Mexico Interstate Stream Commission, Farmington, New Mexico.
- R. B. Porter, Assistant Attorney General, State Capitol, Salt Lake City, Utah.
- J. A. Howell, Chairman, Utah Water and Power Board, Ogden, Utah.

George D. Clyde, Commissioner-Elect, Logan, Utah.

John P. Stevens, Member, Utah Water and Power Board, Henefer, Utah.

- Wallace D. Yardley, Member, Utah Water and Power Board, Beaver, Utah.
- Hugh W. Colton, Member, Utah Water and Power Board, Vernal, Utah.

Orson Christensen, Member, Utah Water and Power Board, Brigham City, Utah.

- Charles Redd, Member, Utah Water and Power Board, La Sal, Utah.
- Gordon W. Clark, Member, Utah Water and Power Board, St. George, Utah.
- Byron O. Colton, Member, Utah Water and Power Board, Roosevelt, Utah.
- Mark Gardner, Chief Engineer, Utah Water and Power Board, State Capitol, Salt Lake City, Utah.
- J. C. Busby, Utah Water and Power Board, State Capitol, Salt Lake City, Utah.

B. H. Stringham, Chairman, Colorado Development Committee of 21 Counties, Vernal, Utah.

Henry Roberts, Colorado Development Committee of 21 Counties, Goshen, Utah.

Sterling Price, Executive Secretary and Manager, Greater Utah Valley, Inc., Springville, Utah.

- Lawrence Siddoway, Executive Manager, Chamber of Commerce, Vernal, Utah.
- Dale Jensen, Director, Uintah County Water Users, Vernal, Utah.
- C. R. Henderson, Chairman, Colorado River Committee of Uintah County, Vernal, Utah.
- E. J. Fjeldsted, Weber Basin Water Conservancy District, Ogden, Utah.

D. D. Harris, Manager, Weber River Water Users Association, Layton, Utah.

R. J. Sloan, Salt Lake County Water Users Association, Salt Lake City, Utah.

Gerald Irvine, Attorney, Utah Power and Light Company, Salt Lake City, Utah.

David D. Moffat, Jr., Engineer, Utah Power and Light Company, Salt Lake City, Utah.

H. T. Person, Dean of the School of Engineering, University of Wyoming, Laramie, Wyoming.

Joe L. Budd, Assistant to the Commissioner, Big Piney, Wyo.

E. O. Larson, Regional Director, Region 4, Salt Lake City, Utah. J. Stuart McMaster, Regional Counsel, Region 4, Salt Lake City,

C. B. Jacobson, Regional Hydrologist, Region 4, Salt Lake City, Utah.

Milton T. Wilson, District Engineer, Salt Lake City, Utah.

G. E. Harbeck, Jr., Staff Engineer, Water Resources Division, Denver, Colorado.

November 6, 1953

- John R. Erickson, Engineer, New Mexico Interstate Stream Commission, Santa Fe, New Mexico.
- Jean S. Breitenstein, Attorney, Colorado Water Conservation Board, Denver, Colorado.
- George D. Clyde, Director of the Utah Water and Power Board, State Capitol, Salt Lake City, Utah.
- L. C. Bishop, State Engineer, State Capitol, Cheyenne, Wyo.
- J. R. Riter, Chief Hydrologist, Hydrology Division, Bureau of Reclamation, Denver, Colorado proxy for Harry W. Bashore.
- John Geoffrey Will, Secretary and General Counsel, Grand Junction, Colo.

R. D. Goodrich, Chief Engineer, Grand Junction, Colorado.

- Ival V. Goslin, Assistant Chief Engineer, Grand Junction, Colorado.
- Ivan C. Crawford, Director, Colorado Water Conservation Board, Denver, Colorado.
- Charles W. Soller, Assistant Attorney General, Denver, Colorado.
- H. H. Christy, Colorado Conference Committee, Pueblo, Colorado.
- George Cory, Colorado Conference Committee, Mntrose, Colo rado.

Utah.

H. P. Dugan, Head of the River Regulation Section, Hydrology Branch, Denver, Colorado.

- Glen G. Saunders, Attorney, Denver Water Board, Denver, Colorado.
- F. M. Peterson, Colorado River Water Conservation District, Delta, Colorado.
- J. M. Dille, Northern Colorado Water Conservancy District, Greeley, Colorado.
- John H. Bliss, State Engineer, Santa Fe, New Mexico.
- Fred E. Wislon, Legal Adviser to the Commissioner, Albuquerque, New Mexico.
- I. J. Coury, New Mexico Interstate Stream Commission, Farmington, New Mexico.
- John Patrick Murphy, Secretary, Middle Rio Grande Flood Control Association, Albuquerque, New Mexico.

Joseph M. Tracy, State Engineer, Salt Lake City, Utah.

- E. R. Callister, Attorney General, Salt Lake City, Utah.
- William R. Wallace, Utah Water Users Association, Salt Lake City, Utah.
- Thomas W. Jensen, Utah Water Users Association, Salt Lake City, Utah.
- B. H. Stringham, Chairman, Colorado Development Committee of 21 Counties, Vernal, Utah.
- Hugh W. Colton, Member, Utah Water and Power Board, Vernal, Utah.
- Lawrence Siddoway, Executive Manager, Chamber of Commerce, Vernal, Utah.
- Harry Ratliff, Engineer, Humphreys Engineering, Vernal. Utah.
- Howard Black, Attorney General, Cheyenne, Wyoming.
- H. T. Person, Dean of the School of Engineering, University of Wyoming, Laramie, Wyoming.
- Norman W. Barlow, Assistant to the Commissioner, Cora, Wyoming.
- Breck Moran, Chief of Resource Development, Natural Resource Board, Cheyenne, Wyoming.
- J. Stuart McMaster, Regional Counsel, Region 4, Salt Lake City, Utah.
- H. P. Dugan, Head of the River Regulation Section, Hydrology Branch, Denver, Colorado.
- John L. Mutz, Area Engineer, Albuquerque, New Mexico.

Francis M. Bell, District Engineer, Denver, Colorado.

- G. B. Keesee, Area Irrigation Engineer, Gallup, New Mexico.
- Charles M. Tansey, Jr., Assistant Counsel, Farmington, New Mexico.
- H. T. Person, Dean of the School of Engineering, University of Wyoming, Laramie, Wyoming.

William E. Welsh, Secretary-Manager, Washington, D. C.

December 12, 1953

John R. Erickson, State Engineer, Santa Fe, New Mexico.

Jean S. Breitenstein, Attorney, Colorado Water Conservation Board, Denver, Colorado.

- George D. Clyde, Director, Utah Water and Power Board, State Capitol, Salt Lake City, Utah.
- L. C. Bishop, State Engineer, State Capitol, Cheyenne, Wyoming.
- John Geoffrey Will, Secretary and General Counsel, Upper Colorado River Commission, Grand Junction, Colorado.
- R. D. Goodrich, Chief Engineer, Upper Colorado River Commission, Grand Junction, Colorado.
- Ival V. Goslin, Assistant Chief Engineer, Upper Colorado River Commission, Grand Junction, Colorado.

Duke W. Dunbar, Attorney General, Denver, Colorado.

- Charles W. Soller, Assistant Attorney General, Denver, Colorado.
- Omer Griffin, Assistant Attorney General, Denver, Colorado.
- Ivan C. Crawford, Director, Colorado Water Conservation Board, Denver, Colorado.
- R. J. Tipton, Consulting Engineer, Colorado Water Conservation Board, Denver, Colorado.
- R. M. Gildersleeve, Engineer, Colorado Water Conservation Board, Denver, Colorado.
- George W. Colburn, Engineer, Colorado Water Conservation Board, Denver, Colorado.
- F. C. Merriell, Colorado River Water Conservation District, Grand Junction, Colorado.
- J. M. Dille, Northern Colorado Water Conservancy District, Greeley, Colorado.
- George A. Pughe, Colorado Water Conservation Board, Craig, Colorado.
- Frank Delaney, Colorado River Water Conservation District, Glenwood Springs, Colorado.
- F. M. Peterson, Colorado River Water Conservation District, Delta, Colorado.
- C. J. McCormick, Colorado River Water Conservation District, Grand Junction, Colorado.
- Charles R. Neill, North Fork Water Conservation District, Hotchkiss, Colorado.
- Harold Christy, Colorado Conference Committee, Pueblo, Colorado.
- Glenn G. Saunders, Denver Water Department, Denver, Colorado.
- H. L. Potts, Denver Water Department, Denver, Colorado.
- A. P. Starr, Austin, Colorado.

Kelso Musser, Delta, Colorado.

William Nelson, Daily Sentinel, Grand Junction, Colorado.

Gordon G. Gauss, Associated Press, Denver, Colorado.

Phil Robertson, United Press, Denver, Colorado.

T. E. Frenzel, International News Service, Denver, Colorado.

John H. Bliss, New Mexico Interstate Stream Commission, Santa Fe, New Mexico.

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Fred E. Wilson, Legal Adviser to the Commissioner, Albuquerque, New Mexico.

I. J. Coury, New Mexico Interstate Stream Commission, Farmington, New Mexico.

John Patrick Murphy, Secretary, Middle Rio Grande Flood Control Association, Albuquerque, New Mexico.

- Jack Cline, San Juan Water Users Association, Fruitland, New Mexico.
- E. R. Callister, Attorney General, Salt Lake City, Utah.
- J. A. Howell, Chairman, Utah Water and Power Board, Ogden, Utah.
- Jay R. Bingham, Utah Water and Power Board, Springville, Utah.
- Hugh W. Colton, Utah Water and Power Board, Vernal, Utah.
- B. H. Stringham, Chairman, Colorado Development Committee of 21 Counties, Vernal, Utah.
- Henry B. Millecam, Mayor, Vernal, Utah.
- L. Y. Siddoway, Executive Manager, Chamber of Commerce, Vernal, Utah.
- O. L. Johnson, Chamber of Commerce, Vernal, Utah.
- C. R. Henderson, Uintah County Colorado River Development Committee, Vernal, Utah.
- Dale C. Jensen, Vernal City, Vernal, Utah.

B. D. Adams, Utah County Commissioner, Provo, Utah.

Harry Ratliff, Humphreys Phosphate Company, Vernal, Utah.

H. T. Person, Dean of the School of Engineering, University of Wyoming, Laramie, Wyoming.

Breck Moran, Chief of Resource Development, Natural Resource Board, Cheyenne, Wyoming.

Wilbur A. Dexheimer, Commissioner of Reclamation, Washington, D. C.

- N. B. Bennett, Jr., Chief Branch of Project Planning, Bureau of Reclamation, Washington, D. C.
- J. R. Riter, Chief Hydrologist, Hydrology Division, Bureau of Reclamation, Denver, Colorado.
- H. P. Dugan, Head of the River Regulation Section, Hydrology Division, Bureau of Reclamation, Denver, Colorado.

- E. O. Larson, Regional Director, Region 4, Bureau of Reclamation, Salt Lake City, Utah.
- J. Stuart McMaster, Regional Counsel, Region 4, Bureau of Reclamation, Salt Lake City, Utah.
- Cecil B. Jacobson, Hydrology Division, Region 4, Bureau of Reclamation, Salt Lake City, Utah.
- Howard E. Robbins, Regional Director, Region 5, Bureau of Reclamation, Amarillo, Texas.
- C. H. Jex, Area Engineer, Bureau of Reclamation, Grand Junction, Colorado.
- John L. Mutz, Area Engineer, Bureau of Reclamation, Albuquerque, New Mexico.
- Francis M. Bell, District Engineer, U. S. Geological Survey, Denver, Colorado.
- G. B. Keesee, Area Irrigation Engineer, Office of Indian Affairs, Gallup, New Mexico.
- Charles M. Tansey, Jr., Assistant Counsel, Navajo Tribal Council, Farmington, New Mexico.
- John L. Burritt, Secretary Treasurer, Delta Montrose REA, Cedaredge, Colorado.

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