STATEMENT OF STATE OF COLORADO

By

COLORADO WATER CONSERVATION BOARD

Concerning

Report on Colorado River Basin

In Preparation by Bureau of Reclamation

March 28, 1945

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RESOLUTION OF COLORADO WATER CONSERVATION BOARD

March 28, 1945

WHEREAS, the Bureau of Reclamation, United States Department of Interior, has submitted its report, dated November, 1944 and entitled, "A Comprehensive Report on the Control, Improvement and Utilization of the Water Resources of the Colorado River Basin in Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming," in tentative and incomplete form to the above named states for their comments, criticisms and suggestions;

AND, WHEREAS, the above entitled report has been carefully studied and reviewed by the Colorado Water Conservation Board, with the aid and assistance of its engineering staff, after discussions with, and consideration of comments of, representatives from various interested localities and areas of the State of Colorado which would be affected by any plan of development of the Colorado River Basin;

AND, WHEREAS, it is understood that the Bureau of Reclamation, after a revision of its report, will resubmit it to the states for further study and opportunity for submission of their several suggestions and objections, if any they may have, pursuant to Public Law 534, Chapter 665, 78th Congress, 2nd Session;

NOW, THEREFORE, BE IT RESOLVED by the Colorado Water Conservation Board this 28th day of March, A. D. 1945 that the attached statement, embodying comments, criticisms and suggestions respecting the above mentioned report be submitted for and on behalf of the State of Colorado to the Bureau of Reclamation, United States Department of Interior; and that the Bureau be respectfully asked to consider such statement and revise its report in compliance with the comments and suggestions therein contained.

THE COLORADO WATER CONSERVATION BOARD

By John C. Vivian

JOHN C. VIVIAN, GOVERNOR and CHAIRMAN

ATTEST:

Clifford H. Stone

CLIFFORD H. STONE, SECRETARY

(Statement Attached)

March 28, 1945

STATEMENT OF STATE OF COLORADO

By

Colorado Water Conservation Board

Concerning Report on Colorado River Basin
In Preparation by Bureau of Reclamation

1. The Report in preparation by the Bureau of Reclamation, United States Department of Interior, dated November 1944, entitled, "A Comprehensive Report on the Control, Improvement and Utilization of the Water Resources of the Colorado River Basin in Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming," has been submitted in tentative and incomplete form to said States for their comments and suggestions. In its revised final form the Report is to be transmitted to Congress for adoption and publication.

2. The Report on the Colorado River Basin is said to have been prepared in compliance with Sec. 15, 45 Stat. 1057, the Boulder Canyon Project Act adopted December 21, 1928, which authorized and directed the Bureau of Reclamation "to make investigations and public reports of the feasibility of projects for irrigation, generation of electric power, and other purposes in the States of Arizona, Nevada, Colorado, New Mexico, Utah and Wyoming for the purpose of making such information available to said States and to Congress, and of formulating a comprehensive scheme of control and improvement and utilization of the water of the Colorado River and its tributaries;" and Sec. 2, 54 Stat. 774, the Boulder Canyon Project Adjustment Act adopted July 8, 1940, which authorized the "continuation and extension of studies and investigations by the Bureau of Reclamation for the formulation of a comprehensive plan for the utilization of waters of the Colorado River system for irrigation, electrical power, and other purposes, in the States of the Upper Division and the States of the Lower Division, including studies of quantity and quality of water and all other relevant factors."

3. Other reports of the Bureau of Reclamation with which the Report under consideration will be compared by Congress include;

(a) Report on Missouri River Basin, dated April 1944, transmitted to and adopted by Congress and published as Senate Document 191, 78th Congress, 2d Session, - being the first of a series of comprehensive or basin-wide reports contemplated by the Bureau of Reclamation, one for each of the dozen or more major stream systems or natural drainage basins in the Seventeen Western States.

(b) The document entitled, "Inventory of Irrigation and Multiple Purpose Projects for Construction in the Post War Period," in the Seventeen Western States, transmitted to Congress by the Bureau of Reclamation on June 6, 1944, and published as "Part 5 - Reclamation, Irrigation

and Power Projects" of the Hearings, pursuant to Senate Resolution 102, before the Sub-Committee on Roads and Reclamation of the Senate Committee on Postwar Economic Policy and Planning.

4. The following comments and suggestions, relative to the Report on the Colorado River Basin, constitute a Statement by and in behalf of the State of Colorado, and are made by the Colorado Water Conservation Board as authorized by Chapter 265, Session Laws of 1937. Inasmuch as pages 11 to 15 of the Report, being the section entitled, "Summary and Recommendations," are blank in the copies submitted to Colorado, but are to be filled in by the Bureau of Reclamation in the revised final draft transmitted to Congress, this Statement shall be considered preliminary and incomplete, and subject to such amendment as Colorado may deem necessary or advisable if and when the recommendations of the Report are made known to the State. The intention of the Statement is to improve the value of the Report to Congress and to the States of the Colorado River Basin.

5. The Report contains a list of potential projects for irrigation, hydro-electric power, and other purposes, which might be constructed in the Colorado River Basin and the States thereof, the aggregate depletions of which, together with allowances for present depletions, are said to exceed the available water supplies. With respect to said list of potential projects, the Bureau of Reclamation says: "Here are possible projects - here are opportunities for the future. The people must decide what shall be done." However, the Bureau points out that while the potential projects outline the improvement opportunities and development possibilities of the future, the Report does not present a final plan, for the reason that "many intrastate, interstate and international problems must be solved before a final pattern of development can be evolved." More specifically, with respect to decisions to be made and problems to be solved by the citizens, States and Nations, the Bureau says that in each State selections must be made from the list of potential projects; that interstate relations must be defined in the Upper Basin and clarified in the Lower Basin; and that the limits of ultimate development in the United States will be determined in part by any allocation of water to Mexico by treaty between the two Nations.

6. The potential projects described and summarized in the Report are listed without regard for the order in which they are or will be needed and are likely to be constructed, and without segregation according to relative feasibility. With respect to "investigations and public reports of the feasibility of projects," as authorized by the Boulder Canyon Project Act, the Bureau of Reclamation says that, although reports on some individual projects have been published, additional detailed investigations will be needed to determine the relative merits of (listed and alternative) projects, and must be made before many of the potential projects listed in the Report can be authorized and construction undertaken.

7. While the Report contains estimates of project and total construction costs it fails to present information concerning the basin-

wide or regional benefits expected to ultimately result from the improvements and developments outlined by such projects, and fails to indicate how much of the total investment may be expected to be returned or repaid by water and power users and other local beneficiaries. Nevertheless the Bureau of Reclamation says, that the Colorado River Basin can be developed into one of the most prosperous sections of the country, and that maximum development of the Colorado River is necessary, not only for the economic stabilization and growth of the Colorado River Basin, but also for the benefit of the entire Nation, upon the theory that true National prosperity can be achieved only by the prosperity of all component parts of the integrated economic system.

8. To improve the value of the Report to Congress, and in behalf of the entire Colorado River Basin and its development in competition with other natural drainage basins and stream systems, Colorado suggests that the Report be revised to include information concerning the basin-wide or regional benefits to result from the full utilization of water, and to show the relations between total construction costs and ultimate benefits, and how much of the investment in the Colorado River Basin may be expected to be repaid in time by water and power users and other local beneficiaries. Colorado submits that, in the absence of such showings, the Report on the Colorado River Basin will compare unfavorably with the previously transmitted Report on the Missouri River Basin and perhaps with others in preparation by the Bureau of Reclamation. Assuming the information concerning benefits and returns is included in the Report, Colorado suggests that a recommendation appear therein to the effect that the general improvement program and ultimate development plan broadly outlined by the potential projects listed in the Report be approved by Congress subject to such modifications and changes therein as may be indicated, from time to time, by the additional data and information acquired as additional detailed investigations are completed on potential and alternative projects, and as general investigations are continued in the basin; and subject to such modifications and changes therein as may be dictated by the solutions of intrastate and interstate problems by the citizens and States of the Colorado River Basin, and of international problems by the two Nations.

9. To further improve the value of the Report to Congress, and prevent it from halting, instead of promoting, the development of the Colorado River Basin, Colorado suggests the designation therein of an initial list of projects, constituting the next or postwar or near-future stage of construction, together with a recommendation to Congress that said initial list of projects be adopted, and that the Bureau of Reclamation be authorized to spend the sum of money to be specified in the Report (consistent with the sum specified in the Missouri River Basin Report) on the commencement of construction of said initial list of projects, and on the continuation of additional detailed project investigations and further general investigations incident to the improvement and development of the Colorado River Basin.

10. With respect to the initial list of projects to be selected and designated in the Report, it will be recalled that heretofore, on June 6,

1944, the Bureau of Reclamation transmitted to Congress an Inventory of Projects considered suitable for construction in the postwar period in all the stream basins of the Seventeen Western States. Colorado suggests that the initial list of projects to be designated in the Report be selected from said Inventory of Postwar Projects, and consist of all those considered suitable for postwar construction which can be operated without thereby causing the beneficial consumptive use of waters of the Colorado River system from exceeding the quantities of water heretofore apportioned for such use to the Upper Basin and to the Lower Basin by Art. III (a) and (b) of the Colorado River Compact, and without thereby causing the flow of the Colorado River at Lee Ferry to be depleted below an aggregate of 75,000,000 acre feet for any period of ten consecutive years, as provided by Art. III (d) of said compact, and without thereby causing the beneficial consumptive use of water in any one State of the Upper Division from exceeding the quantity of water which that State contributed under virgin conditions to the waters of the Colorado River system, provided that this shall not be construed as relieving any state from delivering its fair share at Lee Ferry to make good the terms of the Colorado River Compact.

11. Directing attention, next, to revisions of the Report to improve its value to the citizens and States of the Colorado River Basin, Colorado admits that the intrastate, interstate and international problems mentioned therein must eventually be solved before the final stages of ultimate development are reached, but denies that such problems should be undertaken or can be solved all at once and promptly, as stated or implied by the Report. On the contrary Colorado asserts, and suggests the Report be revised to show, that such problems are inter-related and the solutions of some are dependent on the previous solutions of others; that such problems must be and are being solved one at a time, or in stages, and in an orderly manner as they are confronted; that solutions of recognized problems, as well as others to arise in the future, are dependent in part on data being and to be compiled by the Bureau of Reclamation, in addition to that summarized in the Report; and that decisions on some of the problems cannot be made until further development has been accomplished by additional construction in the basin.

12. In support of the foregoing general suggestions, attention is directed, first, to the intrastate problems that are said to await solutions by Colorado and its citizens, namely, of making selections from the potential projects or development possibilities listed in the Report. As the Report points out, additional detailed investigations and individual project feasibility reports will be needed to determine relative merits, and hence are necessary before the requested final selections can be made. Colorado asserts that, during the period of more than sixteen years since the Boulder Canyon Project Act was adopted, which authorized the making of such investigations and reports, the Bureau of Reclamation has completed them for less than 20 percent of the potential projects or known development possibilities in Colorado; that, until such investigations and reports are completed by the Bureau of Reclamation for the remaining more than 80 percent of the possible Colorado projects, the State and its citizens cannot fully solve their intrastate problems nor make the final selections requested in the Report; and that such selec-

tions as may now be required, to avoid interrupting the progressive development of the State, were made by the Bureau of Reclamation when on June 6, 1944, all those projects that appeared, from pending and completed investigations, to be most needed, feasible and economically justified, were recommended to Congress for postwar construction in Colorado.

13. The major intrastate problems that confront Colorado are those involving diversions from the Colorado River Basin for use in other sections of the State. These are created by the unequal distribution of land and water resources over Colorado, - 70 percent of the water resources of the State being in the Colorado River Basin, west of the Continental Divide, whereas that basin contains but 26 percent of the irrigated lands and but 5 percent of the arable lands awaiting reclamation by irrigation in Colorado. The policy of the State of Colorado, with respect to export diversions from the Colorado River Basin, is expressed in the Colorado Water Conservancy District Law (Sec. 13, Session Laws of 1937, as amended), which provides that:

(a) Any works or facilities planned or designed for the exportation of water from the natural basin of the Colorado River and its tributaries in Colorado shall be subject to the provisions of the Colorado River Compact and the Boulder Canyon Project Act, as amended;

(b) Any such works or facilities shall be designed, constructed and operated in such a manner that the present appropriations of water, and in addition thereto prospective uses of water for irrigation and other beneficial consumptive-use purposes, including consumptive uses for domestic, mining and industrial purposes, within the natural basin of the Colorado River in the State of Colorado from which the water is exported, will not be impaired nor increased in cost at the expense of water users within the said natural basin; and,

(c) The facilities and other means for the accomplishment of said purpose shall be incorporated in, and made a part of, any project plans for the exportation of water from said natural basin in Colorado.

Under the said policy of the State of Colorado the intrastate problems incident to exportations from the Colorado River Basin are being solved as rapidly as the detailed investigations and project reports are completed by the Bureau of Reclamation. Colorado points out that the recent reorganization of the Bureau of Reclamation has delayed the completion of project investigations; that the boundaries of regions now established, though helpful to States such as Utah and California, inasmuch as the Salt Lake and Boulder City offices have charge of the areas involved in both the points of diversion and the places of use of such exportations, are adverse to developments in Colorado, inasmuch as the State and its citizens are required to deal with the Salt Lake office, in charge of the Colorado River Basin, and with the Denver and Amarillo offices, in charge of river basins in Colorado east of the Continental Divide; and that the Report on the Colorado River Basin shows the estimated costs and potential depletions of exportation projects under investigation by the Denver and Amarillo offices, but does not report the

acreages irrigated, power generated, or other benefits to result from such projects; and, while the Report states or infers that such benefits will appear in basin-wide reports in preparation for the importing basins, Colorado points out that projects for importing water to the South Platte River, a tributary of the Missouri River, were not included in the Missouri River Basin Report, and that the Report on the Arkansas River Basin is said to be in preparation in the Amarillo office, while projects for importing water to that basin are being investigated, planned and designed in the Denver office.

14. In further support of the general suggestions outlined in paragraph 11, attention is directed, next, to the interstate problems that are said to await solutions in the Upper Basin, namely, that interstate relations among all States of the Upper Division must be defined. Colorado asserts, and suggests the Report be revised to show, that the physical conditions which generally prevail in the Upper Basin are such that the streamflows of the Colorado River and its major tributaries are being used only in the one State in which they are produced by the natural precipitation and runoff therein, - and hence there are no pending or threatened controversies between adjoining States concerning the use of such streamflows; that such controversies as have arisen in the past, or are likely to arise in the future, involve a relatively few minor tributaries, such as the La Plata River, a tributary of the San Juan River, where an interstate compact heretofore has been ratified between Colorado and New Mexico, and the Little Snake River, a tributary of the Yampa River, where an interstate compact is being negotiated between Colorado and Wyoming; and that similar controversies as they may arise in the future are expected to be adjusted when and as they arise, by the two States and their interested citizens, as provided by Art. VI of the Colorado River Compact, with the aid of and based on the factual information supplied by the Bureau of Reclamation and other State and Federal agencies.

15. Concerning the definition of interstate relations in the Upper Basin, as requested by the Report, Colorado admits that a compact among the States of the Upper Division, as contemplated in the Colorado River Compact, will eventually be needed to define the relative rights and obligations of the respective States, and should be negotiated before the final stage of ultimate development in the Upper Basin is reached; but asserts that such a compact is desirable but not practicable at the present time. As indicated by the Report, present development in the Upper Basin, including allowances for projects now authorized but not yet completed, involves the use of but one-third of the quantity of water heretofore apportioned to the Upper Basin by Art. III (a) of the Colorado River Compact. Before a compact among States of the Upper Division will be needed, to recognize and protect existing developments in each State, and define the interests of each in the waters of the Upper Basin awaiting future development, it appears desirable that sufficient additional time should elapse during which projects might be constructed that would at least double the present utilization of water in the Upper Basin, and during which the Bureau of Reclamation might complete the necessary detailed investigations of all development possibilities. Before a final and permanent compact among States of the Upper Division can be negotiated,

it appears requisite that international relations be defined by treaty between the two Nations, and the surplus waters of the Colorado River system be determined, under Art. III (e) of the Colorado River Compact; that the ultimate limits of development in the Upper Basin be defined under the apportionment heretofore made by Art. III (a), and the further apportionment to be made in the future under Art. III (f) of the Colorado River Compact; and that interstate relations among States of the Lower Division, as complicated by various acts and contracts, be clarified to such extent as may be necessary for a better understanding of the relative rights of the Upper and Lower Basins under the Colorado River Compact.

16. The Report evidences that the data and information were assembled in different offices. It gives the impression, by its arrangement, of being two separate sub-basin reports under one cover. The absence of basin-wide summaries implies that practises in the two sub-basins, with respect to diversions and uses of water, are so different in character that comparative summaries for the entire basin cannot be prepared. To make the Report in fact, and in accordance with its title, a Report on the Colorado River Basin, basin-wide summaries of the data and information should be included in the final revised draft. This may involve rearrangement of the chapters, - combining chapters IV and VII into one chapter entitled, "Using the Water," chapters V and VIII into one entitled, "Power from Water," chapters VI and IX into one entitled, "Wealth from Water," - with each of the three revised chapters being subdivided into Part 1 - Upper Colorado River Basin, Part 2 - Lower Colorado River Basin, and Part 3 (to be added) - Summary for Colorado River Basin. It is essential that all terms employed in the Report be defined, and be employed consistently throughout the Report, to the end that both sub-basins and all States shall be treated alike.

17. For purposes of the Report the Bureau of Reclamation adopts a so-called "Basin," which is neither the natural basin, "within and from which waters naturally drain into the Colorado River system," nor is it the Colorado River Basin as defined by the Colorado River Compact to include, in addition to the natural basin, "all parts of said States without the drainage area of the Colorado River system which are now or shall hereafter be beneficially served by waters diverted from the system." The so-called "Basin" of the Report has boundaries that coincide with those of the natural basin above Lee Ferry, but which depart from the natural boundaries below Lee Ferry. In the chapters relating to "Power and Wealth from Water" the boundaries below Lee Ferry are expanded to include all of Southern California, and in the Chapter entitled "Using the Water," the "Basin" below Lee Ferry includes 7,800 square miles of the Salton Sea drainage basin, including the Imperial Valley. Having adopted such a "Basin," the Report presents information concerning waters diverted from the Colorado River system for use outside the natural basin, and designates those above Lee Ferry as "export diversions." While diversions exactly similar in physical and legal character are made below Lee Ferry, the term "export diversions" does not appear in the Lower Basin portion of the Report, presumably because the waters are used within the adopted "Basin," though outside the natural basin the same as those above Lee Ferry. Thus the Report implies that practises in the Upper Basin differ from those in the

Lower Basin, - that some of the waters of the Colorado River system are being used "outside" above Lee Ferry, whereas all uses are "inside" below Lee Ferry. Such an implication, which is not in accordance with facts, and which results solely from the distorted boundaries of the adopted "Basin," is unfair to the States of the Upper Division. Colorado suggests that the Report be revised to show the amounts of water involved in present and potential diversions from the Colorado River system below Lee Ferry for use outside the natural basin; that such quantities be listed individually and be summarized separately from uses within the natural basin, and be designated "export diversions," the same as those above Lee Ferry; and that the export diversions above and below Lee Ferry be compared in amount in the basin-wide summaries which Colorado suggests be added to the Report.

18. The Report presents estimates of so-called "virgin flows," which are not defined, and of so-called "depletions," which are inadequately defined, and says, at page 6: "The Compact divided the water on the basis of virgin flows." Colorado suggests that the Report be revised to eliminate all comparisons between so-called "virgin flows" and compact allocations of water, and all inferences that the two are directly comparable; and in defining depletions, account be taken of changes in stream losses; and further, that the Bureau not assign depletions or savings in stream losses to individual projects. This suggestion does not mean that so-called "virgin flows" should not be evaluated or appear in the Report, for that term, if carefully and fully defined and consistently employed, is useful in analyzing streamflow, water supply, and related data. At the same time the Report should not state or infer that the "virgin flow" quantities are the same as or are directly comparable with the waters of the Colorado River system that have been and are hereafter to be apportioned by the Colorado River Compact.

19. While "virgin flows" are not defined in the Report, the quantities therein shown have been calculated as averages for periods of years, commonly for the period 1931-1940 for stream gaging stations above Lee Ferry, and commonly for the period 1897-1943 for stations below Lee Ferry. Bureau of Reclamation representatives say that, in the revised final draft, average values for both periods will appear for stations in both basins. Colorado says that the Report as a whole should be based on long-time averages. The purpose to be served by virgin flow estimates, manifestly, is to forecast the average conditions to be anticipated in the future. With respect to natural phenomena such as precipitation, and the runoff and streamflows resulting therefrom, all planning for the future is necessarily based on what has occurred in the past. The best evidence of what to expect in the future must be based on the available records of the past. Since neither the occurrence nor the sequence of flood and drouth seasons and cycles of years can be forecast with accuracy, Colorado suggests that virgin flow quantities appearing in the Report should all be based on the same period of years, in order that comparisons may be made one with another; and that said period of years should be 1897-1943, if that be the longest for which streamflow records are available, or can be calculated from related information. That period is of sufficient length to insure that changes in average values, as additional records become available, will probably be only of minor

extent. Colorado says that data for drouth conditions, and sub-normal cycles such as 1931-1940, are important, but says that such data should appear separately from virgin flow estimations. Due to the uncertainties as to when another such cycle of years may be encountered, and as to what then may be the status of development, Colorado says that so-called virgin flows for such an assumed drouth cycle will be misleading, and will not indicate the streamflows available for irrigation, power, and other purposes, unless accompanied by reservoir operation studies to show the effects of streamflow regulation and the additional supplies of water thereby made available during such a period of years. Colorado suggests the inclusion in the Report of such reservoir operation studies on virgin flow conditions to show the regulating effect at Lee Ferry and the International Boundary of mass operations of reservoirs above those points.

20. Virgin flow quantities shown in the Report are the sum of: (a) the average annual streamflows recorded at (or calculated for) the designated gaging station; plus (b) the allowances for upstream "depletions" in the average year of the same period, - said "depletions" being the quantities of water estimated to have been withheld from the stream by the diversion, use and storage of water from and in the natural drainage basin upstream from the designated station. Neither the recorded streamflows nor the "depletion" allowances of the historic period, are shown in the Report. Colorado suggests that, for two key stations, the Report should contain detailed information concerning both items; and that the key stations should be: Colorado River at Lee Ferry and International Boundary.

21. Colorado points out that since "depletions" are a part of the estimated "virgin flows," an understanding of what is meant by "virgin flows" depends in part on the meaning of "depletions," which are defined in general as the differences between diversions and returns; and that evaporation losses from existing and potential main-stem reservoirs are entered as depletions, but are not measurable by the difference between diversions and returns. A proper definition of "depletions" would include both the manner of calculation, or the factors employed in the estimations, and the place of evaluation, whether at the places where such "depletions" occur, or in terms of their resulting effects at points downstream. The data presented are inconsistent in this respect, and therefore are not directly comparable. Upper Basin depletions appear to have been evaluated as of the places where they occur, whereas in the Boulder and Gila divisions of the Lower Basin, the upstream "depletions" appear to have been credited with the estimated salvage of water or reductions in natural conveyance losses attributable to the diminished volumes and regulated character of the flows resulting from upstream development. Colorado urges that both basins be treated alike.

22. The recorded streamflows at designated gaging stations are the unconsumed outflows from the upstream drainage basin, that were not withheld from the stream either by man-made "depletions" or by natural losses of water. In calculating the "virgin flows" of the Report, the man-made "depletions" were added to the recorded outflows, and the natural losses were ignored. Thus "virgin flows" may be said to indicate the streamflows that might have been recorded during the average year of a similar climatic

cycle prior to the time when any of the waters were diverted, used or stored. Since "virgin flows" are outflows from the drainage basin, and since natural losses are not considered in their calculations, the "virgin flow" quantities do not represent the streamflows originally created by natural precipitation over the drainage basin, or the streamflows produced by the runoff from natural precipitation. "Virgin flows" are necessarily less than the original streamflows by whatever amounts of water are consumed by natural processes of evaporation and transpiration, incident to its conveyance downstream to the point where outflows are measured and "virgin flows" are evaluated. Colorado says that natural losses should be taken into account, and that information concerning the extent of natural losses under so-called "virgin conditions" is necessary, and should be added to the estimated "virgin outflows," in order to determine or estimate the amounts of the original streamflows of the Colorado River system. Colorado points out that so-called "depletions" have been estimated and appear in the Report for so-called "present conditions" and for those conditions which may prevail in the future if and when all the potential projects listed in the Report are constructed; that such present and potential "depletions" are segregated by basins and States; and that data concerning the amounts and sources of the original streamflows by basins and States are necessary to complete the Report, and to prevent an incomplete Report from being misleading to the point of being unfair and adverse to the interests of the States of the Upper Division, and particularly to the State of Colorado.

23. The Report, at page 19, says: "Under virgin conditions the River was a growing stream throughout its course until it reached the Black Canyon section (site of Boulder Dam) below which the stream was depleted, except at times of great flood, by evaporation losses in the desert region;" and that virgin flows at various points have been estimated by the Bureau of Reclamation, as follows:

ESTIMATED FLOW - VIRGIN CONDITIONS

Stream	Location	Average Annual Flow (Acre-Feet)
Green River	at mouth	5,903,000
Colorado River	above mouth of Green River	7,289,000
Colorado River	Lee Ferry	16,271,000
Little Colorado	near the mouth	338,000
Virgin River	Littlefield	310,000
Colorado River	Laguna Dam	16,451,000
Gila River	Dome	1,271,000
Gila River	near Phoenix	2,282,000 *

* From text (page 19).

Directing attention to the question of natural losses, the amounts of which are not shown in the Report, Colorado points out that:

(1) The word "depleted" here refers to natural losses, since by definition there were no man-made "depletions" under virgin conditions, and might better read "reduced" or "diminished."

(2) A "growing stream" down to the Black Canyon section does not mean that natural losses are absent above that point, or may be ignored as in the Report. On the contrary it means only that inflows to the main river, or contributions from tributary streams and areas, are greater in amount than the quantities of water lost in conveyance. Similarly, a losing river in the desert region does not mean that there were no tributary contributions under virgin conditions, or that they may be disregarded. Instead, it means that natural losses from the main-river channels were greater in amount than the tributary inflows (except at times of flood).

(3) With "virgin flows" of 2,282,000 acre-feet at Phoenix and 1,271,000 acre feet at Dome, the conveyance loss would be 1,011,000 acre feet plus all the virgin tributary inflow to the river section.

(4) The indicated net gain from Lee Ferry to Laguna Dam, according to the above table, is 180,000 acre feet. Since the contributions reported from Little Colorado and Virgin Rivers together amount to 648,000 acre feet, the table implies that natural losses under virgin conditions were 468,000 acre feet. Colorado questions the accuracy of the estimates for the two reported tributaries, and says that miscellaneous tributary drainage areas were ignored. Under so-called virgin conditions the tributary contributions between Lee Ferry and Laguna Dam (as estimated by Colorado engineers) averaged 495,000 acre feet from the Little Colorado River, 392,000 acre feet from the Virgin River, 413,000 acre feet from miscellaneous drainages between Lee Ferry and Boulder Dam, and 200,000 acre feet from miscellaneous streams (including Williams River) and areas between Boulder Dam and Laguna Dam. Assuming that total figure of 1,500,000 acre feet, of the net gain between Lee Ferry andLaguna Dam is 180,000 acre feet, as shown in the above table, the natural conveyance loss would average 1,320,000 acre feet annually along that river section under virgin conditions.

(5) From the instances above mentioned it is apparent that natural conveyance losses in the Colorado River Basin involve substantial quantities of water, and it seems self-evident that such losses under so-called "virgin conditions," when streamflows were maximum and wholly unregulated, would have been greater than those observed and calculated from records during the historic period. Colorado suggests that estimates of natural losses should be made by the Bureau of Reclamation, and should appear in the Report, covering so-called virgin conditions, or the conditions of the period of record, or both. As estimated by Colorado engineers during the period 1908-1942 (when man-made depletions averaged 1,952,000 acre feet per year above Lee Ferry, and 2,911,000 acre feet below Lee Ferry, and when the recorded flow at the International Boundary averaged 12,683,000 acre feet annually), the natural conveyance losses averaged 870,000 acre feet above Lee Ferry, and 2,640,000 acre feet below Lee Ferry, or totalled 3,510,000 acre feet annually in the Colorado

River Basin.

24. The "virgin flow" at Lee Ferry shown in the Report is 16,271,000 acre feet annually. Colorado notes that, as previously calculated by the Bureau of Reclamation for each year of the period 1897-1943, the virgin flow at Lee Ferry averaged 16,223,000 acre feet annually, and for the period 1908-1942 (employed by Colorado engineers) averaged 16,441,000 acre feet annually. Independent estimates by Colorado engineers, based on recorded flows at Lee Ferry averaging 14,308,000 acre feet annually, and upstream "depletions" averaging 1,952,000 acre feet annually during the period, indicate a comparable figure for "virgin flow" at Lee Ferry of 16,260,000 acre feet annually. The difference between the figure of 16,271,000 acre feet shown in the Report, and the comparable figure of 16,260,000 acre feet calculated by Colorado engineers, is so minor in amount that it may properly be disregarded.

25. The Report fails to present data concerning "virgin flows" at Boulder Dam, and at the International Boundary. As estimated by Colorado engineers, for the river section between Lee Ferry and Boulder Dam, under virgin conditions, the tributary inflows averaged 1,300,000 acre feet and the natural losses averaged 130,000 acre feet, indicating a net gain of 1,170,000 acre feet, which, added to the virgin flow at Lee Ferry of 16,260,000 acre feet, gives a virgin flow at Boulder Dam of 17,430,000 acre feet annually; and for the river section between Boulder Dam and Laguna Dam, the tributary inflows averaged 200,000 acre feet and natural losses averaged 1,070,000 acre feet, indicating a net loss of 870,000 acre feet, and a virgin flow at Laguna Dam of 16,560,000 acre feet annually, - as compared with the figure of 16,451,000 acre feet shown in the Report. Virgin flows at the International Boundary, as calculated by Colorado engineers, averaged 18,000,000 acre feet annually, - as compared with the figure of 17,722,000 acre feet which might be derived from the Report by adding the 16,451,000 at Laguna Dam to the 1,271,000 Gila River at Dome. Here, too, the results are in substantial agreement.

26. Chapter II entitled, "Claiming the Basin," includes discussions of explorations, settlement, and early development of the river for irrigation, flood control, power and other purposes, and a summary of conditions in the early 1920's. At page 27 a table is presented entitled, "Irrigation Development in the Colorado River Basin in 1922," which purports to show the irrigated and irrigable acres in the Upper Region and in the Lower Region, including acreages in Mexico. Colorado points out that the term "Colorado River Basin," as defined by Art. II (b) of the Colorado River Compact is limited to "territory within the United States of America;" and suggests that in lieu of said table the following tabulation be substituted, being information compiled from reports of the United States Bureau of the Census, as follows:

IRRIGATED ACRES IN COLORADO RIVER BASIN

As Reported by U. S. Census Bureau

	1902	1909	1919	1929	1939
Arizona	246,866	317,661	461,694	572,289	640,110
California	10,000	213,611	447,384	464,653	454,768
Colorado	417,839	617,242	766,532	856,413	844,494
Nevada	11,481	13,850	8,546	12,308	13,880
New Mexico	29,809	37,300	53,808	55,310	49,841
Utah	92,622	167,287	362,576	347,452	324,899
Wyoming	118,566	183,595	211,507	228,699	273,971
Basin Totals	927,183	1,550,546	2,312,546	2,537,124	2,601,963

The above table indicates the irrigation development of the Colorado River Basin since 1902, or illustrates "Claiming the Basin" for agricultural purposes during the past 40 years, and is not inconsistent with data appearing in the Report for the Basin as a whole. The table at page 27 shows 2,400,000 acres irrigated in 1922, whereas the above table shows 2,312,546 acres in 1919 and 2,537,124 acres in 1929. Later in the Report a figure appears of slightly more than 2,600,000 acres, which represents the present irrigated acreage exclusive of allowances made for irrigable lands of existing and authorized projects to be irrigated in the future, which figure is substantially the same as the 2,601,963 acres reported by the U. S. Census Bureau for the season of 1939, although there are unexplained differences in the figures when considered by individual States. Colorado questions the advisability of reporting information concerning lands considered irrigable in 1922, unless it can be shown that the determinations were based on land classification definitions that were uniformly applied in both basins and Nations. Information concerning developments in Mexico would not come within the title of the Report. Whatever data regarding Mexico may be justified for inclusion and preservation in the Report, if any, might better appear in the following Chapter entitled, "Dividing the Water," and in the section thereof entitled, "Between the United States and Mexico." Colorado points out that the irrigated acreage in the Basin, according to the above table, increased from 927,183 acres in 1902, to 2,601,963 acres in 1939; and suggests that the Bureau of Reclamation segregate the increase of 1,674,780 acres as between federal and private developments. In this connection Colorado notes that the irrigated acreage in the Colorado River Basin in Colorado increased from 417,839 acres in 1902 to 844,494 acres in 1939, and says that the increase of 426,655 acres in about 40 years may be attributed to federal developments to the extent of 90,012 acres, and to private developments to the extent of 336,643 acres.

27. Chapter III, entitled, "Dividing the Water," contains an outline of the factors said to have motivated the negotiation of the Colorado River Compact, and is arranged in two parts entitled, "Between the Upper and Lower Basins;" and "Between the United States and Mexico." Subject headings

under part one; "Between the Upper and Lower Basins," are entitled, The Colorado River Compact, the Boulder Canyon Project Act, Contracts for Power and Water, and Boulder Canyon Project Adjustment Act. With respect to Chapter III, "Dividing the Water," Colorado suggests revisions, amendments, and rearrangements of the information, as follows:

(1) Early in said chapter, under the heading, "Between the Upper and Lower Basins," include the full text of the Colorado River Compact, - a document involving but 4 printed pages which is of such importance as to justify its reproduction in full. Its inclusion will not add to the length of the Report, for thereby many of the explanatory statements as to provisions of the Compact can be deleted, some of which statements may not be entirely accurate, or at least must be revised to make them accurate. Colorado suggests that introductory comments, concerning the fears, hopes and contentions, that are said to have motivated the negotiation of the Compact, should be confined to statements of physical conditions and relations affecting development needs and programs, and should so far as possible avoid interpretations of decisions (such as the decree entered in 1922 in the case of Wyoming v. Colorado respecting the Laramie River, which Colorado says is wrongly interpreted in the Report, as evidenced by subsequent interpretations thereof by the Court itself); and should eliminate legal opinions such as those concerning "the law respecting rights to the use of waters of interstate streams," and contentions such as that "the federal government was the agency which logically should effect the regulation of river development" (since the lower part of the Colorado River was or had been navigable). In the event the Bureau of Reclamation elects to comment on legal questions as the same may have been interpreted in 1922, the Report should include a review of the case of Kansas v. Colorado respecting the Arkansas River, decided in 1907 (and recently reaffirmed), which stream also was or had been navigable in its lower reaches; and which decision definitely covered both questions of interstate and federal-state relations.

(2) In part (2) entitled, "Congressional Acts," include brief digests of the Boulder Canyon Project Act, and the Boulder Canyon Project Adjustment Act, together with such other Acts of Congress as may be related thereto, and such agreements thereunder between the United States and interested organizations as related to the authorization and construction of Boulder Dam; and also a summary of the contracts for power which were entered into and are now in effect.

(3) In part (3) of the Chapter on "Dividing the Water," entitled, "Between the States of the Lower Division," summarize all the contracts entered into between the United States and the States of the Lower Division and interests therein, having to do with the delivery or use of waters of the Colorado River system. Colorado says that numerous contracts have been made, only a few of which are mentioned in the Report, and that such information (including the recently negotiated contract with Arizona, which is not mentioned in the Report) should be presented, together with suggestions by the Bureau of Reclamation as to what steps might be taken to "clarify interstate relations," as requested in the Report.

(4) In part (4) entitled, "Between the States of the Upper Division," include discussio s of conditions and problems as outlined in paragraphs 11-15 of this Statement.

(5) In part (5) entitled, "Between the United States and Mexico," rewrite the text at page 42 of the Report to avoid the presentation of data that might in the future be used by Mexico against the United States, but retaining the discussion of the proposed treaty (at pages 43-44). In the event that the full text of the Boulder Canyon Project Act, the Boulder Canyon Project Adjustment Act, and related documents, are to be included among the appendices, it is suggested that the proposed treaty also be included as an appendix. This procedure might shorten the explanatory text in the Report itself, but will not justify the exclusion of all explanatory comments.

28. Chapters IV and VII of the Report, entitled, "Using the Water," would become Part 1 and Part 2 of Chapter IV under the arrangement herein suggested, to which Part 3 would be added to summarize the data for the entire Colorado River Basin. For detailed treatment the information for both chapters is presented by sub-divisions; - Green, Grand and San Juan Divisions of the Upper Basin; and Little Colorado, Virgin, Boulder and Gila Divisions of the Lower Basin; - and is presented under three general headings; (1) Descriptive Information; (2) Present Development of Water Resources; and (3) Potential Development of Water Resources. Subjects covered in (1) Descriptive Information include physical characteristics, climate, land use, soils, water resources, mineral resources, population, industries, markets and transportation, wild-life and recreation, and other related matters, all of which appear to have been described as fully as limitations on the length of the Report will permit. Without having checked the text or data in detail, and subject to such revisions therein as may be indicated by the suggestions of this Statement, Colorado approves the Descriptive Information of the Report contained in those chapters and divisions that relate to Colorado.

29. In the paragraphs of the Report on "wild-life and recreation" the impression is conveyed that fishing is to be converted from streams to reservoirs. At page 10 of the Synopsis the statement is made that, "the numerous reservoirs would further the propagation of fish and wild-life." Colorado points out, and suggests the Report be revised to show, that the streams themselves, or those tributaries in the higher mountainous sections, are important for trout-fishing, and are valuable for recreational and local business purposes; and that reservoirs to be constructed on such fishing streams should be designed and operated to improve, if possible, the streamflow conditions in behalf of the public interest in sport-fishing. At the same time Colorado recognizes that the regulation and use of streamflows for fishing purposes is non-consumptive of water, and may in fact reduce the natural conveyance losses incident to unregulated and undepleted or virgin-flow conditions.

30. Subject (2), Present Development of Water Resources," has to do with irrigated acreages and depletions under so-called "present" conditions, wherein the word "present" refers not only to the actual or

existing acreages and depletions, but includes also allowances made for the irrigable lands of existing enterprises in the Lower Basin, and for arable lands under authorized projects in the Upper Basin, which irrigable and arable lands, however, are not at present being irrigated. Colorado suggests that the so-called "present" data be segregated, to show (1) the actual or existing conditions, and (2) the allowances made for irrigable and arable lands to be irrigated in the future by projects now authorized, under construction, or incompleted.

31. The following table summarizes the data of the Report, with respect to the existing irrigated acreage in the Colorado River Basin, as determined by the Bureau of Reclamation land classification surveys, and (for purposes of discussion) as reported in the 1940 U. S. Census-Irrigation, for the season of 1939.

ACRES IRRIGATED IN COLORADO RIVER BASIN

As Reported By

	U. S. BUREAU OF RECLAMATION			U.S. CENSUS
	PRESENT	ALLOWANCES	ACTUAL	BUREAU-1939
ARIZONA	4,000	-	4,000	4,000
COLORADO	733,700	2,000	731,700	844,494
NEW MEXICO	38,000	-	38,000	36,178
UTAH	261,100	-	261,100	305,628
WYOMING	242,000	20,000	222,000	273,971
UPPER BASIN	1,278,800	22,000	1,256,800	1,464,271
ARIZONA	1,073,800	236,900	836,900	636,110
CALIFORNIA	803,000	342,100	460,900	454,768
NEVADA	11,000	-	11,000	13,880
NEW MEXICO	18,800	-	18,800	13,663
UTAH	23,500	-	23,500	19,271
LOWER BASIN	1,930,100	579,000	1,351,100	1,137,692
COLO. R. BASIN	3,208,900	601,000	2,607,900	2,601,963

Exclusive of "allowances" for acreages not yet irrigated, the "actual" irrigated acreages reported by the two federal agencies are in substantial agreement for the entire Colorado River Basin. When considered by Upper and Lower Basins, the Report shows about 200,000 acres less in the Upper Basin, and about 200,000 acres more in the Lower Basin, than were reported by the U. S. Census Bureau. These differences when segregated by States are found, in the Lower Basin, in the State of Arizona, and in the Upper Basin, largely in Colorado though in part in Utah and Wyoming. It is not the contention of Colorado, in submitting data from reports of the U. S. Census Bureau, that such information is

comparable in completeness and accuracy with that of the Bureau of Reclamation. Colorado says, however, that U. S. Census Bureau data concerning populations are used in the Report; and that Census Bureau reports on irrigation should not be disregarded inasmuch as they are the principal sources of information for the historic period during which depletions and virgin flows have been calculated, and is information which has been compiled in each census year under uniform definitions that are applicable to both basins and all States alike.

32. The quantity of water consumed within the natural basin above Lee Ferry, by the irrigation of 1,256,800 acres of land therein, is estimated in the Report at 1,948,000 acre feet annually. Although unit rates of water consumption are not disclosed in the Report, the total is equivalent to 1.55 acre feet per acre irrigated, and the Report assumes the same consumption per year in both drouth cycles, such as 1931-1940 and in normal or long-time periods. Colorado engineers estimate that total water consumption within the Upper Basin by existing irrigated lands will average 2,013,000 acre feet under normal conditions, - a figure derived from the application of a somewhat smaller unit rate to a somewhat greater acreage, - and will average 1,812,000 acre feet per year during a drouth cycle such as 1931-1940. Colorado engineers say that the unit rate of water consumption adopted in the Report may be applicable to the problem of estimating water consumption in the basin under full-supply conditions, but that the adopted rate may be too high, considering the relatively large acreage served by unregulated and erratic tributary streamflows, for which present irrigation is inadequate. They say that water consumption in the average year of a drouth cycle such as 1931-1940 is necessarily sub-normal for the reason that diversions and applications of water, the contributions to ground storage, and the return flows during such a period are below average; that much of the acreage is irrigated indifferently and some not at all during drouth cycles; that transpiration losses are reduced by the impaired crop yields; and that the above mentioned factors more than offset the higher temperatures and evaporation rates of longer drouth seasons. Colorado says the Report recognizes the sub-normal depletions of drouth cycles with respect to both export diversions and evaporation losses from mainstem reservoirs, and suggests the same recognition be given to water consumption incident to the irrigation of lands within the natural basin.

33. Existing export diversions above Lee Ferry, for use outside the natural basin, exclusive of allowances for future exportations of authorized projects, are estimated in the Report at 102,000 acre feet in Colorado and 66,000 acre feet in Utah, or a total of 168,000 acre feet per year during a drouth cycle such as 1931-1940. Details are not shown for normal conditions, and the summary tabulation (pages 103 and 104) is confusing because unspecified amounts of water diverted from one division to another, or one State to another, within the natural basin, are included in the totals reported for export diversions. Colorado suggests that such diversions within the natural basin be excluded from the Report, or if included be designated "trans-division," or "trans-state" diversions, and be segregated and summarized separately from "export diversions," which term is applicable to and should be reserved for the waters diverted from the Colorado River system for use outside the natural basin.

Colorado says that export diversions of existing enterprises in Colorado, as they are now constructed and will function in a year of normal climate, will average 135,000 acre feet annually; and that detailed estimates by individual projects appear in the Statement submitted by Colorado at the meeting held in Reno, Nevada, July 20, 1944. A comparable figure for existing exportations in Utah under normal conditions appears to be 79,000 acre feet, making a total for the Upper Basin of 214,000 acre feet annually.

34. Together, the existing depletions in the Upper Basin, resulting from water consumption incident to the irrigation of lands within the natural basin and from export diversions for use outside the natural basin, exclusive of allowances for projects authorized but not constructed and enterprises not yet completed, as estimated by Colorado engineers for the average year of drouth cycles and normal periods, may be summarized as follows:

	Drouth Cycle	Normal Period
Irrigation Consumption in Upper Basin	1,812,000	2,013,000
Export Diversions out of Natural Basin	168,000	214,000
Total Existing Upper Basin Depletions	1,980,000	2,227,000 *

* The comparable figure derived from the Report may approximate 2,129,000 acre feet.

35. In the Lower Basin, the Report includes depletions within the natural basin with exportations for use outside the natural basin, the sum of the two together with evaporation losses from main-stem reservoirs being 4,497,000 acre feet annually. Total consumption incident to the irrigation of 890,200 acres of land within the natural basin (in Arizona, Nevada, New Mexico and Utah) is estimated in the Report at 1,591,000 acre feet annually; diversions from the River for the irrigation of 460,900 acres of land in California are estimated at 2,193,000 acre feet annually; and evaporation los. es from main-stem reservoirs are estimated at 713,000 acre feet annually. Independent estimates by Colorado engineers indicate that depletions of existing projects in the Lower Basin, under normal climatic conditions, will average 5,670,000 acre feet annually, exclusive of allowances for irrigable lands of existing enterprises that have not been irrigated up to the present time. Export diversions for use outside the natural basin below Lee Ferry are given in the Report at 2,193,000 acre feet annually, and are estimated from diversion data by Colorado engineers at 2,700,000 acre feet annually. Evaporation losses from main-stem reservoirs appear in the Report as 713,000 acre feet annually, and are estimated by Colorado engineers (from streamflow records) at 800,000 acre feet annually. Since the estimates of its engineers, with respect to existing depletions in the Lower Basin, are substantially greater than the estimates appearing in the Report, Colorado suggests that the Bureau of Reclamation re-examine its calculations; and, in the event the revised estimates are not materially increased, that the detailed information

involved in the calculations be given in the Report.

36. Directing attention next to so-called "depletion allowances," the Report allows for future depletions in the Upper Basin of 491,000 acre feet annually, by projects under construction but not completed, and by projects authorized but not constructed; and allows for future depletions in the Lower Basin of 4,265,200 acre feet annually, by the "irrigable" lands of existing projects not heretofore or now irrigated. Both allowance quantities appear to be based on long-time average or normal conditions. Allowances in the Upper Basin are reported by individual projects, as follows: 38,000 acre feet of export diversions by Provo project under construction in Utah; 29,000 acre feet of depletions by 20,000 acres to be irrigated by Eden project under construction in Wyoming; 4,000 acre feet of depletions by 2,000 acres of new land to be irrigated by Paonia project authorized for construction in Colorado; 320,000 acre feet of export diversions by Colorado-Big Thompson project under construction in Colorado; and 100,000 acre feet of export diversions for City of Denver by project now partially developed. Data for the Hancos Project (now under construction) was not given. Allowances in the Lower Basin are not listed by individual projects, but are reported as a total of 4,265,200 acre feet for the future irrigation of 579,000 acres of "irrigable" land in Arizona and California, in connection with projects listed at page 237 of the Report that are said to have irrigated 540,000 acres in 1943, all in the Boulder Division. Segregations of the total Lower Basin allowance (by Colorado engineers) indicate that the Report allows 1,000,700 acre feet of depletions for the future irrigation of 239,000 acres of "irrigable" lands in Arizona, in connection with projects said to have irrigated 77,900 acres in 1943; and allows 3,264,500 acre feet for the future irrigation of 342,100 acres of "irrigable" land in California, in connection with projects said to have irrigated 460,900 acres in 1943. The allowances for future depletions in both basins are treated in the Report as "present" depletions, and are summarized and combined with the existing depletions hereinbefore discussed. Colorado suggests that allowances for future depletions should be summarized separately from existing depletions, should be estimated under definitions that are uniformly applicable to both basins and all States alike.

37. For purposes of this discussion the following table has been prepared by adding the depletion allowances of the Report to the existing depletions, to indicate the conditions and relations that would prevail after all projects for which allowances are made come into operation, assuming that in the meantime no other potential projects are constructed.

COLORADO RIVER DEPLETIONS

Units 1000 AF

Per U.S.B.R.

	Existing Depletion	Allowances Per Report	Combined Totals
Arizona	7.2	-	7.2
Colorado	1,212.0	424.0	1,636.0
New Mexico	68.4	-	68.4
Utah	508.4	38.0	546.4
Wyoming	333.0	29.0	362.0
UPPER BASIN	2,129.0	491.0	2,620.0
Arizona	1,473.6	1,000.7	2,474.3
California	2,193.0	3,264.5	5,457.5
Nevada	44.2	-	44.2
New Mexico	28.1	-	28.1
Utah	45.2	-	45.2
Sum	3,784.1	4,265.2	8,049.3
Res. Loss	713.0	-	713.0
LOWER BASIN	4,497.1	4,265.2	8,762.3
COLO. R. BASIN	6,626.1	4,756.2	11,382.3

From the foregoing table it is apparent, with respect to the Upper Basin, that the combined existing depletions and allowances for projects now authorized or under construction will amount to about 2,620,000 acre feet annually, which is about one-third (35 percent) of the 7,500,000 acre feet heretofore apportioned to the Upper Basin by Art. III (a) of the Colorado River Compact; and that other and additional projects with aggregate depletions of 4,880,000 acre feet annually may be constructed in the Upper Basin without thereby causing the total depletions to exceed 7,500,000 acre feet. However, with respect to the Lower Basin, the existing depletions together with the allowances of the Report for future expansion of existing irrigation will exceed the 8,500,000 acre feet heretofore apportioned to the Lower Basin by Art. III (a) and (b) of the Colorado River Compact, - the excess being 262,300 acre-feet annually according to the Report. Until the shares have been determined in those surplus waters of the Colorado River system unapportioned to the Upper Basin and the Lower Basin, and a Treaty made with Mexico in accordance with Art. III (a), (b) and (c) of the Compact, the combined effect of future increased depletions resulting from the construction of potential projects and the expansion of existing projects taking into account the existing depletions, should not exceed the quantities heretofore apportioned by Art. III (a) and (b) of the Compact, namely, 7,500,000 acre feet in the Upper Basin, and 8,500,000 acre feet in the Lower Basin. Colorado objects to the showing of the Report, that allowances or reservations are being made

for future expansion which with existing depletions in the Lower Basin will exceed 8,500,000 acre-feet annually; and objects to the implication that additional potential projects may be constructed in the Lower Basin without such future projects being considered as alternative possibilities in lieu of the said allowances for future depletions of existing projects.

38. Potential projects listed in the Report are estimated at 5,023,000 acre feet of annual depletion in the Upper Basin, and at 2,330,300 acre feet in the Lower Basin. Thus the implication of the Report is that future increased water utilization will occur largely in the Upper Basin. That showing results from combining the existing depletions with future depletions of projects and lands for which "allowances" are made in the Report. A more accurate picture would be presented if such future "allowances" were combined with similar future depletions of potential projects. On that basis the future increased utilization of waters of the Colorado River system, outlined in the Report, will amount to 5,514,000 acre-feet annually in the Upper Basin, and 6,595,500 acre feet annually in the Lower Basin. Together with existing depletions, the total depletions will become 7,643,000 acre feet in the Upper Basin, and 11,092,600 acre feet in the Lower Basin, per estimates of the Bureau of Reclamation, as follows:

Depletions of Colorado River System

Per Report

	Upper Basin	Lower Basin	Total Depletions
Allowances per Report	491,000	4,265,200	4,756,200
Potential Project Depletions	5,023,000	2,330,300	7,353,300
Combined Future Increase	5,514,000	6,595,500	12,109,500
Existing Depletions	2,129,000	4,497,100	6,626,100
Total Depletions	7,643,000	11,092,600	18,735,600

Considering the quantities of water heretofore apportioned to each of the basins by the Compact (7,500,000 to Upper Basin and 8,500,000 to Lower Basin) it is apparent that the potential projects listed in the Report for the Upper Basin can be constructed with assurance that water supplies, within the provisions of the Compact, will be available to all (or substantially all) such projects, whereas in the Lower Basin a considerable portion of the listed projects could have no such assurance at the present time. Instead, the list of potential Lower Basin projects must be treated as a list of development possibilities from which selections must be made, or be considered as a list of alternative possibilities in lieu of those future increased depletions, or some of them, for which allowances are made in the Report. Colorado says that the potential projects listed in the Report for the Upper Basin should be expanded so as to reflect all the opportunities for development in the Upper

Basin, and should be treated as a list of development possibilities from which each State may make such selections as ultimately may be required to avoid exceeding the rights of the Upper Basin and of the States of the Upper Division under the Colorado River Compact.

39. For purposes of discussion, the depletions of potential Upper Basin projects may be segregated and considered in three categories:

(1) irrigation projects within the natural basin, for the reclamation of "new lands" (or lands not now irrigated), and to provide supplemental water supplies for lands now inadequately irrigated;

(2) export diversions for use outside the natural basin; and,

(3) evaporation losses from main-stem power and regulation reservoirs.

Under the plan outlined in the Report it appears that depletion charges are made in accordance with the location of the resulting benefits, - a formula of which Colorado approves. Thereunder the depletions of irrigation projects are charged against the State in which the benefited acreages are located; the depletions of exportation projects against the State in which the water is used; and the depletions of main-stem power and regulation reservoirs are not segregated by States, since their benefits to power and water users, upstream and downstream therefrom, cannot now be anticipated. Their depletions are entered, for the present, against the basin in which the reservoirs are located, and Colorado approves of that temporary arrangement, subject to such revisions as may be dictated by determinations of the locations of benefits when and after such reservoirs are constructed.

40. Considering that group of potential Upper Basin projects which previously herein were designated the "initial list", or next stage of construction, Colorado suggests that their depletions be estimated and shown in the Report. Using rates employed by the Bureau of Reclamation for estimating the future depletions of potential irrigation projects, and exportation quantities hereinafter defined, Colorado engineers have estimated the depletions of said initial list of Upper Basin projects at 2,631,000 acre feet in a year of normal climatic conditions, and at 2,174,000 acre feet in a year of drouth conditions such as 1931-1940. Both averages include the allowances of the Report for projects now authorized and under construction in the Upper Basin. The recorded flow at Lee Ferry during 1931-1940 averaged 10,167,000 acre feet per year. That unconsumed outflow from the Upper Basin remained after all then existing depletions upstream from Lee Ferry had taken their toll of water. During a period in the future similar to 1931-1940, should such a period occur after the projects now authorized and under construction are completed, and after the said initial list of projects have been constructed, the flow at Lee Ferry will amount to 10,167,000 minus 2,174,000 or 7,993,000 acre feet per year, or to 79,930,000 acre feet in the assumed ten-year period. Since that quantity exceeds the delivery obligations of 75,000,000 acre feet imposed by Art. III (d) of the Colorado

River Compact upon the States of the Upper Division, it follows that the said initial list of Upper Basin projects can be authorized and constructed without danger of violating the said delivery obligation, and without requiring the construction of any of the potential main-stem power, regulation or replacement reservoirs listed in the Report. Colorado suggests that the Report be amended to include the analyses and comments above outlined. In connection with said initial list of projects, it should be noted that Colorado has approved the plans of the Little Snake Project only to that first stage of its development which is presently needed, and cannot now approve the plan for full or ultimate development; and Colorado suggests that the potential San Juan-Chama diversion project be excluded from said initial list of projects and not be considered until such time as investigations permit selections to be made by New Mexico; and that an agreement with Colorado will be necessary at that time.

41. Total depletions of all potential Upper Basin irrigation projects listed in the Report are estimated therein at 1,851,000 acre feet annually. Independent estimates by Colorado engineers arrive at substantially the same total for the entire Upper Basin, but disclose rather wide discrepancies when the estimated depletions are segregated by States, as indicated in the following table.

Estimated Depletions of
Potential Upper Basin Irrigation
Projects Listed in Report

	Acres Benefited			Est. Depletions Acre Feet	
	New Lands	Supplemental	Total	U.S.B.R.	C.W.C.B.
Arizona	18,680	6,000	24,680	39,000	39,000
Colorado	471,300	192,700	664,000	918,000	788,000
New Mexico	149,960	15,100	165,060	308,000	291,000
Utah	168,780	161,160	329,940	288,000	319,000
Wyoming	291,330	95,360	386,690	298,000	422,000
Upper Basin Totals	1,100,050	470,320	1,570,370	1,851,000	1,859,000

Unit rates employed by the Bureau of Reclamation in estimating the depletions of potential projects are not disclosed in the Report. Estimates of Colorado engineers are based on rates believed to be applicable under the natural conditions prevailing in the Upper Basin and the States thereof. Colorado suggests that details of depletion calculations should appear in the Report; and says that the above depletions do not fully reflect all the opportunities and possibilities for future development in Colorado, and probably in other States of the Upper Division, that are to be anticipated in the next several decades. In addition to existing depletions of lands irrigated in the Upper Basin, to the allowances for future depletions by projects now authorized or under construction,

and to the above estimated depletions of potential irrigation projects listed in the Report, Colorado says that an allowance might properly be made for the depletions of additional irrigable, arable and pasture lands that may be expected to be irrigated, which additional depletions are estimated by Colorado engineers at 318,000 acre feet annually in Colorado, and 205,000 acre feet annually in other Upper Basin States, or a total of 523,000 acre feet annually in the Upper Basin. The several factors involved in said estimation, forecast, or assumption, may be outlined as follows:

(a) Irrigable Lands. According to the 1940 U. S. Census, the irrigable lands under existing irrigation enterprises which the constructed works were capable of supplying with water exceeded the acreage irrigated by 343,779 acres in the Upper Basin, of which 205,258 acres were in Colorado. Some of such irrigable lands are to be served by the potential projects listed in the Report, but the remaining irrigable lands may in time and probably will in part be irrigated through activities and agencies other than the Bureau of Reclamation.

(b) Arable Lands. According to land classification surveys of the Bureau of Reclamation, the Class 1 and 2 arable lands in western Colorado aggregate 706,480 acres, - a surveyed and classified acreage which Colorado says is incomplete. Of the said acreage, 471,330 acres are to be irrigated by the potential projects listed in the Report. Of the remaining 235,150 acres (or more) of arable land known to be suitable for reclamation by irrigation, a fraction thereof may be included in the previously mentioned (a) irrigable lands; another part may be destined to remain unirrigated; but the balance of the arable lands may, and in time probably will, be irrigated by projects other than those listed in the Report, even though physical conditions and the scattered locations of such lands require that reclamation be accomplished by numerous developments of such small individual magnitude that they fail to interest the Bureau of Reclamation.

(c) Pasture Lands. The need for and possibilities of pasture irrigation are ignored in the Report. According to the 1940 U. S. Census there were 131,923 acres of irrigated pasture in western Colorado, in addition to meadowlands from which native hay crops were harvested. Livestock production is one of the most important of the wealth producing industries in Colorado, and in connection therewith there is a growing need for additional irrigated pasture lands. Livestock interests in Gunnison County claim both the need and the opportunity for an additional 220,000 acres of irrigated pasture in that county alone, and other livestock producing areas in western Colorado have similar plans or hopes for increasing the acreage of irrigated pastures. Colorado says that the Bureau of Reclamation should consider the opportunities for the reclamation of pasture lands by irrigation, and that allowances for the probable ultimate depletions of such lands should appear in the Report, together with those of the previously mentioned irrigable and arable lands developed for harvested crops.

42. With respect to export diversions from the Colorado River system above Lee Ferry, for use outside the natural basin in States of the Upper Division, the Report shows existing exportations averaging 181,000 acre feet annually; an allowance of 458,000 acre feet for projects now authorized or under construction; and potential exportations by projects listed in the report estimated at 2,132,000 acre feet annually. Exportation projects in and for the benefit of Colorado are shown in the Report to involve existing exportations of 102,000 acre feet, an allowance of 420,000 acre feet for projects now authorized or under construction, and estimated exportations by listed potential projects averaging 1,267,000 acre feet annually. Colorado says the existing exportation projects in Colorado, in their present status of construction, are diverting 135,000 acre feet annually under normal climatic conditions; that the potential export diversion projects are improperly described in the Report; that such descriptions as may appear in the revised final draft of the Report should be prepared by or be in accordance with the most recent and feasible plans of the regional directors in charge of such investigations and project reports; and that the estimated depletion allowances for potential exportation projects in Colorado do not adequately reflect the opportunities and probabilities of such diversions, and are far below the possibilities of such developments in Colorado, if questions of project feasibility and economic justification be evaluated upon the same basis as that employed for other competitive projects listed in the Report.

43. Existing exportation projects in Colorado, in their present status of construction, and in an average year of normal climatic conditions, are now diverting waters of the Colorado River system, to the extent of 73,400 acre feet to the South Platte River basin, 58,100 acre feet to the Arkansas River basin, and 4,200 acre feet to the Rio Grande basin, or a total of 135,700 acre feet annually, as shown in detail by individual projects in the Statement of the State of Colorado presented at the meeting in Reno, Nevada, July 20, 1944. Note, from said Statement, that 51,400 acre feet are being diverted by City of Denver developments, and that allowances are necessary for increased future exportations by enterprises heretofore constructed and now in operation, which allowances for City of Denver and other projects are estimated at 132,300 acre feet annually, and which with existing diversions will bring the total to 268,000 acre feet annually. The allowance made in the Report for increased exportations by existing projects is 100,000 acre feet (City of Denver), which Colorado says is inadequate to cover also all other projects now operating.

44. Allowances made in the Report for future exportations of projects now authorized or under construction in Colorado aggregating 420,000 acre feet (Denver 100,000 and Colorado-Big Thompson 320,000 acre feet). In this category the Report should include 21,000 acre feet for the Weminuche Pass Tunnel unit of the authorized San Luis Valley project (page 120 of Report).

45. Opportunities for future exportations of Colorado River water for use in the San Luis Valley in Colorado include the Piedra-Rio Grande diversion (70,000 acre feet, described at page 120), which includes two

reservoirs in the Piedra River basin to provide for regulation of deliveries through the tunnel and for replacement storage; the San Juan-South Fork diversion (53,000 acre feet, not mentioned in the Report); and the Animas-Rio Grande diversion (130,000 acre feet), which is listed (page 120) among the alternative projects, and excluded from the summaries with the statement that "there is insufficient water for this project and also for the full Animas-La Plata project as outlined, or for the Animas River power development." With respect to the conflict between plans for diverting Animas River surplus water for irrigation use either in the San Luis Valley or the La Plata River Valley, Colorado says that decision cannot be made by the local interests, the State of Colorado, or the Bureau of Reclamation, prior to the completion of individual investigations and reports on the feasibility and economic justification of both projects. The Report is not clear as to the period upon which the exportations above mentioned are calculated, whether the drouth cycle of 1931-1940, or long-time averages. From the description on the same page of the San Juan-Chama diversion for New Mexico it appears that drouth-cycle averages are given. With respect to that project, the statement is made that: "In exchange for the water thus brought into New Mexico, a like amount would be diverted from the river and its tributaries in Colorado and used for irrigation in the San Luis Valley." Colorado suggests that in lieu of said statement, the Report should indicate that "an agreement will be required between Colorado, New Mexico and Texas, involving possible revisions of the Rio Grande Compact, in order to determine the benefits to accrue to the San Luis Valley in Colorado by reason of the diversion of water from the San Juan River and its tributaries in Colorado for use in the Rio Grande basin in New Mexico."

46. The description (at page 94) of the Blue River-South Platte diversion is not adequate or accurate. It should indicate a potential yield estimated at 701,000 acre feet, for the combined yield of the projects proposed by the City of Denver and the Bureau of Reclamation, and that the project is an enlargement and extension of the Blue River portion of the trans-mountain diversion systems heretofore initiated by the City and County of Denver. The said Denver system may be described in three parts: (1) the Moffat and Jones Pass tunnels which are constructed, and through which diversions averaging 51,400 acre feet are now being made; (2) the storage reservoir on Williams River, now constructed and the collection systems on Fraser and Williams which are partially constructed and are being extended as needed, which will have the effect of increasing the diversions from said streams and for which increase an allowance of 100,000 acre feet is made in the Report; and (3) potential diversions from the Blue River. The ultimate use by the City of Denver of water that may be exported from the Fraser, Williams and Blue Rivers is estimated at 350,000 acre feet annually. The Blue River-South Platte project proposed by the Bureau of Reclamation contemplates diversions from the Eagle, Piney, Blue and Williams Rivers and their tributaries. Its potential diversions, in addition to the allowance of 100,000 acre feet for Denver's near-future expansion, will average 550,000 acre feet annually. Such additional description of the Blue River-South Platte project as may be embodied in the Report should be obtained from the regional director at Denver, which office is conducting the investigations and preparing the report on the project.

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47. The description (at page 96) of the Gunnison-Arkansas Diversion, and of the Fryingpan-Arkansas and Twin Lakes Tunnel diversions (at page 94), might be consolidated for clarity and revised for accuracy, in accordance with the present status of the investigations, which also are in charge of the regional director at Denver. This project contemplates the diversion from the Gunnison River and its tributaries, and from tributaries of the Roaring Fork River, of waters not needed for present or prospective future irrigation uses in the local basins of said streams. Present studies, subject to further investigations, disclose the opportunities of diverting an average of 800,000 acre feet annually from the Gunnison River and 200,000 acre feet annually from the Roaring Fork tributaries. When the project investigations are completed, the designs and operating plans are expected to disclose that projects of benefit to the local Gunnison Valley will be installed as part of the exportation project that separately might prove infeasible or economically unjustified. Such additional description of the Gunnison-Arkansas project as may appear in the final draft of the Report should be obtained from the Denver regional office.

48. Senate Document 80, 75th Congress, 1st Session, printed June 15, 1937, describes the Colorado-Big Thompson exportation project and the manner in which it shall be operated to preserve the vested and future rights in irrigation; to preserve the fishing and recreational facilities and scenic attractions of Grand Lake and Rocky Mountain National Park; to maintain the conditions of river flow for the benefit of local domestic uses and sanitary purposes; and to so conserve and make use of the waters for irrigation, power, industrial development, and other purposes, as to create the greatest benefits. Colorado suggests that the Report be amended to show, that appropriate understandings are contemplated between representatives of both exporting and importing basins, in connection with all major projects designed and operated for exporting waters of the Colorado River system for use in the Rio Grande, Arkansas, and South Platte river basins in Colorado.

49. Summarizing the foregoing data concerning exportation projects in Colorado, the estimates of the Report and of Colorado engineers are as follows:

	Export Diversions From Colorado River System For Use in Colorado (Acre Feet)*	
	U.S.B.R.	C.W.C.B.
Existing Export Diversions	102,000	135,000
Allowances for Projects now authorized, under construction and in operation	420,000	494,000
Potential Projects (increase)	1,267,000	1,626,000 (a)
Totals	1,789,000	2,255,000

* Quantities based on long-time average or normal conditions, - in the average year of a drouth cycle such as 1931-1940 the exportations would approximate about 80 percent of normal quantities.

(a) Estimates as previously discussed by individual projects. Quantities have been checked with Denver Regional office for importations to Arkansas and South Platte valleys, and have been taken from Report for importations to San Luis Valley.

Colorado suggests that the Report be revised to disclose that opportunities and probabilities for export diversions from the Colorado River system for use in Colorado aggregate 2,255,000 acre feet annually under normal climatic conditions, and about 1,800,000 acre feet annually during drouth cycles such as 1931-1940; and that such exportation projects in Colorado have been and are being planned and designed upon the basis that water and power users are expected to repay the costs of construction other than proper non-reimbursable allocations to flood control, silt control, recreational benefits, etc. In the event that competitive projects are listed or described in the Report upon a different repayment basis, Colorado will expect the Report to disclose that export diversions from the Colorado River system are limited to quantities above mentioned by the construction costs and repayment requirements of such developments but that substantially greater amounts of water are possible of exportation by means of longer tunnels and greater pump-lifts if construction costs are to be disregarded or materially subsidized.

50. The estimates shown in the Report for the depletions in the Upper Basin incident to main-stem reservoir evaporation losses, aggregating 1,040,000 acre feet annually during long-time average or normal conditions, and averaging 831,000 acre feet per year during drouth cycles such as 1931-1940, are not accompanied by detailed information concerning either exposed water surface areas or applicable evaporation rates. For that reason