

SAN JUAN-CHAMA RECLAMATION AND NAVAJO INDIAN IRRIGATION PROJECTS

THURSDAY, JUNE 1, 1961

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON IRRIGATION AND RECLAMATION
OF THE COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington, D.C.

The subcommittee met, pursuant to notice, at 9:50 a.m., in the committee room, New House Office Building, Hon. Wayne N. Aspinall (chairman of the full committee) presiding.

Mr. ASPINALL. The Subcommittee on Irrigation and Reclamation of the House Committee on Interior and Insular Affairs will be in session for further consideration of H.R. 2552, H.R. 6541, and S. 107, bills to authorize the Navajo Indian irrigation project and the initial stage of the San Juan-Chama project and participating projects of the Colorado River storage project and for other purposes.

The subcommittee held hearings on this legislation on April 24, 25, and 26, 1961, but did not complete the taking of testimony.

This morning for further questioning we have present the witness from the Department of Interior, Mr. William I. Palmer, accompanied by Mr. Riter and Mr. Charles and Mr. Burnett. If they will come to the witness stand. Also Mr. Martin P. Mangan, Associate Commissioner of Indian Affairs, together with Mr. Gerald Keese, supervisory general engineer, Branch of Land Operations, Bureau of Indian Affairs.

At the last meeting of the committee, the following members of the committee had questioned the witnesses: Aspinall, Hosmer, O'Brien, and Westland. So this morning we will start with the next ranking member and reserve the right for the other members to question further, if they have any questions of the witnesses, after those recognized first.

**STATEMENT OF WILLIAM I. PALMER, ASSISTANT COMMISSIONER OF RECLAMATION, ACCOMPANIED BY JOHN R. RITER, CHIEF DEVELOPMENT ENGINEER, DENVER OFFICE, BUREAU OF RECLAMATION; RALPH CHARLES, PROJECT DEVELOPMENT ENGINEER, ALBUQUERQUE OFFICE, BUREAU OF RECLAMATION; AND DON BURNETT, CHIEF DIVISION OF PROJECT DEVELOPMENT, BUREAU OF RECLAMATION; AND STATEMENT OF MARTIN P. MANGAN, ASSOCIATE COMMISSIONER OF INDIAN AFFAIRS, ACCOMPANIED BY GERALD KEESEE, SUPERVISORY GENERAL ENGINEER, BRANCH OF LAND OPERATIONS, BUREAU OF INDIAN AFFAIRS—
Resumed**

Mr. ASPINALL. The gentleman from Oklahoma is recognized for any questions he may have.

Mr. EDMONDSON. I reserve my time, Mr. Chairman.

Mr. ASPINALL. The gentleman reserves.

The gentleman from North Dakota.

Mr. NYGAARD. I will reserve my time, Mr. Chairman.

Mr. ASPINALL. The gentleman from California, Mr. Saund.

Mr. HOSMER. Will the gentleman yield?

Mr. SAUND. Yes; I yield.

Mr. HOSMER. As I remember at the last meeting, I had asked Mr. Saund to yield to me because I had to leave for an appointment and I got through part of my questions, but not all of them. Is that your understanding, Mr. Chairman?

Mr. ASPINALL. That is right. You will be recognized next after Mr. Saund.

Mr. HOSMER. Thank you.

Mr. SAUND. Do you want to go ahead and finish your questions? I yield to you.

Mr. ASPINALL. The gentleman yields to you.

Mr. HOSMER. Very well.

I suppose these questions are going to come under various of the witnesses, so those in whose category they fall may make the answer.

Is the regulation provided by the Navajo Reservoir essential to the Navajo Irrigation project?

Mr. RITER. Yes, sir.

Mr. HOSMER. How much of the total cost of the Navajo Dam and Reservoir is presently allocated to irrigation? I believe the figure is \$33 million, to refresh your memory.

Mr. BURNETT. The Navajo Reservoir is one of four regulation reservoirs of the upper Colorado River storage project for which costs were all allocated as a package of the total of the four reservoirs—Navajo, Glen Canyon, Flaming Gorge, and Curecanti. Some \$90 million of the total was allocated to irrigation.

Mr. HOSMER. Let us go about it another way then. Let us take Navajo Dam and Reservoir, what is the cost of it, about \$43 million? (Mr. Rogers now presiding.)

Mr. BURNETT. Yes, sir; the total cost of the Navajo Dam and Reservoir is \$43,206,000.

Mr. HOSMER. Half a million is allocated for flood control, right?

Mr. BURNETT. No, sir; only \$207,000 is allocated to flood control.

Mr. HOSMER. Two hundred and seven thousand for flood control.

How much for enhancement of fish and wildlife?

Mr. BURNETT. There is no allocation to the enhancement of fish and wildlife in the Navajo Reservoir.

Mr. HOSMER. How much for recreation?

Mr. BURNETT. Let me qualify my above statements.

Mr. HOSMER. Yes.

Mr. BURNETT. The Navajo figures that I am quoting are the original allocations and the original costs. Subsequent to the preparation of the above data on Navajo, the Fish and Wildlife Service completed a study of the upper basin and a fish and wildlife allocation was made for the Navajo Reservoir.

Mr. HOSMER. Are you familiar with the document prepared by the U.S. Bureau of Reclamation called "Financial and Power Rate Analysis, Colorado River Storage Project and Participating Projects," dated September 1960?

Mr. BURNETT. Yes, sir.

Mr. HOSMER.

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Mr. HOSMER. Do you have that document?

Mr. BURNETT. No, sir.

Mr. HOSMER. Anybody with you?

Mr. BURNETT. No, sir.

Mr. HOSMER. Has anybody got one in the room?

Mr. MCFARLAND. Yes.

Mr. HOSMER. Turn to page 22 and hand it to the witness. I would rather not have to pull these facts out of you one by one. I can get through questioning you in 10 minutes if we can get these things out. What I am trying to get is what amount of this \$43 million is properly allocated to irrigation, and I know the figure is \$33 million. If you turn to page 22 in that document you just got and read off some of those figures you will arrive at it.

I do not understand why the Bureau witnesses cannot come up here and tell us about this. I cannot conceive of spending \$43 million of the taxpayers' money and not being able to come up here and tell us what the irrigation allocation is on this. You have got six witnesses up here and I do not suppose there is any one of them that can answer it.

Mr. PALMER. Mr. Hosmer, the answer to your question is in part, as Mr. Burnett has indicated, that at the very outset of the Colorado River storage development, it was determined that an annual cost of \$2 per acre-foot of the joint main stem storage facilities should be the basis for the irrigation allocation. Now under the full utilization of the irrigation waters that would be available in Navajo, you probably would come up with an allocation in the order of the \$34 million you have quoted.

Mr. HOSMER. \$33 million. All right. Now we have got that fact on the record. Thirty-three out of the forty-three million dollars would be allocable to irrigation.

Now, how much of this allocation would be attributable to the Navajo irrigation project?

Mr. PALMER. Well—

Mr. HOSMER. Substantially all of it except a small amount for the Hammond and a little bit for river regulation in there?

Mr. PALMER. Again, the \$2 per acre-foot would apply. And you are right, the bulk of the water in Navajo that is usable for irrigation would go to the Navajo project. However, bear in mind there is a large block of water that is stored behind Navajo that is usable in the fulfillment of the commitments to maintain the stream, et cetera.

Mr. HOSMER. We will get into that a little bit later. So you would say—roughly can we settle at \$30 million?

Mr. PALMER. Within the qualification, Mr. Hosmer, that I have given you of the principle of allocation, this in as good a figure as we could develop right now; yes.

Mr. HOSMER. All right. Now the Navajo project itself, less this irrigation allocation, what does it come to—\$135 million?

Mr. BURNETT. Yes, sir.

Mr. HOSMER. What?

Mr. BURNETT. Yes, sir; \$135 million.

Mr. HOSMER. And then if you added this irrigation allocation under the Leavitt Act; the total cost, however, would be about \$165 million.

Mr. BURNETT. If added together; yes, sir.

Mr. HOSMER. Now there are, in the Navajo project, approximately 105,100 acres to be irrigated?

Mr. KEESEE. It is here; 110,600, I believe.

Mr. HOSMER. So if you divide the 110,000 into \$165 million you come out with something around just under \$1,600-per-acre cost. Does that sound about right?

Mr. KEESEE. The total cost on that including the 12 percent for contingencies and 8 percent for engineering and overhead, plus 2½ percent for interest during construction, amounts to a total of \$146,000,336.

Mr. HOSMER. Then you add 30 million to that.

Mr. KEESEE. The 30 million is in your total.

Mr. HOSMER. What?

Mr. KEESEE. The \$2 charge for the water is in the cost.

Mr. HOSMER. And you say it comes out where, 146; is that right?

Mr. KEESEE. 146.

Mr. HOSMER. That brings us down somewhere around \$1,500 an acre to irrigate this land; is that right?

Mr. KEESEE. That is approximately correct; yes, sir.

Mr. HOSMER. All right; now, what is the value of that land per acre irrigated? I understand it is not salable; it belongs to the tribe. Would the fair value be about \$200 per acre?

Mr. KEESEE. I do not know what the irrigated land is selling for in the San Juan Basin, Mr. Hosmer.

Mr. HOSMER. I have a figure that shows that farm investment or market value of farms in that area ranges from \$24,000 to \$31,500 for a farm from 90 to 105 acres. That is in House Document 24 at page 349 and works out to a cost of about \$340 an acre. Does that seem to be an unreasonable cost to you?

Mr. KEESEE. That would be about right, I think.

Mr. HOSMER. That is about right; all right.

Now in this Navajo irrigation project that will be on the reservation, does the Indian own his own land there or is it part of the tribal holdings?

Mr. KEESEE. It belongs to the Navajo Tribe.

Mr. HOSMER. Are you familiar with any estimated hypothetical repayment ability of that acreage?

Mr. KEESEE. Yes, sir.

Mr. HOSMER. What is it?

Mr. KEESEE. That was a part of the—it is approximately 17 percent, as I recall it, Mr. Hosmer.

Mr. HOSMER. Are you familiar with Senate Report No. 83 on this project? It shows it would be able to repay about \$21 million in 50 years.

Mr. KEESEE. That is right.

Mr. HOSMER. All right. That equals about \$200 an acre. So hypothetically that could be repaid, of the some \$1,500 an acre cost; is that right?

Mr. KEESEE. That is correct.

Mr. HOSMER. As a matter of fact, none of it will be repaid because of the Leavitt Act. Is that further correct?

Mr. KEESEE. That is right.

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Mr. HOSMER. So even hypothetically the irrigators could pay back in this land only 13 percent of the investment.

Mr. KEESEE. About 16 percent.

Mr. HOSMER. What?

Mr. KEESEE. We say 16 percent.

Mr. HOSMER. You say 16 percent.

Mr. KEESEE. Yes, sir.

Mr. HOSMER. All right. Now this figure we have got here, if we take an average farm it would be about a hundred acres; is that right?

Mr. KEESEE. That is right.

Mr. HOSMER. So the average investment per farm would be \$150,000 for each of these Indian families.

Mr. KEESEE. Yes; that is right.

Mr. HOSMER. Figuring some 1,100-plus farms.

Mr. KEESEE. Yes.

Mr. HOSMER. In addition to the 1,120 on-farm families, it is estimated there are 2,240 off-farm families to be supported, making a total of 3,360 families all together that will gain benefit from this \$146 million expenditure.

Mr. KEESEE. That is right.

Mr. HOSMER. And I believe that works out to somewhere around \$45,000 per family invested; is that right? Is that roughly an accurate figure?

Mr. KEESEE. It would be about 18,000 people.

Mr. HOSMER. I am talking about the number of families.

Mr. KEESEE. It would be about that. That is about correct.

Mr. HOSMER. This new sawmill they built out there cost \$7½ million?

Mr. KEESEE. That I cannot answer.

Mr. HOSMER. Does anybody know?

Mr. MANGAN. I believe that is approximately correct.

Mr. HOSMER. I think it was testified to by the secretary of the tribal council when he was here. He also said it was supposed to support about 500 families. Do you recall that?

Mr. MANGAN. I was not here at that time. No; I do not recall.

Mr. HOSMER. If that testimony is true, then this sawmill investment would be about \$15,000 per family if my figures are correct. Does that sound right to you?

Mr. MANGAN. That sounds right.

Mr. HOSMER. As contrasted to \$45,000 per family for this irrigation project.

Now the construction period for this Navajo project is 12 years?

Mr. KEESEE. About 14 years.

Mr. HOSMER. What is the development? Are they given 10 years after that?

Mr. KEESEE. Along about approximately that, 5 to 10 years.

Mr. HOSMER. What?

Mr. KEESEE. Five to ten years.

Mr. HOSMER. Five to ten years.

Mr. KEESEE. Yes, sir.

Mr. HOSMER. Somewhere upward of 22 years, altogether, right?

Mr. KEESEE. That is correct.

Mr. HOSMER. The Federal investment during this period takes interest, does it not?

Mr. KEESEE. We computed it for interest, yes, in our analysis.

Mr. HALEY. Will the gentleman yield?

Mr. HOSMER. I yield.

Mr. HALEY. I did not get his answer, what was the answer?

Mr. KEESEE. We computed the interest in our determination of feasibility.

Mr. HOSMER. What did you determine the total investment would be including that interest?

Mr. KEESEE. That was the 146 million I spoke of.

Mr. HOSMER. No; not including this interest during the development period and so on, construction period. You got interest over a period of upward of 20 years at at least $2\frac{7}{8}$ percent.

Mr. KEESEE. We computed it on the basis of $2\frac{1}{2}$ percent.

Mr. HOSMER. How much interest?

Mr. KEESEE. The \$146—wait a minute—it would be the difference. About \$21 million.

Mr. HOSMER. That interest is not in your—

Mr. KEESEE. It would be \$21 million.

Mr. HOSMER. On what are you taking that interest? On \$146 million?

Mr. PALMER. Mr. Hosmer, on all irrigation developments, by policy of Congress, the Bureau of Reclamation does not compute interest. What the Bureau of Indian Affairs has done and what we would do would be to compute the interest during construction on the investment as a means of determining the economic feasibility in arriving at a benefit-cost ratio. When the work under construction became utilitarian it would not continue to be weighted with an interest component. In other words, if you built a feature in 2 years, you would compute interest on that feature for 2 years.

Mr. HOSMER. But if it takes 20 years to develop and engineer this thing and get it into full production and you are borrowing money at the rate of $2\frac{1}{2}$ percent per year, in 10 years you are going to pay interest on equal to 25 percent of the amount and in 20 years, 50 percent of the amount. So the interest the taxpayers are stuck for must range somewhere between $\$36\frac{1}{2}$ million and \$37 million; does it not?

Mr. PALMER. Mr. Hosmer, again let me clarify this issue.

Mr. HOSMER. I am talking about figures that you have not included in your cost and feasibility study.

Mr. PALMER. Let me clarify the basis of computing interest. Total interest you are computing in your calculation would not be all paid in year 1. If it took 14 years for the construction period the interest on money invested would be computed over a period of 14 years as the investment was made.

Mr. HOSMER. That is why I am willing to take it on an average and take $2\frac{1}{2}$ for 10 years. And divide your \$146 million by 4 and you get $\$36\frac{1}{2}$ million, which you have to add to the \$146 million to get what the taxpayers are paying for this thing. And it turns out to be \$182,500,000 worth of investment, at the least. Do you follow me?

Mr. PALMER. I follow you completely. If you will go back to Mr. Keesee's statement, he indicated to you that in the figures given you there was about \$21 million in interest which is not too far from your rule of thumb interest for 10 years.

Mr. HOSMER. I is the amount of tion cost?

Mr. KEESEE. \$10

Mr. HOSMER. W agrees to?

Mr. KEESEE. I c imately \$105 milli which brings you t for engineering a million. That wa to the figure of \$12.

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Mr. HOSMER. I cannot possibly see how he gets that figure. What is the amount of the cost of the Navajo project itself, the construction cost?

Mr. KEESEE. \$104,000,909.

Mr. HOSMER. Where do we get this \$135 million that everybody agrees to?

Mr. KEESEE. I can break that down. The total field cost is approximately \$105 million. To that is added 12 percent for contingencies which brings you to approximately \$117 million. Plus your 8 percent for engineering and overhead, bringing you to approximately \$125 million. That was a figure that we put in in 1955 and it was indexed to the figure of \$125 million, yes.

Mr. HOSMER. Then we got into this business of the allocations to the dam itself, which you stipulated would be some \$30 million so that brings us to \$155 million; is that right?

Mr. KEESEE. That is taking into consideration your annual costs in the analysis.

Mr. HOSMER. \$155 million. That differs from the \$146 million you gave a little while ago by about \$9 million; is that right?

Mr. HALEY. May I interrupt for a clarifying question, if the gentleman from California will yield?

Mr. HOSMER. I yield.

Mr. HALEY. I want to say to the gentleman I am glad to see he is tending to dip into the real cost of these projects. It is something that has been disturbing to me for a long time. Apparently the Department down there when they set up a project usually do not attempt to really let the Congress or anybody else know what these projects are going to cost. As the gentleman well knows, very, very seldom do they get one of these projects at even within 25 percent of their original estimate. I am glad to see that somebody is beginning to let the Department know down there when they come up here with these figures you are misleading this Congress, you are misleading this committee, and you are misleading the people of the United States because you do not put the real cost of these projects in there.

And I think you ought to do it. I think the Congress should demand that you do it.

Mr. HOSMER. I think the gentleman has made a very profound, objective observation. I would like to ask unanimous consent that the witnesses go through and check these figures that they have given me this morning and make certain that they are accurate, and make what changes are necessary. I would also like, when we get this full cost, which you say is \$155 million, which I believe to be closer to \$266 million, that you will divide each of those figures by the 1,120 families you are going to get, and get us a range of figures for the investment per farm. Do you understand?

Mr. KEESEE. I will be glad to furnish you that.

Mr. MORRIS. Mr. Chairman.

Mr. HOSMER. When you do that I would like you to take the amount of interest the Government is currently paying to borrow money and find out how much interest annually is being paid to subsidize each one of these Indian families. Do you understand that? Because none of this money is going to be paid back. So this charge will be against the taxpayers in perpetuity.

Mr. HALEY. Will the gentleman yield?

Mr. HOSMER. Yes, I yield.

Mr. MORRIS. Reserving the right to object.

Mr. HOSMER. I yield to the gentleman from Florida.

Mr. MORRIS. Mr. Chairman, a point of order.

Mr. ROGERS. The gentleman will state it. Is the gentleman making a unanimous-consent request, as I understand?

Mr. HOSMER. Yes.

Mr. MORRIS. Reserving the right to object, Mr. Chairman, would the gentleman explain to the committee? Are you going to revise all the Bureau of Reclamation's reporting forms for this bill?

Mr. HOSMER. Quite to the contrary. I am merely trying to find out what it is going to cost the American taxpayer per annum in perpetuity to provide a farm for each of these 1,120 families. I think they are entitled to know. I think perhaps some of the other Members of Congress who are not members of this committee, but will be hearing this bill on the floor, will be interested in that amount and possibly interested in comparing what the per capita income of the Indians is out there and perhaps comparing it to what other types of investment that could be of equal or greater benefit to these people, these 1,120 families and to the tribe that might not be of even as great a magnitude as the one that is proposed in the legislation.

Mr. MORRIS. Does the gentleman have—was there any reason why this information could not have been asked for when we held hearings over a month ago?

Mr. HOSMER. If the gentleman will recall, every time we get one of these irrigation projects there are about 2 days of hearings scheduled, there are Bureau witnesses, and there are witnesses who come in from out of State; the witnesses from out of State have to be accommodated, otherwise they will be subsidizing the Washington hotel complex, and we are necessarily restricted. So, I think in fairness, the gentleman will realize that maybe all of these questions could not have been posed: maybe they are questions that should not be posed; maybe they are questions that should be answered before the project is ever brought up here. But since they are not, I think we are entitled to it.

Mr. MORRIS. Let me say to the gentleman, I think these questions should have been answered and I think this material should have been and should in all projects, and I think it was furnished to the committee. But the thing that disturbs me is that here we come along with a project and we have had it pending for a considerable length of time—hearings have been held last session of Congress and a couple of sessions ago and at the last minute almost, why, the gentleman asks for some very detailed information that the Bureau witnesses apparently have not been able to come up with this morning.

Mr. HOSMER. I think the gentleman implied the criticism would not be to me, the gentleman from California, but to Bureau witnesses for not having furnished this in the first place. I hope this is the implication.

Mr. ROGERS. Is there objection?

Mr. MORRIS. That is right.

Mr. ROGERS. Is there objection?

Mr. MORRIS. Further reserving the right to object.

Mr. ROGERS. Would the gentleman restate his request?

Mr. HOSMER. I want to know the total cost of this project, a corrected cost, including the interest payment and get a total amount for the families to find out what the total is based on each of the families to calculate what the total interest is at the going rate.

Mr. ROGERS. Can you state that?

Mr. PALMER. Yes, that is the general question.

Mr. ROGERS. Let us have a unanimous consent request and then we can proceed.

Mr. PALMER. All right.

Mr. ROGERS. Is the gentleman ready?

Mr. MORRIS. Reserving the right to object, what we want to do is to make sure that they will furnish the information.

Mr. PALMER. It will be a unanimous consent request.

Mr. ROGERS. The gentleman has the floor.

Mr. MORRIS. I will reserve the right to object.

Mr. HALEY. Mr. Chairman, I shall not object.

Mr. ROGERS. Mr. Chairman, I have the floor.

Mr. HALEY. But the gentleman has called his attention, this morning, to these hearings and the fact that the per family was brought up by the gentleman from California that this project has been started and the cost of the farms or whatever it is, is \$100,000 per family.

The gentleman requests that we set this aside for the Indians and set aside these farms and set aside the money the tribe would receive and the money that would be paid for the project.

So the gentleman's question is, if I may, Mr. Chairman, would you please before us here now, call the attention of the committee there and bring up the question of the real cost of these projects and run into serious trouble with the reclamation projects and think that the Congress is being misled by the figure that is being put out there and let people know what the real cost is.

Mr. ROGERS. Is there any objection?

Mr. ASPINALL. Reserving the right to object.

Mr. ROGERS. The gentleman has the floor.

Mr. ASPINALL. And the gentleman from California is asking for the information.

Mr. HOSMER. I want them to take the \$166 million figure on the total cost of this project and whatever figure they come up with as a corrected cost, including interest during construction and development and get a total capital investment, divide it by the number of families to find out what the cost per family is in each of those cases, based on each of those figures; then further, I would like them to calculate what the taxpayers are going to have to pay in perpetuity as interest at the going rate on this investment per family.

Mr. ROGERS. Can you do that, Mr. Palmer?

Mr. PALMER. Yes, sir; we can do this but may I speak a minute on the general question that Mr. Hosmer has raised?

Mr. ROGERS. Let us wait until we get through with this unanimous-consent request and then you can speak on it.

Mr. PALMER. All right.

Mr. ROGERS. Is there objection?

Mr. MORRIS. Reserving the right to object, Mr. Chairman, all I want to do is to make sure that they can furnish this information and that they will furnish it speedily.

Mr. PALMER. It was to this point, Mr. Chairman, I wished to talk.

Mr. ROGERS. The Chair will find that out later on.

Mr. MORRIS. I withdraw my reservation.

Mr. HALEY. Mr. Chairman, reserving the right to object and I shall not object.

Mr. ROGERS. Mr. Haley.

Mr. HALEY. But the gentleman from California, if I may have his attention, this matter was discussed, was it not, in nearly all of these hearings and the question of the tremendous cost of this project per family was brought up at that time. It seems to me that the gentleman from California's request is in order because every time that this project has been before this committee the same question has arisen and the cost of giving the services to these 1,100 or 1,200 farms or whatever it is has been variously estimated from \$60,000 to \$100,000 per family.

The gentleman recalls the suggestion was made rather than build this for the Indians that we take the money necessary to irrigate these farms and set it up in a trust fund where each member of the tribe would receive about \$5,000 a year.

So the gentleman's question is in order and I just want to say this, if I may, Mr. Chairman: I warned and warned this group right before us here now, I think you had better "get on the ball" down there and bring up here to this Congress and to this committee the real cost of these projects; otherwise, gentlemen, you are going to run into serious trouble and you are going to cripple some very fine reclamation projects in the western part of this country because I think that the Congress, I know that I am, are getting "fed up" on the misleading figures that you bring up here. Let us put the thing out there and let people look at it.

Mr. ROGERS. Is there objection?

Mr. ASPINALL. Reserving the right to object and I shall not object.

Mr. ROGERS. The gentleman from Colorado.

Mr. ASPINALL. Any member of this committee who wishes to, could get the information in 15 minutes that the gentleman from California is asking for. Our staff member is here. It is a question of

the assumption you make whether or not you are going to agree with the figure. If you are going to argue on these figures, that is one thing, but so far as getting the information is concerned, it is in the report, it can be obtained by any member of this committee that has been on the committee for one term.

Mr. ROGERS. Is there objection? The Chair hears none and the unanimous-consent request of the gentleman from California is granted.

Would you yield to the Chair, Mr. Saund, on your time?

Mr. SAUND. Yes.

Mr. ROGERS. For the purpose of letting Mr. Palmer speak on this for half a minute.

Mr. PALMER. I was going to make exactly the same observation that the chairman of the full committee has just made. Not only will we supply this information, but the information is available to the committee through the committee clerk.

Mr. ROGERS. Can you get this in a short time?

Mr. PALMER. It can be assembled, combined in any kind of form the committee wants. In House Document 424 of the 86th Congress, which is before this committee, the costs were broken down in intricate detail at that time. The cost factors that are before the committee now are indexed-up cost figures that reflect the result of inflation. We are not only ready, but we are willing and able to supply this committee with any kind of information this committee desires and we will do it as speedily as possible.

(The information referred to follows:)

1. Estimated cost of Navajo Indian irrigation project as of Jan. 1, 1961.....	\$134,359,000
2. Preliminary surveys and investigations.....	974,000
3. Present cost of Navajo Reservoir allocated to Navajo Indian irrigation project ¹	18,453,500
4. Total estimated construction cost.....	153,786,500
5. Estimated construction cost per farm unit.....	137,309
6. Estimated interest charge during construction ²	20,749,000
7. Estimated interest charge per farm unit.....	18,526
8. Total estimated construction cost and interest charge during construction per farm unit.....	155,835
9. Estimated annual interest charge per farm unit at 2½ percent.....	4,480

¹ Bureau of Reclamation study of September 1960 allocates \$32,875,000 of the cost of Navajo Reservoir to irrigation, of which \$18,453,500 is estimated as chargeable to the Navajo Indian irrigation project.

² The present policy of the Congress is not to charge interest on irrigation construction funds. However, in determining economic feasibility, this figure is used in computing benefit-cost ratio.

Mr. ROGERS. The gentleman from California will proceed.

Mr. HOSMER. Let us turn to the San Juan-Chama project now. It costs about \$86 million for construction.

Mr. BURNETT. Yes, sir.

Mr. HOSMER. And about \$53 million is allocated to irrigation.

Mr. BURNETT. \$53,400,000.

Mr. HOSMER. How much?

Mr. BURNETT. \$53,400,000.

Mr. HOSMER. How many acres does the project serve, 121,000 approximately?

Mr. BURNETT. Yes, sir.

Mr. HOSMER. I have which indicate that unit would be about \$1,330; and Pojoaque to you?

Mr. BURNETT. Yes.

Mr. HOSMER. And an acre and the Mic per acre for an aver

Mr. BURNETT. W unit is about correct

Mr. HOSMER. One is correct, about \$44

Mr. CHARLES. Th

Mr. HOSMER. Now feet a year on the a

Mr. BURNETT. No that is for "M" and tion—

Mr. HOSMER. For

Mr. BURNETT. Fo

Mr. HOSMER. 46,0 about four-tenths o about right?

Mr. BURNETT. Ye

Mr. HOSMER. Wh for water each year right?

Mr. BURNETT. It mately correct; yes,

Mr. HOSMER. Th House Document N Do you think it sho

Mr. BURNETT. Th Under the project, land is for small int cally all of the wat is already irrigated.

Mr. HOSMER. As acres with full requ

Mr. BURNETT. Ye

Mr. HOSMER. And amount of investme

Mr. BURNETT. W of course.

Mr. HOSMER. Yes

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Mr. CHARLES. It some of the lands a probably would run

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Mr. HOSMER. I have some figures from the hearings on the last bill which indicate that the construction costs per acre for the Cerro unit would be about \$926; the Taos unit, \$800; the Llano unit, some \$1,330; and Pojoaque unit, some \$1,040. Does that sound about right to you?

Mr. BURNETT. Yes, sir.

Mr. HOSMER. And that the tributary units would be around \$220 an acre and the Middle Rio Grande Conservancy District about \$210 per acre for an average cost of \$440 per acre.

Mr. BURNETT. We have not averaged it, but your cost per acre per unit is about correct.

Mr. HOSMER. One of the gentlemen is nodding. Do you mean that is correct, about \$440 an acre for overall?

Mr. CHARLES. The individual ones are substantially correct, sir.

Mr. HOSMER. Now this project is going to deliver how many acre-feet a year on the average? I have a figure of 46,900, is that right?

Mr. BURNETT. No, sir. The total diversion is 110,000, but 56,000 of that is for "M" and "I" purposes. So your figure of 43 for irrigation—

Mr. HOSMER. Forty-six.

Mr. BURNETT. Forty-six, right.

Mr. HOSMER. 46,000, 9 for irrigation. That as I read it amounts to about four-tenths of an acre-foot per acre per year; does that sound about right?

Mr. BURNETT. Yes, that is about right.

Mr. HOSMER. What is the average annual requirement of these lands for water each year? I have a figure of 2 1/4 acre-feet. Is that about right?

Mr. BURNETT. It varies on the different units, but that is approximately correct; yes, sir.

Mr. HOSMER. The figure that I have given you is derived from House Document No. 424 and it does seem very low for this arid area. Do you think it should be higher?

Mr. BURNETT. The area is practically all supplemental irrigation. Under the project, as planned, the only water to be delivered to new land is for small interspersed areas within the tributary units. Practically all of the water is used for supplemental purposes on land which is already irrigated.

Mr. HOSMER. As a matter of fact, you could serve less than 20,000 acres with full requirement by this amount of irrigation water.

Mr. BURNETT. Yes, at 2 1/4 feet per acre.

Mr. HOSMER. And if you are serving only that many acres with this amount of investment, it would run about \$2,500 per acre.

Mr. BURNETT. We would have altogether a different project plan, of course.

Mr. HOSMER. Yes.

Now I tried to go through the record and the best I can see is that the average value of this land runs anywhere from \$130 to \$300 per acre throughout the whole project, varying between those figures. Does that figure sound somewhere near right to any of you?

Mr. CHARLES. It would vary considerably more than that because some of the lands are in the immediate vicinity of Albuquerque and probably would run as high as two or three thousand dollars an acre.

Mr. HOSMER. That would not be exactly farmland, would it?

Mr. CHARLES. It would be used for—

Mr. HOSMER. That would be land that you are going to use for municipal and industrial purposes, would it not?

Mr. CHARLES. It would still receive an irrigation supply for a small acreage.

Mr. HOSMER. But it would not be growing crops very long, would it?

Mr. CHARLES. No, sir; it would not.

Mr. HOSMER. It would be growing houses.

What part of this \$53 million allocated to irrigation will be paid by the irrigators and what part from the basin fund?

Mr. BURNETT. I did not get the second part of the question.

Mr. HOSMER. You said there is \$51 million allocated to irrigation in this project.

Mr. BURNETT. Yes, sir.

Mr. HOSMER. And I am trying to figure out how much of it is actually going to be repaid by the irrigators themselves.

Mr. BURNETT. About \$8 million.

Mr. HOSMER. And how much out of the basin fund?

Mr. BURNETT. The balance out of the basin fund.

Mr. HOSMER. \$45 million out of the basin fund?

Mr. BURNETT. Yes, sir.

Mr. HOSMER. Sixty percent of this acreage is farms of less than 10 acres; is that right? Do you recall? House Document 442 states that about 60 percent of the area to be furnished water here consists of farms of less than 10 acres and the remaining percentage less than 20 acres.

Mr. CHARLES. That is approximately right, sir.

Mr. HOSMER. These are not commercial farms, are they?

Mr. CHARLES. No; they are not.

Mr. HOSMER. They are just subsistence farms.

In House Document 424, there was a statement that somehow these small farms were going to be consolidated into big ones. Do you recall that statement, any of you?

Mr. CHARLES. The trend is toward—in the actual farming area, the trend is toward enlarging those farms, and we hope that more of them will become large enough to be self-supporting over a period of time.

Mr. HOSMER. You mean some people are going to go out of the farming business and other people are going to get bigger?

Mr. CHARLES. That is happening generally, sir, and it is happening to some extent in these tributary units.

Mr. HOSMER. It is happening because these projects of this nature are going in, is it not? You are creating conditions under which you are actually, in effect, forcing people off the farms.

Mr. PALMER. No, sir. Mr. Hosmer, in this area you have a very unusual situation. This area was settled, much of it, as long ago as 400 years and much of it has been continuously farmed since that time. It has been farmed under the Spanish-American system of subdivision. As families grew the family holding was divided and it has got down in many instances to the point where the units as they are now existing are simply inadequate to provide even a subsistence living. One of the ingredients that is required to bring about an adjustment

that is essential in the removal of the people because of the pattern that has

Mr. HOSMER. In "moonlighting" so

Mr. PALMER. No, on the farms and their families have

Mr. HOSMER. But either die or will subsistence.

Mr. PALMER. This year. They do a supplement their income

Mr. SAYLOR. Will

Mr. SAUND. Yes, I

Mr. SAYLOR. Now, it not, the part of the which will be taken

Mr. PALMER. Act Navajo part which is San Juan-Chama br

term the "tributary" is the middle Rio Gr

Mr. SAYLOR. What Mr. Hosmer, do you going to Indian land farms, and so on and

Mr. PALMER. You Indian portion is lar intensive developmen the tributary units is stance would be to operation.

And, in passing, before, that the Bu perhaps the only age active support at all assumption Mr. Hos

Mr. SAYLOR. I was as the Indian lands a testified to here does Department as far a large development.

Mr. PALMER. No, s

Mr. SAYLOR. The that you are going to

Mr. PALMER. Prec

Mr. HOSMER. Than

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Mr. PALMER. Yes,

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that is essential in this area is the availability of additional water and the removal of the limitation of size that has been imposed upon these people because of the lack of regulated and reliable water and because of the pattern that has evolved in the area.

Mr. HOSMER. In other words, you are telling me these people are "moonlighting" so far as their agricultural activities are concerned.

Mr. PALMER. No, sir; this is not the case. These people have lived on the farms and have produced on the farms for over 400 years. Their families have owned it.

Mr. HOSMER. But if they are not at a subsistence level, they will either die or will be working someplace else to maintain their subsistence.

Mr. PALMER. This I also indicated when before the committee last year. They do a certain amount of outside work to augment and supplement their income.

Mr. SAYLOR. Will the gentleman yield?

Mr. SAUND. Yes, I yield.

Mr. SAYLOR. Now, this project is divided actually into two parts, is it not, the part of the Indian reservation, Indian lands, and the part which will be taken care of outside of the Indian reservation?

Mr. PALMER. Actually, three parts, Mr. Saylor. There is the Navajo part which is the Indian part you are speaking about, then the San Juan-Chama breaks logically into two segments; one is what we term the "tributary unit," the four tributary units; and the other one is the middle Rio Grande project area.

Mr. SAYLOR. What you have said, the testimony you have just given, Mr. Hosmer, do you want that testimony to apply to the part that is going to Indian land? Your testimony is going to the consolidation of farms, and so on and so forth.

Mr. PALMER. You have got a completely different situation. The Indian portion is land that is not now cultivated, it is not now under intensive development. The part in the middle Rio Grande and in the tributary units is. Of course, the long-range objective in each instance would be to encourage the development of an economic operation.

And, in passing, may I also add, as I have testified to this group before, that the Bureau of Reclamation under reclamation law is perhaps the only agency of the Federal Government that is giving any active support at all to the family-sized farm, which is contrary to the assumption Mr. Hosmer drew.

Mr. SAYLOR. I wanted to make the record straight here that as far as the Indian lands are concerned, I certainly hope that what has been testified to here does not show it is the thought or the desire of the Department as far as the Indian lands are concerned to end up with large development.

Mr. PALMER. No, sir.

Mr. SAYLOR. The very purpose of a sizable portion of this bill is that you are going to try to take care of these Indian families.

Mr. PALMER. Precisely, sir.

Mr. HOSMER. Thank you.

The irrigators' annual payments. Is somebody familiar with them?

Mr. PALMER. Yes, sir.

Mr. HOSMER. My question is directed to what is the amount of repayment over the 50-year period in excess of operation and payment of maintenance costs. I have a figure of around \$8 million.

Mr. CHARLES. Around \$8 million; yes, sir.

Mr. HOSMER. That makes it \$160,000 a year repayment on irrigation from the irrigators \$8 million divided by 50 comes to that figure.

Mr. CHARLES. Yes, sir.

Mr. HOSMER. Together with the interest costs during construction, I think you have indicated that the total Government investment here will be \$56 million. You said \$53,400,000 actual investment and then the table shows interest during construction at approximately \$2,600,000, a total of \$56 million.

Mr. CHARLES. I believe that \$53,400,000 includes the interest during construction.

Mr. HOSMER. Will you check that through and when you do so refer to Senate Report No. 83 at page 8 for the irrigation allocation and to House Document 424, page 12, table 9, for the interest during construction. My calculations show those two figures together total \$56 million, that the interest on that at 2½ percent would be \$1,400,000 a year. I just wish to compare that figure to the \$160,000 a year that the irrigators are repaying.

(NOTE.—Information supplied by the Bureau of Reclamation follows:)

The irrigation allocation, \$53,400,000, from page 9 of Senate Report 83, is correct. It reflects the construction costs shown in table 9, page 12, House Document 424, indexed to January 1958 prices. The interest during construction on the irrigation costs as reallocated would amount to approximately \$2,679,000, making a total investment of \$56,070,000.

Mr. PALMER. Mr. Hosmer, again, it is the policy, and the reclamation law that no interest be charged on the irrigation allocation.

Mr. HOSMER. For 9 years, Mr. Haley and I have been asking these same questions, trying to get these figures down and then are told that "Well, we do not, in the Bureau, include these various extra charges in our calculations." We realize that you do not include them in your calculations. That is why we have to ask questions here so we can get them on record.

Mr. PALMER. My point is that we would be pleased, as I have already indicated, to supply the committee or any of its members any information it desires in any kind of form it would like to have it. But I point out again that under reclamation law the irrigation allocation is not interest bearing and for this reason we do not calculate the interest.

Mr. HOSMER. I understand that.

Mr. PALMER. If you desire that, we are pleased to give it to you.

Mr. HOSMER. I am trying to find out what the taxpayers are actually putting into this, not what the Government books are showing for the cost.

Mr. CHARLES. The figure, \$53,400,000, does not include the interest during construction. That is the capital cost allocation.

Mr. HOSMER. And the interest during construction is \$2,600,000.

Mr. BURNETT. We have not computed that charge. We do not have it as a lump sum.

Mr. HOSMER. I think it runs out about \$2,600,000, approximately.

Mr. Chairman, I have other questions, but I am sure the other mem-

bers of the committee would to ask unanimous consent to had their opportunity.

Mr. ASPINALL (presiding) unanimous consent request, I league a chance to come back that I always do.

Mr. HOSMER. You mean y and that is all?

Mr. ASPINALL. I would like If we cannot, that is all right same questions he has at of purport to do and I think his colleague should remember th

Mr. HOSMER. That is why tunity to complete my quest colleagues the consideration a

Mr. ASPINALL. My colleague Today he has been going o almost, by the gentleman from man from California wishes cordance with our rules. My he can come back.

Mr. HOSMER. Very well. I to my colleague from Californ

Mr. SAUND. Mr. Palmer.

Mr. PALMER. Yes, Judge Sa

Mr. SAUND. At the outset request. I hope that the Dep time. I would like to ask a for these two projects?

Mr. PALMER. Yes, Judge S we propose to bring these k unless we could make certified supply.

Mr. SAUND. By that I mean existing.

Mr. PALMER. Judge Saund firmative.

Mr. SAUND. How do you fig

Mr. PALMER. Without gett into before, let me point out- struction of the compact or an the projects that are now bef most conservative interpretat tions, we filed with the comm on how we developed this conc

I have with me Mr. John Development Division and Pr who is a very eminent and y right. He is the man under prepared and he would be ve questions.

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bers of the committee would want to get a chance, so I would like
to ask unanimous consent to resume my questioning after they have
had their opportunity.

Mr. ASPINALL (presiding). The Chair is not going to grant that
unanimous consent request, but he certainly is going to give his col-
league a chance to come back if time permits. His colleague knows
that I always do.

Mr. HOSMER. You mean you are going to wind it up in an hour
and that is all?

Mr. ASPINALL. I would like to wind it up in an hour if we could.
If we cannot, that is all right. My friend has been going over the
same questions he has at other times. I know what his questions
purport to do and I think he has a right to do that, but I think my
colleague should remember there are other members of the committee.

Mr. HOSMER. That is why I was just trying to protect my oppor-
tunity to complete my questioning and at the same time afford my
colleagues the consideration and courtesy to which I feel they are due.

Mr. ASPINALL. My colleague reserved his time at the last hearing.
Today he has been going on time yielded to him, a whole hour,
almost, by the gentleman from California, Mr. Saund. If the gentle-
man from California wishes to continue to yield time, that is in ac-
cordance with our rules. My colleague reserved his time heretofore;
he can come back.

Mr. HOSMER. Very well. I will yield back the time with gratitude
to my colleague from California.

Mr. SAUND. Mr. Palmer.

Mr. PALMER. Yes, Judge Saund.

Mr. SAUND. At the outset of my questions I would like to make a
request. I hope that the Department is cooperative and we can save
time. I would like to ask a simple question. Is the water available
for these two projects?

Mr. PALMER. Yes, Judge Saund. Under no circumstances would
we propose to bring these kind of developments to the Congress
unless we could make certification as to the availability of the water
supply.

Mr. SAUND. By that I mean water legally available and physically
existing.

Mr. PALMER. Judge Saund, again the answer would be in the af-
firmative.

Mr. SAUND. How do you figure that?

Mr. PALMER. Without getting into the long discussion that we got
into before, let me point out to the committee that under any con-
struction of the compact or any interpretation of the compact, any of
the projects that are now before the Congress are clearly within the
most conservative interpretation of that. Anticipating your ques-
tions, we filed with the committee a brief that is part of the record
on how we developed this conclusion.

I have with me Mr. John R. Riter, who is Chief of our Project
Development Division and Project Planning Division in Denver and
who is a very eminent and very competent hydrologist in his own
right. He is the man under whose direction the calculations were
prepared and he would be very pleased to respond to your specific
questions.

But may I add again, sir, that there is as a part of this record the specific answers to the questions that you have posed with regard to this matter.

Mr. SAUND. Mr. Palmer, I have not had a chance to look at that. Mr. Riter, will you answer that question? Mr. Palmer says there are many interpretations. Will you give us those interpretations? How do you arrive at the fact that the water for these projects is legally available and physically existing? How do you arrive at that? Will you give me your figures?

Mr. RITER. Yes, sir. In the statement that the Department filed we pointed out that the allocation to the upper basin under which water would be obtained under the compact is well within the apportionment to the upper basin. Including existing developments, including authorized developments, including the two projects proposed to be authorized here, the average annual depletion is 4,260,000 acre-feet. The upper basin allocation is 7,500,000 acre-feet, but we realize, sir, that with the existing projects, with the existing storage reservoirs, we do not plan that the upper basin can use more than about 6,200,000 on a longtime average. So then looking at the Animas-LaPlata project and looking at the other proposals presently before the Congress, that is, the Fryingpan-Arkansas project and Savory-Pothook project, the total estimated longtime depletion is 4,503,000 acre-feet.

Now with the presently authorized reservoirs of the Colorado River storage project, it is our estimate that the upper basin can deplete the river by 6,200,000 acre-feet on an average, and that is recognizing, sir, the obligation to the lower basin under the compact.

Mr. SAUND. How do you arrive at 6.2 million?

Mr. RITER. That is a projection as to what we figure might come in, sir, by the year 2062. The projects I have enumerated add up to 4,503,000 acre-feet and the balance—

Mr. SAUND. Mr. Riter, just answer my question. You said that according to your calculations, the upper basin could deplete 6.2 million.

Mr. RITER. Yes, sir.

Mr. SAUND. How did you arrive at that 6.2 million figure? What is the total supply you considered available, and how much of that is allocated to the upper basin? You recognize the Colorado River compact?

Mr. RITER. Yes, sir.

Mr. SAUND. You recognize also the Upper Colorado River Basin compact.

Mr. RITER. Yes, sir.

Mr. SAUND. How did you get the 6.2 million acre-feet availability for the upper basin depletion? You must have had something to go on.

Mr. RITER. Yes, sir. We have reservoirs, exchange reservoirs, hold-over reservoirs, already authorized. They have an initial capacity of about 35 million acre-feet. After figuring sediment deposition, remaining active capacity is about 23 million acre-feet based on a critical drawdown period. We estimated that after allowing for the water that would go downstream under the compact, there would still be on a

longtime average, sir, 6,200,000 upper basin.

Mr. SAUND. Before you can be the basic figure of the supply then you divide that. Is that not

Mr. RITER. Yes.

Mr. SAUND. What is the total

Mr. RITER. Longtime average feet virgin depletion.

Mr. SAUND. What do you mean

Mr. RITER. That is about 60

Mr. SAUND. I will pass this to give you a copy, Mr. Riter.

Mr. ROGERS. Will the gentleman

Mr. SAUND. Yes, sir.

Mr. ROGERS. Does my colleague chart placed in the record?

Mr. SAUND. Yes, sir.

Mr. ROGERS. Unless there is a

Mr. SAUND. I also pass this to

Mr. ROGERS. Unless there is a (The material referred to for

TABLE 1-a.—Undepleted or "virgin"

Water year:	Virgin flow	Water
1909	23, 275	192
1910	14, 248	191
1911	16, 028	190
1912	20, 520	192
1913	14, 473	192
1914	21, 222	193
1915	14, 027	191
1916	19, 201	192
1917	21, 057	191
1918	15, 364	191
1919	12, 462	190
1920	21, 951	191
1921	23, 015	191
1922	18, 305	191
1923	18, 269	191
1924	14, 201	191

ANNUAL AVERAGE

Period:
1909-16
1911-16
1922-26
1930-36

Source: Calif. Ex. 2201A.

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ve posed with regard to

a chance to look at that.
r. Palmer says there are
e interpretations? How
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ou arrive at that? Will

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0 acre-feet, but we real-
h the existing storage
asin can use more than
a looking at the Animas-
proposals presently before
as project and Savory-
e depletion is 4,503,000

s of the Colorado River
pper basin can deplete
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nder the compact.

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million figure? What
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Colorado River Basin

n acre-feet availability
ave had something to

change reservoirs, hold-
e an initial capacity of
diment deposition, re-
-feet based on a critical
allowing for the water
here would still be on a

longtime average, sir, 6,200,000 acre-feet available for depletion in the upper basin.

Mr. SAUND. Before you can bring in this figure, 6.2, you have to have the basic figure of the supply. You get the total supply first and then you divide that. Is that not right?

Mr. RITER. Yes.

Mr. SAUND. What is the total supply you begin with?

Mr. RITER. Longtime average is a little better than 15 million acre-feet virgin depletion.

Mr. SAUND. What do you mean by longtime average?

Mr. RITER. That is about 60 years—wait a minute.

Mr. SAUND. I will pass this chart over to the members. And I will give you a copy, Mr. Riter.

Mr. ROGERS. Will the gentleman yield to me?

Mr. SAUND. Yes, sir.

Mr. ROGERS. Does my colleague ask unanimous consent to have the chart placed in the record?

Mr. SAUND. Yes, sir.

Mr. ROGERS. Unless there is an objection, it is so ordered.

Mr. SAUND. I also pass this chart out, table 1-a.

Mr. ROGERS. Unless there is an objection, it is so ordered.

(The material referred to follows:)

TABLE 1-a.—Undepleted or "virgin" flow of Colorado River at Lee Ferry

[Units=1,000 acre-feet]

Water year:	Virgin flow	Water year—Con.	Virgin flow	Water year—Con.	Virgin flow
1909	23, 275	1925	13, 033	1941	18, 148
1910	14, 248	1926	15, 853	1942	19, 125
1911	16, 028	1927	18, 616	1943	13, 103
1912	20, 520	1928	17, 279	1944	15, 154
1913	14, 473	1929	21, 428	1945	13, 410
1914	21, 222	1930	14, 885	1946	10, 426
1915	14, 027	1931	7, 769	1947	15, 473
1916	19, 201	1932	17, 243	1948	15, 613
1917	24, 037	1933	11, 356	1949	16, 376
1918	15, 364	1934	5, 640	1950	12, 894
1919	12, 462	1935	11, 549	1951	11, 647
1920	21, 951	1936	13, 800	1952	20, 290
1921	23, 015	1937	13, 740	1953	10, 670
1922	18, 305	1938	17, 545	1954	7, 900
1923	18, 269	1939	11, 075	1955	9, 150
1924	14, 201	1940	8, 601	1956	10, 720

ANNUAL AVERAGES FOR SELECTED PERIODS

Period:	Virgin flow
1909-56	15, 211
1914-56	14, 920
1922-56	14, 008
1930-56	13, 085

Source: Calif. Ex. 2201A.

[Units=1,000 acre-feet]

Year	Water years		Calendar years		Year	Water years		Calendar years	
	H. Doc. No. 364	California Water Resources Bulletin	"Blue" Book	LaRue ¹ WSP 556 (Lees Ferry)		H. Doc. No. 364	California Water Resources Bulletin	"Blue" Book	LaRue ¹ WSP 556 (Lees Ferry)
	(1)	(2)	(3)	(4)		(1)	(2)	(3)	(4)
1896	10,089			13,415	1929	21,428	20,945	22,355	
1897	18,009		20,538	18,375	1930	14,885	14,756	14,589	
1898	13,815		13,606	13,135	1931	7,769	8,042	7,936	
1899	15,874		18,735	21,095	1932	17,243	16,959	17,566	
1900	13,228		13,450	13,555	1933	11,356	11,411	11,723	
1901	13,582		14,521	14,415	1934	5,640	6,012	5,501	
1902	9,393		9,205	9,825	1935	11,549	11,578	12,326	
1903	14,807		13,294	13,850	1936	13,800	13,762	14,356	
1904	15,645		12,680	13,225	1937	13,740	13,746	14,218	
1905	16,027	12,593 ²	16,520	14,800	1938	17,545	17,360	18,160	
1906	19,121	18,516	20,106	18,676	1939	11,075	11,270	10,845	
1907	23,402	25,528 ²	22,834	22,452	1940	8,601	8,882	9,495	
1908	12,856	13,708	13,392	12,527	1941	18,148	17,865	20,576	
1909	23,275	24,850	25,255	22,703	1942	19,125	18,809	17,256	
1910	14,248	14,917	15,118	14,064	1943	13,103	13,078	13,615	
1911	16,028	13,532 ²	18,213	16,325	1944	15,154	15,011		
1912	20,520	19,543	20,295	18,786	1945	13,410	13,372		
1913	14,473	14,684	14,227	14,451	1946	10,426	10,535		
1914	21,222	20,768	21,995	20,716	1947	15,473	15,262		
1915	14,027	12,437 ²	14,156	13,596	1948	² 15,613	15,453		
1916	19,201	18,600	20,605	19,886	1949	² 16,376			
1917	24,037	22,918 ²	22,885	22,566	1950	² 12,894			
1918	15,364	16,514	15,843	16,226	1951	² 11,647			
1919	12,462	11,422	12,501	12,696	1952	² 20,290			
1920	21,951	19,917 ²	23,038	21,453	1953	² 10,670			
1921	23,015	22,473	22,224	22,009	1954	² 7,900			
1922	18,305	18,170	18,655	18,565	1955	² 9,150			
1923	18,269	18,114	19,376		1956	² 10,690			
1924	14,201	14,305	13,828		1957	² 19,770			
1925	13,033	13,034	14,582		1958	² 16,460			
1926	15,853	15,774	15,301		1959	² 8,600			
1927	18,616	18,298	20,111		1960	² 11,190			
1928	17,279	17,144	17,064						

¹ Computed by addition of estimated "historic" flow and upstream depletion WSP 556, p. 108, table 3, col. (6) and p. 110, table 6, col. (4).

² White Book memo supplement.

³ CRB extensions.

Mr. ROGERS. The Chair would like to inquire of his colleague if his colleague showed these to Mr. Riter before this time?

Mr. RITER. I have not seen them.

Mr. SAUND. No, but they are very simple. They are his own charts, Mr. Chairman.

Mr. Riter, you say there is overall at least 15 million supply. You mean by that undepleted virgin flow at Lee Ferry?

Mr. RITER. Yes, and—

Mr. SAUND. Let us make it short. Is that right?

Mr. RITER. Approximately that. It varies a little bit depending on what period of time you use.

Mr. SAUND. All right, you have this "Virgin Flow, Colorado River at Lee Ferry," the two-page document here, and it gives the estimated flow from 1896 on.

Mr. RITER. Yes, sir.

Mr. SAUND. Now is it not a fact that the actual measurements were not taken at Lee Ferry before 1922?

Mr. RITER. That is right.

Mr. SAUND. All right are the figures between Mr. RITER. They are sir.

Mr. SAUND. They are Mr. RITER. Yes, the measured at Yuma since measured at some local estimates.

Mr. SAUND. You see marks starting at 1905 1922. The first column and the second column. These figures in the first have been arrived at those years so marked t than 2 million: 1905, 1 the difference between t

Mr. RITER. Of course source Bulletin estimat

Mr. SAUND. If you 14,248,000 and 14,917, cases there is a differ estimates by both parti

Then you look from difference is half a mi and 1948.

All I am trying to ge when there were no me the two estimates of 2 the measurements, in t half a million acre-fee making a mistake wh But the figures you car ments after 1922. Yo

Mr. RITER. From th agree with you; yes, si

Mr. ASPINALL. Will Mr. SAUND. Yes; I

Mr. ASPINALL. Is it my colleague questions which the representat other representatives their determination of Colorado River?

Mr. SAUND. All I a making those estimate which there was a dif mates. They were all into account the mea never a difference of n measurements certainl That is my point.

Water years		Calendar years	
H. Doc. No. 364	California Water Resources Bulletin	"Blue" Book	LaRue WSP 556 (Lees Ferry)
(1)	(2)	(3)	(4)
21,423	20,945	22,355	-----
14,885	14,756	14,589	-----
7,769	8,042	7,936	-----
17,243	16,959	17,566	-----
11,356	11,411	11,723	-----
40	6,012	5,501	-----
11,578	11,578	12,326	-----
13,800	13,762	14,356	-----
13,740	13,746	14,218	-----
17,545	17,360	18,169	-----
11,075	11,270	10,845	-----
8,601	8,882	9,495	-----
18,148	17,865	20,576	-----
19,125	18,809	17,256	-----
13,103	13,078	13,615	-----
15,154	15,011	-----	-----
13,410	13,372	-----	-----
10,426	10,535	-----	-----
15,473	15,262	-----	-----
15,613	15,453	-----	-----
16,376	-----	-----	-----
12,894	-----	-----	-----
11,647	-----	-----	-----
20,290	-----	-----	-----
10,670	-----	-----	-----
7,900	-----	-----	-----
9,150	-----	-----	-----
10,690	-----	-----	-----
19,770	-----	-----	-----
16,460	-----	-----	-----
8,600	-----	-----	-----
11,190	-----	-----	-----

eam depletion WSP 556, p. 108, table 3,

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his time?

They are his own charts,
t 15 million supply. You
Ferry?

right?
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gin Flow, Colorado River
and it gives the estimated

actual measurements were

Mr. SAUND. All right, then tell me what is the difference. What are the figures between 1896 and 1922?

Mr. RITER. They are estimated based on other records on the river, sir.

Mr. SAUND. They are estimated?

Mr. RITER. Yes, they are estimates. The river has been actually measured at Yuma since 1902. The upper basin tributaries were also measured at some locations since 1896. The figures at Lee Ferry are estimates.

Mr. SAUND. You see the first page of that and you see the checkmarks starting at 1905. There are six checkmarks between 1905 and 1922. The first column here is headed "House Document No. 364" and the second column, "California water Resources Bulletin No. 1." These figures in the first and second columns are both estimates that have been arrived at. You see these six checkmarks, and in all of those years so marked the difference between the two estimates is more than 2 million: 1905, 1907, 1911, 1915, 1917, and 1920. In those years the difference between these two estimates is over 2 million.

Mr. RITER. Of course, I am not familiar with these California Resource Bulletin estimates.

Mr. SAUND. If you look at them, they are very close. In 1910, 14,248,000 and 14,917,000; and they are both estimates. Yet in six cases there is a difference of over 2 million. And they were honest estimates by both parties.

Then you look from 1922 to 1948, that is 26 years, and the highest difference is half a million acre-feet for any one year between 1922 and 1948.

All I am trying to get at is this: When we are just taking estimates when there were no measurements there could be a difference between the two estimates of 2 million acre-feet, but after you started making the measurements, in those 26 years there was not a difference of over half a million acre-feet any time. So there could be more chance of making a mistake when you are making just estimates until 1922. But the figures you can rely on a little better are those of the measurements after 1922. You will agree with that; will you not?

Mr. RITER. From the standpoint of the accuracy of records, I will agree with you; yes, sir.

Mr. ASPINALL. Will my colleague yield to me?

Mr. SAUND. Yes; I yield.

Mr. ASPINALL. Is it not a fact, though, that these estimates which my colleague questions at the present time are the very estimates on which the representative of the State of California along with six other representatives of the Colorado River Basin States founded their determination of the division of the waters along the river, the Colorado River?

Mr. SAUND. All I am trying to show, Mr. Chairman, is this: In making those estimates, within 17 years there were six instances in which there was a difference of 2 million acre-feet in these two estimates. They were all honest estimates. But when you start taking into account the measurements after 1922, in 26 years there was never a difference of more than half a million acre-feet. That is, the measurements certainly can be relied upon more than just estimates. That is my point.

Another thing, now, looking at this chart. Beginning with 1896 and going all the way down to 1922, you will see that there are 4 years—1907, 1909, 1917, and 1921—when the estimate was over 23 million.

Mr. RITER. That is right.

Mr. SAUND. And yet if you start from 1922 on, when the actual measurements were taken, there is not one single year where it was 23 million.

Mr. RITER. That is right. And, Mr. Saund, may I say that, in recognition of the very thing that you have pointed out, that is one reason why I have tried to be conservative in estimating what we can count upon for use in the upper basin. I am confident, sir, with the reservoirs that we have, we can sustain a use in the upper basin of 6,200,000 and still not violate the compact.

Mr. SAUND. You say that based on an actual supply of at least 15 million acre-feet; is that right?

Mr. RITER. The 15 million acre-feet—there will be quite a bit of spill in these high years. In document—

Mr. SAUND. Do not try to confuse me, sir. I want plain, simple answers. Do you base that figure of 6.2 on an undepleted virgin flow of at least 15 million acre-feet at Lee Ferry annually?

Mr. RITER. I did not have to. That is the figure I actually used, but our operation studies in this document which Mr. Hosmer furnished, or made available, to us, this "Financial and Power Rate Analysis, Colorado River Storage Project and Participating Projects" under date of September 1960—there are some longtime operations in here from 1906 through 1959, and those studies show that in those high years you brought to my attention there would be a considerable amount of water spilled from the upper basin reservoirs that would not be usable. So that I have looked primarily at the usable water, the spill would indicate that those years would be discounted.

Mr. SAUND. Mr. Riter, you do not expect me to agree with you there would be as much as 23 million acre-feet, because, according to your estimate you have that amount at least four times. But when you actually started making measurements in 1922, after that there never was one of 23 million acre-feet. This is an important matter, Mr. Riter.

Mr. RITER. I know it is.

Mr. SAUND. You have to have the water. You are going out over here and asking people to build their lives on the hope that they will have water for those acreages. I am speaking about the Indians, and I am doing this because we know what happened to us in Imperial County. I have lived in that country which depends upon water from the Colorado River. I know the years we had to go to the railroad tracks to get drinking water, and I know what happens when the man up above gets the water and when down below you just do not get it.

What we are trying to do is to show that, if there is not availability of water, let us not spend public money, and also let us not fool anybody that they will have the water if it is not available. If it does not exist, no law can make it available, you know.

Let's go on now. You have this chart in front of you?

Mr. RITER. Yes, sir.

Mr. SAUND. Here is us take the third line, right. We have 1914 feet. Then we have 13,085,000. How do available?

Mr. RITER. No, Judge.

Mr. SAUND. This spill that later on, if that is

Mr. RITER. Mr. Saund, 15,200,000; but we have Our operations studies utilize that water we entirely have available.

Our assumptions, our full at the beginning of studies show that. So

Mr. SAUND. I will m

Mr. RITER. Okay.

Mr. SAUND. You do feet of virgin undepleted do that, could you?

Mr. RITER. Our estimate basis of our records, sup

Mr. SAUND. But not ments.

Mr. RITER. That is carryover reservoirs, si

Mr. SAUND. Is it n that and these people remember that—when in the year 1934? That ing water in Imperial was 7,900,000 acre-feet ago, it was 9,150,000 ac

Mr. RITER. You are longtime carryover re build in 1956. The p in years of high runoff. These are lon

Mr. SAUND. Well, y the only expert so far, water is concerned. would you not?

Mr. RITER. Yes, sir.

Mr. SAUND. Some en are hired by people to d

Mr. RITER. Yes, sir.

Mr. SAUND. I will r Goodrich, then chief er sion. In its Engineer this is what Mr. Goodr

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nt of you?

Mr. SAUND. Here is the annual average for selected periods. Let us take the third line, 1922 to 1956. That is 14 million acre-feet. All right. We have 1914 to 1956, that is over 40 years, 14,920,000 acre-feet. Then we have 1930 to 1956, which is the latest available, 13,085,000. How do you say that there will be 15 million acre-feet available?

Mr. RITER. No, Judge; I say—

Mr. SAUND. This spill and the reservoirs, I am going to come to that later on, if that is what you depend on.

Mr. RITER. Mr. Saund, we estimate on a longtime basis there is 15,200,000; but we have not planned to fully utilize all of that water. Our operations studies show there will be some spilled. In order to utilize that water we would need more reservoirs than what we presently have available.

Our assumptions, our studies show our reservoirs would have been full at the beginning of this 1930 drawdown period. Our operations studies show that. So that we would—

Mr. SAUND. I will make it short, Mr. Riter.

Mr. RITER. Okay.

Mr. SAUND. You do not say flatly that there will be 15 million acre-feet of virgin undepleted flow at Lee Ferry in any year. You could not do that, could you?

Mr. RITER. Our estimates show that is on a longtime basis, on the basis of our records, supplemented by estimates.

Mr. SAUND. But not available since 1922 when you started measurements.

Mr. RITER. That is right; that is the reason we have the longtime carryover reservoirs, sir.

Mr. SAUND. Is not a fact there have been years—and I know that and these people sitting in the room from Imperial Valley will remember that—when the recorded flow was only 5,640,000 acre-feet in the year 1934? That was the year when we did not even have drinking water in Imperial Valley. There is another year, 1954, when it was 7,900,000 acre-feet. Another year, 1955, it being only 5 or 6 years ago, it was 9,150,000 acre-feet.

Mr. RITER. You are correct, sir; and that is the purpose of these longtime carryover reservoirs which the Congress authorized us to build in 1956. The purpose of those reservoirs was to store waters in years of high runoff in order to have it available in years of low runoff. These are longtime carryover reservoirs, Mr. Saund.

Mr. SAUND. Well, you would not make the statement that you are the only expert so far as the available supply of the Colorado River water is concerned. You would give credit to somebody else, too, would you not?

Mr. RITER. Yes, sir.

Mr. SAUND. Some engineers who make a business of doing that and are hired by people to do that?

Mr. RITER. Yes, sir.

Mr. SAUND. I will read you here from a statement of Mr. R. D. Goodrich, then chief engineer of the Upper Colorado River Commission. In its Engineering Report No. 22, dated November 14, 1955, this is what Mr. Goodrich said, and he was at that time the chief en-

gineer of the Upper Colorado River Commission, not of California. This is what he said:

On the basis of all data now available, the present safe yield of the upper Colorado River at Lee Ferry appears to be from 13 million to 14 million acre-feet annually.

What about Raymond Hill? You know him.

Mr. RITER. Yes, sir; I know Mr. Hill personally.

Mr. SAUND. Mr. Raymond Hill is considered to be some kind of an authority on this question. You respect that?

Mr. RITER. I respect him, sir, as an engineer, and I respect his judgment.

Mr. SAUND. You respect his judgment. Alright, this is what he said. This is Mr. Raymond Hill.

It should be accepted by all concerned, therefore, that 14 million acre-feet per year is the upper limit of the dependable supply obtainable from the undepleted virgin flow of the Colorado River at Lee Ferry.

He and Mr. Goodrich stated within 13 and 14. Mr. Goodrich stated between 13 and 14 million and Mr. Hill said 14. That is the estimates here in the data from 1914 on, whichever period you take. And yet you say you start out with 15.2.

Mr. RITER. I said I started out with that, but I also said, sir, with the demands we have we spilled a considerable amount of that water, we did not use it all.

Mr. SAUND. Let me ask this question: When the reservoirs in the upper basin were filled up, was that 1930?

Mr. RITER. They are not built yet, but our Bureau study—

Mr. SAUND. I am talking about the ones existing then. In 1930, all of the reservoirs in the upper basin were filled up, were they not?

Mr. RITER. You mean these theoretical reservoirs we are now building?

Mr. SAUND. No; I am talking about the ones existing in 1930.

Mr. RITER. Some of them have been built since then.

Mr. SAUND. I will come to that later on. I do not want to have an argument with you; we are just trying to arrive at the facts.

Mr. RITER. Okay.

Mr. SAUND. You had some reservoirs in the upper basin before 1930. I do not mean those authorized in 1956. You had some reservoirs before 1930, and all of those reservoirs were filled to capacity by 1930. So all of the water that came between 1930 and 1956 for which you have figures was all the water there was because none of it could have been held back in those reservoirs. Is that right?

Mr. RITER. I do not know what your point—

Mr. SAUND. Do not worry about my point. Just say if I am right or wrong. Just tell—

Mr. RITER. Mr. Saund, I do not—

Mr. SAUND. Let me make it plain. You had some reservoirs in the upper basin before the year 1930?

Mr. RITER. We probably did, sir.

Mr. SAUND. All right. Then do you know that all of those reservoirs had filled up before 1930?

Mr. RITER. Those that I am aware of and those I have studied showed—

Mr. SAUND. Mr. Palmer, you will admit that?

Mr. ASPINAL of the Bureau to 1930. Then up to, perhaps But as far as B

Mr. SAUND. 1956 no water c Is that correct?

Mr. RITER. S River project; in that period.

Mr. SAUND. V

Mr. RITER. W project.

Mr. PALMER. man of the full has escaped you, prior to 1930, eit tainly all of the istent in the upj canti and Navah is not an area of 1

Mr. SAUND. M existing in natur 1956; none of it w

Mr. PALMER. 2 are trying to mal streams to irriga some very minor verted out to field

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Now the irriga basin, in Uinta B area, Delta area, from 1930 on, and extent of the diver

Mr. SAUND. Bet flow at Lees Ferry say I started out reservoirs. What ahead.

You say the reser is that right, Mr. R

Mr. RITER. The drawdown periods.

Mr. SAUND. Is it that?

Mr. RITER. No, si

Mr. SAUND. All 1

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ones existing in 1930.

since then.

I do not want to have an
drive at the facts.

the upper basin before 1930.
You had some reservoirs
filled to capacity by 1930.
and 1956 for which you
use none of it could have
ght?

Just say if I am right

had some reservoirs in

now that all of those res-

and those I have studied

t?

Mr. ASPINALL. If my colleague will yield, there were no reservoirs of the Bureau of Reclamation in the upper Colorado River area prior to 1930. There were small reservoirs, any place from 400 acre-feet up to, perhaps 15,000 or 20,000 acre-feet that were privately owned. But as far as Bureau operations, they had no reservoirs.

Mr. SAUND. But I am trying to point out that between 1930 and 1956 no water could be held back from the year's flow by any reservoir. Is that correct?

Mr. RITER. Sir, in that period we filled the reservoirs of the Pine River project; we filled Taylor Park Reservoir, which had been built in that period.

Mr. SAUND. When did you fill those?

Mr. RITER. We filled the reservoirs of the Colorado-Big Thompson project.

Mr. PALMER. The point, Mr. Congressman, that I believe the chairman of the full committee and Mr. Riter are making I think maybe has escaped you, in that there was very little storage in total available prior to 1930, either private or State or public, or whatever it is. Certainly all of the combined capacity of all of the reservoirs now existing in the upper basin, if you take out Flaming Gorge and Curecanti and Navaho and Glen Canyon, is very, very insignificant. This is not an area of major storage facilities.

Mr. SAUND. Mr. Palmer, what I am saying is that all of the water existing in nature just came down to Lee Ferry between 1930 and 1956; none of it was held back.

Mr. PALMER. No, sir; this is not correct, and this is the point we are trying to make. There were nominal and normal diversions from streams to irrigate that did not go down to Lee Ferry. There were some very minor storage facilities available and that water was diverted out to fields.

But the point I sense you are trying to drive at, I want to alert you now that there is little storage, was little storage in 1930, as the chairman has indicated, and, in terms of total capacity, little has been constructed until we started on the Colorado River storage development.

Now the irrigation development that was present in the upper basin, in Uinta Basin and Yampa Basin and in the Grand Junction area, Delta area, Montrose area, this water, of course, was diverted from 1930 on, and to that extent the streams were depleted to the extent of the diversion less return flow.

Mr. SAUND. Between 1930 and 1956 the best you could do with the flow at Lees Ferry, while there was not much of it held back. I will say I started out with 14. You were going to tell me about these reservoirs. What are they going to do, Mr. Riter? I will let you go ahead.

You say the reservoirs will make the available supply from 14 to 15; is that right, Mr. Riter?

Mr. RITER. The reservoirs will release their storage during these drawdown periods.

Mr. SAUND. Is it not a fact that the evaporation will be more than that?

Mr. RITER. No, sir.

Mr. SAUND. All right. Have you ever heard of Mr. Leopold?

Mr. RITER. Yes.

Mr. SAUND. This is from your Circular 410. No. This is the U.S. Geological Survey Circular 410. Mr. Leopold has been there with the Survey for years and he is now the Chief of the Water Research Bureau. Is that right?

Mr. PALMER. I believe that is right.

Mr. RITER. I do not know his title.

Mr. SAUND. But he has been there for a long time. In this U.S. Geological Survey Circular 410, page 15, Mr. Leopold says:

It can be seen that reservoir capacity in excess of about 40 million acre-feet would achieve practically no additional water regulation if evaporation loss is subtracted from annual regulation.

I do not know; I am not an expert. But that is what he says. Have you heard of Mr. Langbein?

Mr. RITER. Yes, sir.

Mr. SAUND. He is an expert hydrologist with the Geological Survey, considered to be a very well-known authority on the subject? You know of him.

Mr. Langbein stated in U.S. Geological Survey Circular 409, page 4:

The net regulation indicates, insofar as mainstem regulation of the Colorado River is concerned, that the capacity of existing reservoirs and of those under construction (total nearly 50 million acre-feet) is near a theoretical optimum—the minimum capacity necessary to provide the maximum obtainable regulation—and that any increase in capacity will not increase the supply. Furthermore, this optimum is insensitive. There is no significant gain in net regulation between 29 and 78 million acre-feet of capacity. The gain in regulation to be achieved by increasing the present 29 million acre-feet to nearly 50 million acre-feet of capacity appears to be largely offset by a corresponding increase in evaporation.

Mr. RITER. Mr. Saund—

Mr. SAUND. All I can cite is the expert here. Maybe you do not agree with him. Do you agree?

Mr. RITER. I would have to check the figures out. Our calculation, our operation studies show that the evaporation would not offset the storage release for the reservoirs we now have under construction.

Mr. SAUND. I put in the record the testimony of these longtime experts employed by the U.S. Geological Survey and one is the head of the Water Resources Bureau.

Mr. RITER. That is right.

Mr. SAUND. That is all I can say. I am not a hydrologist. I know if the water is not there you just cannot use it. You can have all the arguments you want.

Mr. RITER. Our studies show that with the total projects already built, those authorized, and those now presently before the Congress, if you include the two projects in this bill we are now considering, would deplete the flow by a longtime average by 4,503,000 acre-feet. Now I have got some cushion, sir, between that figure and the 6.2 million acre-feet. I am confident we can build projects to use up to the 6.2. If you do not believe me, you certainly ought to believe we can build it 4.5 and we think we can go beyond the 4.5. I do not—

Mr. SAUND. You say there is 15.2 available?

Mr. RITER. Yes, but—

Mr. SAUND. Under I cited two experts.

Mr. RITER. Yes.

Mr. SAUND. And they have given me your figure on that. Let us see.

that, but I will say that of undepleted virgin flow release for the lower basin.

Mr. RITER. It would

Mr. SAUND. Let us are talking about evaporation at least 7½.

Mr. RITER. Yes.

Mr. SAUND. How about

Mr. RITER. I can tell how much more the upper is. There has been no is a lot—

Mr. SAUND. The construction to take too much time. upper basin will share of the Mexican Treaty

Mr. PALMER. Judge

Mr. SAUND. All right

Mr. PALMER (continuing) that I think might be better

Mr. SAUND. OK.

Mr. PALMER. Taking consideration, if you will, that where the actual stream indicate the 14 million feet

Mr. SAUND. Yes.

Mr. PALMER. Keep in mind Mr. Riter has proposed uses in the basin.

Mr. SAUND. Yes.

Mr. PALMER. Now at the River compact, it was water of the river was

water would not go to the Colorado River storage are talking about now in

proposals now before the disposition of the final already diverted and check gages at Lees Ferry, you basin entitlement and if you have quoted that by

Mr. SAUND. I think in interpretation of the Compact of the flow at Lees interpretation? How in

Mr. PALMER. Again you

410. No. This is the U.S. Gold has been there with the Chief of the Water Research

a long time. In this U.S. Mr. Leopold says:

s of about 40 million acre-feet regulated if evaporation loss is

t that is what he says.

with the Geological Survey, authority on the subject? You

Survey Circular 409, page

m regulation of the Colorado reservoirs and of those under near a theoretical optimum—maximum obtainable regulation increase the supply. Further significant gain in net regulation. The gain in regulation to acre-feet to nearly 50 million by a corresponding increase

here. Maybe you do not

res out. Our calculation, tion would not offset the ve under construction. ony of these longtime ex-vey and one is the head

ot a hydrologist. I know it. You can have all the

he total projects already ly before the Congress, if e now considering, would ,503,000 acre-feet. Now gure and the 6.2 million ects to use up to the 6.2. t to believe we can build I do not—

Mr. SAUND. Undepleted virgin flow at Lees Ferry. I say "14" and I cited two experts.

Mr. RITER. Yes.

Mr. SAUND. And then the average between 1922 and 1956. But you have given me your figures and I have given you mine. We can argue on that. Let us see. Starting out with 14—you do not have to accept that, but I will say this as a hypothetical figure—14 million acre-feet of undepleted virgin flow at Lees Ferry, then how much do you have to release for the lower basin?

Mr. RITER. It would be at least 75 million acre-feet every 10 years.

Mr. SAUND. Let us make it simple—75 divided by 10 is 7½. We are talking about evaporation from reservoirs and all of that; you say at least 7½.

Mr. RITER. Yes.

Mr. SAUND. How about figuring on eight and a quarter.

Mr. RITER. I can take whatever figure you want. I do not know how much more the upper basin's share of the Mexican Treaty burden is. There has been no agreement among the States on that. There is a lot—

Mr. SAUND. The compact—I have a copy of that, but I do not want to take too much time. It says when there is not a surplus then the upper basin will share equally with the lower basin the requirements of the Mexican Treaty, which is 1½ million acre-feet annually.

Mr. PALMER. Judge Saund, may I—

Mr. SAUND. All right now—

Mr. PALMER (continuing). May I interject a thought at this point that I think might be helpful?

Mr. SAUND. OK.

Mr. PALMER. Taking the figures that Mr. Riter has presented, consider, if you will, that in this critical period you are talking about where the actual stream gaging records at Lees Ferry by your figures indicate the 14 million figure—

Mr. SAUND. Yes.

Mr. PALMER. Keep in mind also that the compact and that the figures Mr. Riter has presented to you were predicated on the existing uses in the basin.

Mr. SAUND. Yes.

Mr. PALMER. Now at the time of the authorization of the Colorado River compact, it was estimated that 2½ million acre-feet of the water of the river was already in use in the upper basin. Now that water would not go to Lees Ferry, it was already in use at the time the Colorado River storage project was authorized. Now, what we are talking about now is the amount of water that is involved in the proposals now before the Congress as they impinge upon the ultimate disposition of the final amounts of water. With 2½ million acre-feet already diverted and clearly having an impact on the reading of the gages at Lees Ferry, you see the 2½ million runs against the upper basin entitlement and it is already being measured in the water years you have quoted that by your figures indicate a 14 million figure.

Mr. SAUND. I think it is very simple, Mr. Palmer. What is your interpretation of the Colorado River compact so far as the requirement of the flow at Lees Ferry is concerned? Will you give your interpretation? How much water has to go down?

Mr. PALMER. Again you have heard the witness—

Mr. SAUND. You must have some interpretations.

Mr. PALMER. You have heard the testimony of the technical witness on that subject.

Mr. SAUND. All right, then, let him answer it. Mr. Riter, what is your interpretation of the obligation of the upper basin so far as the flow at Lees Ferry is concerned? I am not arguing.

Mr. RITER. Not less than 7.5 million.

Mr. SAUND. No: less than 7.5 a year?

Mr. RITER. Yes. The other matter is tied up in a lot of matters you cannot answer, I cannot answer, because it involves legal interpretations some of which are now before the Supreme Court for decision. But—

Mr. SAUND. All right, you have your interpretation and figures telling me there is enough water available, but you begin with 15.2 instead of 14.

Mr. RITER. I say part of that 15.2 will be spilled and our studies show that, sir.

Now there is another thing. I am talking in terms of averages. The 6.2 million acre-feet is longtime average. In the extremely low years there are going to be some shortages and in the upper basin will not get 6.2 million acre-feet in such low years. In the first place, the water is not available for transmountain diversion, and there are going to be shortages on the inbasin uses and then our holdover reservoirs are going to be drawn to low level.

Mr. SAUND. The chairman is getting very impatient and I want to get this thing over with. Put down on your paper 14 million acre-feet, hypothetical. If you do not agree, that is a different matter.

Mr. RITER. All right.

Mr. SAUND. You say there has to be at least $7\frac{1}{2}$ of that to be given to the lower basin. Then how much does that leave?

Mr. RITER. By straight arithmetic, 6.5.

Mr. SAUND. 6.5; all right. How much is evaporation loss that you anticipate when all of these reservoirs have filled up in the upper basin?

Mr. RITER. We have estimated an average of 700,000 acre-feet, but that, sir, is part of the 6.5.

Mr. SAUND. I am not talking—yes; that is part of the 6.5. But there is 14 million. Let us face it. There is 14. I put that figure in. And you agree that there has to be at least $7\frac{1}{2}$ million acre-feet going below Lees Ferry.

Mr. RITER. At the minimum.

Mr. SAUND. At the minimum. It could be more. Then that leaves $6\frac{1}{2}$.

Mr. RITER. Yes, sir.

Mr. SAUND. For the upper basin to deplete.

Mr. RITER. Yes, sir.

Mr. SAUND. How much would be the evaporation loss according to your estimates when all of these dams and projects are built?

Mr. RITER. In round numbers, 700,000.

Mr. SAUND. 700,000.

Mr. RITER. I think we used the figure of 691,000 on a long-time average.

Mr. SAUND. Let us take the seven hundred thousand. That is 0.70—that leaves 5.8; is that right?

Mr. RITER. Yes.

Mr. SAUND. You multiply in this— $11\frac{1}{4}$ percent?

Mr. RITER. $11\frac{1}{4}$ percent.

Mr. SAUND. You take out balance; is that right?

Mr. RITER. Yes.

Mr. SAUND. How much is right?

Mr. RITER. How much did you

Mr. SAUND. About six hundred feet.

Mr. RITER. That is approximately

Mr. SAUND. How much.

Mr. RITER. Approximately

Mr. SAUND. 650.

Mr. RITER. Yes.

Mr. SAUND. Okay. Now I document to witness].

This is from the testimony of the engineer of the New Mexico Commission of subcommittee hearing 86th Congress, 2d session.

All right. This is what Mr. Riter is by present and authorized

Mr. RITER. May I call your reservoir losses in there which evaporation losses for main Navajo Reservoir loss at deducted out because we have Agreed?

Mr. SAUND. Yes. How much

Mr. RITER. 73,300 acre-feet reservoirs and Navajo Reservoir

Mr. SAUND. 112,000. I take

Mr. RITER. Yes.

Mr. SAUND. I will read this. He said that the committed to presently use 92,300 acre-feet; that out. Hammond project Navajo Reservoir losses 39. W tion Co., 239,000 acre-feet. The ject, 252.3, and San Juan-Chama industrial, 112.5, and Animas. This is the estimate given by Riter. Is that right?

Mr. RITER. I think that sounds

Mr. SAUND. That makes 671

You figured with me on the was only 650,000 acre-feet. 21,000 acre-feet? And we are the upper basin.

Mr. RITER. I do not know

Mr. RITER. Yes.

Mr. SAUND. You multiply 5.8—what is the share of New Mexico in this—11¼ percent?

Mr. RITER. 11¼ percent.

Mr. SAUND. You take out 50,000 for Arizona and then 11¼ of the balance; is that right?

Mr. RITER. Yes.

Mr. SAUND. How much is that? About 640,000 acre-feet; is that right?

Mr. RITER. How much did you get?

Mr. SAUND. About six hundred and forty or fifty thousand acre-feet.

Mr. RITER. That is approximately correct.

Mr. SAUND. How much.

Mr. RITER. Approximately that.

Mr. SAUND. 650.

Mr. RITER. Yes.

Mr. SAUND. Okay. Now I will give you this paper here [handing document to witness].

This is from the testimony of Mr. S. E. Reynolds, chief engineer of the New Mexico State engineers. This is from the testimony of subcommittee hearing on H.R. 2352 and H.R. 2494 and S. 72, 86th Congress, 2d session.

All right. This is what Mr. Reynolds said. He said, "Committed uses by present and authorized projects in New Mexico"—

Mr. RITER. May I call your attention to the fact, sir, he has some reservoir losses in there which we have taken out. The share of evaporation losses for main stem reservoir, 73,300 acre-feet. He has got Navajo Reservoir loss at 39,000 acre-feet. So they ought to be deducted out because we have already taken out the evaporation loss. Agreed?

Mr. SAUND. Yes. How much?

Mr. RITER. 73,300 acre-feet of evaporation losses for main stem reservoirs and Navajo Reservoir, loss of 39,000.

Mr. SAUND. 112,000. I take 112,000 from 73.3; is that right?

Mr. RITER. Yes.

Mr. SAUND. I will read this here. This is what Mr. Reynolds said. He said that the committed uses by present and authorized projects presently use 92,300 acre-feet; share of evaporation 73.3, we will take that out. Hammond project 6.8; extension of Indian project, 34.7. Navajo Reservoir losses 39. We will take that out. Utah Construction Co., 239,000 acre-feet. Then the proposed Navajo irrigation project, 252.3, and San Juan-Chama, 110,000. Then the municipal and industrial, 112.5, and Animas-La Plata, 33.4. All together, 3,783.3. This is the estimate given by Mr. Reynolds, New Mexico State engineer. Is that right?

Mr. RITER. I think that sounds like his figures.

Mr. SAUND. That makes 671,000.

You figured with me on the basis of 14 million acre-feet and there was only 650,000 acre-feet. Where are you going to get the extra 21,000 acre-feet? And we are just at the beginning of the projects in the upper basin.

Mr. RITER. I do not know where Mr. Reynolds gets 112,500.

Mr. SAUND. Future use from municipal and industrial. We have enough on the record in the Senate on that.

Mr. RITER. All he is committing at the present time is—he is committing himself to 112,500. As I understand it, in this bill that is something for the Secretary to determine, how much future municipal and industrial water there will be available. So you will have to discount it by that if we are going to go on the thesis that you have given me and I have made the figures for you.

Mr. SAUND. Do you know that Senator Anderson in his speech said that he can see the time when most of that water would be used for municipal and domestic purposes? You do not say there never will be a need. You do not allow 110,000 for municipal use?

Mr. RITER. I think I said earlier in my testimony, when I was here in April, this question of municipal and industrial water sales is something that the Bureau of Reclamation wants to give an awful lot of study to, that before I want to recommend to the Secretary of the Interior that he sell additional water over and above what is in this bill, I would want to give an awful lot of study to that and I would like to study these figures you have just developed, sir. Among other things, I would like to study the market for it, where that water is going to.

Mr. SAUND. Mr. Riter, is it not really going very close? I took your figures and the only difference we have is—I read to you the statement from two known experts.

Mr. RITER. Yes.

Mr. SAUND. You can depend upon only 14 million acre-feet. Then we took the Bureau's measurements and starting from 1922 to 1956, you got only 14 million acre-feet. So that is what we can depend on. That is the water which physically exists. Then I have taken your interpretation of the Colorado River compact and you know my interpretation is not the same.

You say that the upper basin is required to let go by Lee Ferry only 7½ million.

Mr. RITER. I said a minimum of 7½.

Mr. SAUND. I say that the Colorado River compact states they are also obligated to share half and half the requirement because of the Mexican treaty. That would be another three-quarters of a million acre-feet and if the Supreme Court decides the way the special master has recommended, what would you say, we would be really short of water, would we not, with 7.5?

Mr. RITER. What it amounts to then, as far as the basin is concerned, upper basin versus lower basin, there would be water in the upper basin and there would be a problem in the upper basin as to the division of that water among themselves.

Mr. SAUND. You figure New Mexico is entitled to 11¼ percent of what is left after giving 50,000 acre-feet to Arizona. And the water is not there. I take your figure now that the upper basin is required to let go by only 7½ million acre-feet and I say they would be required to give half of the obligation set up by the Mexican treaty and there is no water there. How can you come over here and make a flat statement that water is available? That is not right.

Mr. RITER. No; look. The figure of Mr. Reynolds' conclusion I put a question mark on is 112,500. I want to study that figure before

I recommend to the Secretary of Int
That is the figure I question.

Mr. SAUND. Do you mean to tell
an estimate which will be more than
is the man appearing for New Mex

Mr. RITER. All I say is that Mr. I
mony, started out on the assumption
is 11¼ percent of 7,500,000 acre-fe
say until we can resolve these ques
112,500. I told the subcommittee
wanted to give serious study to the a
water that I would recommend that
the Navajo Reservoir if this bill sho

Mr. ROGERS. Mr. Saund, will you

Mr. SAUND. Yes.

Mr. ROGERS. Mr. Saylor.

Mr. SAYLOR. Mr. Chairman, I a
the record at this point two letters
One is from the State of New Mexi
by Carl Cooper, watermaster super
other is a letter from the San Juan
reau, dated May 24, 1961, signed by

Mr. ROGERS. Is there objection?

Mr. HOSMER. Reserving the right
side or the other in this dispute?

Mr. SAYLOR. They sure do. The
in my mind that causes me to ques

Mr. MORRIS. Will the gentleman

Mr. SAYLOR. The reason I ask th
questions with regard to these two le

Mr. HOSMER. I will withdraw my

Mr. ROGERS. Is there objection?
letters will be included in the record
(The letters referred to follow:)

Mr. FRANCIS E. STOCK,
Post Office Box 26, Waterflow, N. Mex.

DEAR MR. STOCK: Reference is made t
1961, in regard to developing a water

Please be advised that the waters of
be fully appropriated and no water is t
fore to obtain water for the land in q
purchase a valid water right under th
same to your land.

In case you wish to consider the pure
State Engineer's Manual of Rules and R
in making this change.

The proper forms will be sent to you up
If we may be of further service, please

Very truly yours,

and industrial. We have

present time is—he is com-
and it, in this bill that is
ow much future municipal
So you will have to dis-
thesis that you have given

Anderson in his speech said
water would be used for
not say there never will be
ipa e?

stingly, when I was here
ustrial water sales is some-
ts to give an awful lot of
d to the Secretary of the
and above what is in this
study to that and I would
veloped, sir. Among other
or it, where that water is

going very close? I took
s—I read to you the state-

4 million acre-feet. Then
starting from 1922 to 1956,
s what we can depend on.
Then I have taken your
ct and you know my in-

let go by Lee Ferry only

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Reynolds' conclusion I put
study that figure before

I recommend to the Secretary of Interior that he sells that much water.
That is the figure I question.

Mr. SAUND. Do you mean to tell me that Mr. Reynolds was making
an estimate which will be more than will really be required when he
is the man appearing for New Mexico in favor of these projects?

Mr. RITER. All I say is that Mr. Reynolds, as I understand his testi-
mony, started out on the assumption that New Mexico's entitlement
is 11¼ percent of 7,500,000 acre-feet. You have discounted that. I
say until we can resolve these questions, I am going to question that
112,500. I told the subcommittee the very first day I was here I
wanted to give serious study to the amount of municipal and industrial
water that I would recommend that the Secretary of Interior sell from
the Navajo Reservoir if this bill should become law.

Mr. ROGERS. Mr. Saund, will you reserve the balance of your time?

Mr. SAUND. Yes.

Mr. ROGERS. Mr. Saylor.

Mr. SAYLOR. Mr. Chairman, I ask unanimous consent to insert in
the record at this point two letters, copies of which I have received.
One is from the State of New Mexico, the State engineer office, signed
by Carl Cooper, watermaster supervisor, dated May 11, 1961, and the
other is a letter from the San Juan County Farm and Livestock Bu-
reau, dated May 24, 1961, signed by William A. Utton, vice president.

Mr. ROGERS. Is there objection?

Mr. HOSMER. Reserving the right to object, do they pertain to one
side or the other in this dispute?

Mr. SAYLOR. They sure do. They raise a very important question
in my mind that causes me to question this bill.

Mr. MORRIS. Will the gentleman yield?

Mr. SAYLOR. The reason I ask this, I want to ask the Bureau some
questions with regard to these two letters.

Mr. HOSMER. I will withdraw my reservation.

Mr. ROGERS. Is there objection? The Chair hears none and the
letters will be included in the record.

(The letters referred to follow:)

STATE OF NEW MEXICO,
STATE ENGINEER OFFICE,
Santa Fe, N. Mex., May 11, 1961.

Mr. FRANCIS E. STOCK,
Post Office Box 26, Waterflow, N. Mex.

DEAR MR. STOCK: Reference is made to your undated letter received May 10,
1961, in regard to developing a water right under the farmers mutual ditch.

Please be advised that the waters of the San Juan River are considered to
be fully appropriated and no water is available for new development. There-
fore to obtain water for the land in question, it would be necessary that you
purchase a valid water right under the farmers mutual ditch and transfer
same to your land.

In case you wish to consider the purchase and transfer of a valid right, the
State Engineer's Manual of Rules and Regulations is enclosed for your guidance
in making this change.

The proper forms will be sent to you upon request.
If we may be of further service, please so advise.

Very truly yours,

S. E. REYNOLDS,
State Engineer.
By CARL COOPER,
Watermaster Supervisor.

SAN JUAN COUNTY FARM & LIVESTOCK BUREAU,
Aztec, N. Mex., May 24, 1961.

HON. WAYNE N. ASPINALL,
House Office Building, Washington, D.C.

DEAR SIR: Enclosed is a copy of a letter to Francis E. Stock from the New Mexico State Engineer's Office stating, "Please be advised that the waters of the San Juan River are considered to be fully appropriated and no water is available for new development."

The request was for water rights to develop available land in San Juan County. This request did not involve Federal money but could be fully handled by private capital and would benefit San Juan County and the State of New Mexico by its use. Another such request by Glen Crawford was also turned down in like manner.

Please refer to hearing before the Subcommittee on Irrigation and Reclamation, House of Representatives, May 20, 1960. On page 73, Mr. Steve Reynold's testimony gives the total committed uses by present and authorized projects as 275,100 acre-feet. Yet his office is already turning down applications for use of San Juan River water in San Juan County by private individuals. If this water is fully appropriated as stated in enclosed letter, where is New Mexico to get the water for the proposed San Juan-Chama diversion which is listed in this testimony as a proposed project? The San Juan River and its tributaries is the only source by which New Mexico may use its share of the Upper Colorado River Basin water.

I ask that these letters be entered into the record as they definitely prove testimony by the San Juan County Farm & Livestock Bureau at the hearing held in April that the construction of the San Juan-Chama diversion will effectively stop development in the Great San Juan Basin of New Mexico.

Yours truly,

WILLIAM A. UTTON, *Vice President.*

Mr. SAYLOR. In the letter from the State engineer office they stated that:

Please be advised that the waters of the San Juan River are considered to be fully appropriated and no water is available for new development. Therefore to obtain water for the land in question, it would be necessary that you purchase a valid water right under the farmers mutual ditch and transfer same to your land.

The second letter is a letter to the chairman of the full committee which states that this is a request for water rights that did not involve Federal money, they would be handled fully by private capital and would benefit San Juan County and the State of New Mexico in its use.

And they also state that other requests of a similar nature have been turned down.

My question to the Bureau witnesses is that if the State of New Mexico and the State engineer office says that there is no water for private development in the San Juan River, where are you going to get the water to put in this project under construction?

Mr. PALMER. Mr. Saylor, I have not had the pleasure of seeing the letter.

Mr. SAYLOR. I will show you the two letters.

Mr. PALMER. Let me suggest to you—

Mr. ROGERS. Have you finished, Mr. Palmer?

Mr. PALMER. No, I thought Mr. Morris was going to ask a question.

Mr. MORRIS. Will the gentleman yield?

Mr. SAYLOR. Happy to yield.

Mr. MORRIS. Do you care for me to answer that question?

Mr. SAYLOR. I certainly would like to have somebody answer it

because, while I have looked at this, I don't deny find a situation where the State

Mr. MORRIS. Mr. Chairman, while the Colorado Interstate Streams Commission, a commission would file on all of the San Juan River, the Secretary of the Interior for the time being is under consideration by this committee. The State engineer does not issue any permits for water until these projects are authorized and issued in an orderly manner.

It is unfortunate that Mr. Cooper did not detail in his letter but, of course, this was sent in by an individual who does not represent the project, and certainly as something that is not in this committee. That is all.

Mr. HOSMER. Will the gentleman yield?

Mr. SAYLOR. Yes.

Mr. HOSMER. Is this the same area that was indicated that the unanimous decision was for this project?

Mr. MORRIS. Mr. Hosmer, I do not know if it is in the United States or anywhere else where the project is.

Mr. HOSMER. I think it was your statement that was twice removed, that made that statement.

Mr. MORRIS. I do not want to put the question to anybody saying in the area they were talking about. Mr. I. J. Coruy speaking at a meeting of the streams commission in Farmington, N. M., of the representatives of the various counties who were present and they all were in agreement.

Mr. HOSMER. That was in 1957.

Mr. MORRIS. I would have to check the date, but that sounds like 1957.

Mr. HOSMER. Then we have things to discuss.

Mr. MORRIS. I am sure the gentleman explained the situation, does he not? The questions he would like to ask about the project.

Mr. HOSMER. No. I think the letter is the main point.

Mr. SAYLOR. Mr. Riter, the main point for the furnishing of the water for the project appeared here from the State of New Mexico. It told us how they expected to trap exchange waters that were going to be used for waters that they would use on their own.

Now as I have read your report on the water that is going to be used for municipal purposes, I am seriously concerned with the statement and now, that you were going to give the Secretary of the Interior, regardless of how much water should be sold from this reservoir, should be sold for municipal

because, while I have looked at this project favorably, when I suddenly find a situation where the State itself says there is no water—

Mr. MORRIS. Mr. Chairman, while I was chairman of the New Mexico Interstate Streams Commission, a decision was made that the commission would file on all of the San Juan basin water and hold it for the Secretary of the Interior for these very projects which are now under consideration by this committee. There is water, the State engineer does not issue any permits now in New Mexico for use of this water until these projects are authorized, and then the permits will be issued in an orderly manner.

It is unfortunate that Mr. Cooper did not go a little more into detail in his letter but, of course, this was obviously a letter that was sent in by an individual who does not agree with the findings on this project, and certainly as something to distract and possibly to deceive this committee. That is all.

Mr. HOSMER. Will the gentleman yield?

Mr. SAYLOR. Yes.

Mr. HOSMER. Is this the same area from where that witness came in and indicated that the unanimous consent of everybody in the area was for this project?

Mr. MORRIS. Mr. Hosmer, I do not know of any project in the United States or anywhere else where they are 100 percent for it.

Mr. HOSMER. I think it was your predecessor in this job, once or twice removed, that made that statement.

Mr. MORRIS. I do not want to put words in my friend's mouth and I am sure he does not want to put them in mine. But I cannot recall anybody saying in the area they were 100 percent for it. I do remember Mr. I. J. Coruy speaking at a meeting we had of the interstate streams commission in Farmington, N. Mex., and he said he polled all of the representatives of the various groups in San Juan County who were present and they all were in favor of the project.

Mr. HOSMER. That was in 1957.

Mr. MORRIS. I would have to check the records and see exactly what the date was, but that sounds like it is close.

Mr. HOSMER. Then we have things like this popping up.

Mr. MORRIS. I am sure the gentleman understands after I have explained the situation, does he not? Or does he have any other questions he would like to ask about this letter?

Mr. HOSMER. No. I think the letter speaks for itself.

Mr. SAYLOR. Mr. Riter, the main purpose of this project has been for the furnishing of the water for irrigation and those who have appeared here from the State of New Mexico testifying in support of it told us how they expected to trap water in their own locality and exchange waters that were going to be diverted from the Colorado for waters that they would use on their own land.

Now as I have read your report on the project, there is very little water that is going to be used for municipal or industrial use. I am seriously concerned with the statement that you have made before and now, that you were going to give considerable study to telling the Secretary of the Interior, regardless of whom he may be, as to how much water should be sold from this project, or that is stored in the reservoir, should be sold for municipal and industrial use.

From the testimony which has been given by you this morning and the testimony which has been given by the State authorities, the figures indicate to me there is very little water available for industrial or municipal use unless you take it away from irrigation use. Is that right?

Mr. RITER. Mr. Saylor, that is one of the problems we want to study. Mr. Reynolds, as I understand his testimony, was not inhibited like Mr. Saund said. Mr. Reynolds started out on the assumption the upper basin would get its full allocation. In other words, I have tried to take a more conservative approach. I have tried to look at the projects that are being authorized in the bill. As far as the San Juan-Chama project is concerned, a sizable part of that water is contemplated to be used for municipal and industrial purposes.

Now the bill, as I understand it, also would authorize the sale of additional quantities of water to the discretion of the Secretary where his discretion would be that he not overdraft the river. I think I told the committee the opening day, the first day I was here, that that is one problem that we are studying now, we are initiating a study in great detail with that very thought in mind, how much water can we safely sell over and above the water that is proposed to be committed in this legislation.

Mr. SAYLOR. Let me ask you this question: Suppose the State of New Mexico continues to grow over the next 40 years as it has in the past, one of the rapid growing areas of the country, and the question comes up whether you supply people water on which to live or whether you supply water to put on land and raise crops. What is the attitude of the Bureau of Reclamation on that?

Mr. RITER. That is a problem we will have to answer when the time comes here.

Mr. PALMER. Let me lay a little foundation.

Mr. SAYLOR. I have been told they are so heartless down in the Bureau they have already placed land above people. You know you cannot get along without putting water on land, but people cannot live without water to drink.

Mr. PALMER. Mr. Saylor, the answer to your question is not a simple one. It goes something like this: That in all of the projects that have thus far been developed by the Bureau of Reclamation under the applicable laws of the State in which they have been built, some of the water and some of the use has been transferred from agriculture to municipal-industrial use. I cite for example the Salt River project in Arizona, around the Phoenix area, where much of this land has been taken up by the city as it grew and much of the water that was originally used for irrigation is now used by the city of Phoenix for municipal-industrial growth.

We recognize, and again may I accent, under State law that the highest use would be for municipal and industrial use and if and when that time comes, when land has to be diverted from irrigation to get water to municipal and industrial use, that will occur. Now this is a perfectly logical and a perfectly good way to bring about the optimum development of an area such as Albuquerque, Phoenix, Salt Lake City, Boise, and the Ogden area, and in southern California cities as well.

Mr. SAYLOR. All right. No used for irrigation bears no in do you have or should there be it that if water is taken from municipal use, that that portion cost of the project, but you would

Mr. PALMER. In many recent the authorizing act permits it industrial water. Weber Basin years by law we make a reallocation and irrigation use.

Now the Secretary in the first year so informed the committee highlighted to go ahead on that basis

Mr. HOSMER. Will the gentleman

Mr. ROGERS. It is already passed in recess—

Mr. SAYLOR. I would like to

Mr. ROGERS. Go ahead.

Mr. SAYLOR. In view of the others who appeared here ask Plata project be placed on a priority basis, because in the minds of the water, what is the attitude of the committee to that proposition?

Mr. PALMER. I believe that was originally posed said they a matter of fact, Mr. Riter indicated it would be perfectly all right way.

Mr. ROGERS. The committee met this afternoon.

(Whereupon, at 11:50 a.m., the committee adjourned at 2 p.m., the same day, June 1, 1941.)

The subcommittee reconvened (man of the subcommittee) presided

Mr. ROGERS. The Subcommittee will now come to order for further consideration.

I believe Mr. Saylor, who was called, will be turned.

Mr. MORRIS. Do you have any questions, Mr. Chairman?

I would like to direct the committee to the Navajo Indian irrigation project.

Mr. Keesee, did you use the same economic criteria—in the plan used in other Indian projects?

given by you this morning by the State authorities, the water available for industrial use from irrigation use. Is

the problems we want to solve, as testified in his testimony, was not in the hands started out on the as-fair allocation. In other words, a conservative approach. I have been authorized in the bill. I am concerned, a sizable part of the water for municipal and industrial

to authorize the sale of a portion of the Secretary where his office is on the river. I think I told the committee that that is one of the things we are initiating a study in great haste to see how much water can be safely used to be committed in this

question: Suppose the State of Arizona for the next 40 years as it has in the past, and the question is on which to live or whether to live in the mountains. What is the attitude

to answer when the time

is. I am heartless down in the Bureau for the people. You know you cannot live on it, but people cannot live

our question is not a simple one. I think most of the projects that have been built under the Reclamation Act have been built, some of the projects transferred from agriculture to industry. The Salt River project in Arizona, where so much of this land has been irrigated, the water that was originally used for the city of Phoenix for

under State law that the water for industrial use and if and when it is transferred from irrigation to industrial use will occur. Now this is a question to bring about the optimum use of the water in Phoenix, Salt Lake City, and California cities as well.

Mr. SAYLOR. All right. Now, in view of the fact that water that is used for irrigation bears no interest under reclamation law, what plans do you have or should there be an amendment put in this bill if we pass it that if water is taken from irrigation and applied to industrial and municipal use, that that portion of it should then not only bear the fair cost of the project, but you would also have to pay interest?

Mr. PALMER. In many recent contracts where the applicable law of the authorizing act permits it, we make a reallocation for municipal-industrial water. Weber Basin, for example, is one where every 5 years by law we make a reallocation of the water between M. & I. use and irrigation use.

Now the Secretary in the first day of the hearing on this bill this year so informed the committee at that time, that we would be delighted to go ahead on that basis.

Mr. HOSMER. Will the gentleman yield?

Mr. ROGERS. It is already past our time. The committee better stand in recess—

Mr. SAYLOR. I would like to ask one more question of these witnesses.

Mr. ROGERS. Go ahead.

Mr. SAYLOR. In view of the fact that the State engineer and certain others who appeared here asked that this project and the Animas-La Plata project be placed on an equal footing rather than on a priority basis, because in the minds of some people there was not sufficient water, what is the attitude of the Bureau of Reclamation with regard to that proposition?

Mr. PALMER. I believe that the witnesses at the time the question was originally posed said they had no objection to that basis and, as a matter of fact, Mr. Riter in his analysis of the hydrology, demonstrated it would be perfectly compatible to handle the project that way.

Mr. ROGERS. The committee stands in recess until 2 o'clock this afternoon.

(Whereupon, at 11:50 a.m., the subcommittee recessed, to reconvene at 2 p.m., the same day, June 1, 1961.)

AFTER RECESS

The subcommittee reconvened at 2 p.m., Hon. Walter Rogers (chairman of the subcommittee) presiding.

Mr. ROGERS. The Subcommittee on Irrigation and Reclamation will come to order for further consideration of pending bills.

I believe Mr. Saylor, who was questioning the witness, has not returned.

Mr. MORRIS, do you have any questions?

Mr. MORRIS. Mr. Chairman, I just have one or two very simple and short questions.

I would like to direct the first question to Mr. Keesee, concerning the Navajo Indian irrigation project.

Mr. Keesee, did you use the same criteria—engineering criteria, economic criteria—in the planning of the Navajo project that you used in other Indian projects?

STATEMENTS OF WILLIAM I. PALMER, ASSISTANT COMMISSIONER OF RECLAMATION, ACCOMPANIED BY DONALD R. BURNETT, CHIEF, DIVISION OF PROJECT DEVELOPMENT, BUREAU OF RECLAMATION, JOHN R. RITER, CHIEF DEVELOPMENT ENGINEER, DENVER OFFICE, BUREAU OF RECLAMATION; AND RALPH CHARLES, PROJECT DEVELOPMENT ENGINEER, ALBUQUERQUE OFFICE, BUREAU OF RECLAMATION; AND JOHN O. CROW, ACTING COMMISSIONER OF INDIAN AFFAIRS, ACCOMPANIED BY MARTIN P. MANGAN, ASSOCIATE COMMISSIONER OF INDIAN AFFAIRS, GERALD KEESEE, SUPERVISORY GENERAL ENGINEER, BRANCH OF LAND OPERATIONS, BUREAU OF INDIAN AFFAIRS

Mr. KEESEE. Yes, sir.

Mr. ASPINALL. Would my colleague yield at that point?

Mr. MORRIS. I yield.

Mr. ASPINALL. I would like to ask Mr. Mangan a question.

Mr. Mangan, in your position, now, with the Bureau of Indian Affairs, as Associate Commissioner, is it the feeling of the Bureau of Indian Affairs that this is a feasible project; that it will be worthwhile to the Navajo Tribe, and that the Navajo Tribe will make a prosperous operation out of the Navajo irrigation district if they are permitted to have it?

Mr. MANGAN. Yes, sir. I believe Mr. Udall appeared here and testified to that effect.

Mr. ASPINALL. Thank you.

Mr. MORRIS. I would like to ask either Mr. Palmer or Mr. Charles, who did the planning on the San Juan-Chama portion of the project: Did you use the same engineering criteria and same economic criteria in planning this project and justifying it that you used in other Bureau of Reclamation projects?

Mr. PALMER. Yes, Mr. Morris.

Mr. MORRIS. I would like to ask the hydrologist, Mr. Riter, one question, also.

Mr. Riter, you are a hydrologist; is that not correct?

Mr. RITER. That is my chief training. I am actually chief development engineer at present.

Mr. MORRIS. And in your opinion, there is ample water supply for this project?

Mr. RITER. Yes, sir.

Mr. MORRIS. And did you use the same principle in arriving at the water-supply studies that the Bureau uses in other water-supply projects of this nature?

Mr. RITER. Yes, sir.

Mr. ASPINALL. Now, will my colleague yield at that point?

Mr. MORRIS. I yield to my chairman.

Mr. ASPINALL. In arriving at the figure of 62,000,000 acre-feet of water for the upper basin, was that founded on the basis that there would necessarily be 15-million-plus acre-feet of water in Lee's Ferry?

Mr. RITER. Our studies used that figure, but as I tried to explain to Mr. Saund, the study showed that in the high years we would not be able to use all that water. There would be some spills.

Mr. ASPINALL. Y that is arrived at or that part that there is a less amountally planned. Is t

Mr. RITER. I do question, Mr. Aspin

Mr. ASPINALL. I the upper basin is at Lees Ferry.

Mr. RITER. No, si

Mr. SAUND. Will

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Mr. RITER. From believed. I was jus pate in those negoti it appears that bac apportioning part o

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Mr. ROGERS. Mr. .

Mr. JOHNSON. M from California, if

Mr. SAUND. You

Mr. JOHNSON. Th ask, Mr. Chairman.

I understood you say that all projects fore the committee Arkansas, would onl

Mr. PALMER. Mr.

I believe the figure let Mr. Riter verify t

Mr. RITER. Yes, t allowance for the p presently before the

Mr. JOHNSON. Bu acre-feet of water, c

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Judge Saund, how take you? Would t turn it over.

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e spills.

Mr. ASPINALL. Yes; but, in fact, the figure of 6.2 million is a figure that is arrived at on the basis that there would be less than 7,500,000, or that part that the upper basin is entitled to, which would mean that there is a less amount in the long run at Lee's Ferry than was originally planned. Is that right?

Mr. RITER. I do not know that I get the full significance of your question, Mr. Aspinall.

Mr. ASPINALL. I want to know if 6,200,000 acre-feet of water for the upper basin is dependent upon 15-million-plus acre-feet of water at Lees Ferry.

Mr. RITER. No, sir.

Mr. SAUND. Will the gentleman yield?

The chairman of the full committee was asking if you originally planned 7½ million acre-feet for the upper basin. Was that not really based on the assumption by the signers of the Colorado River compact that there will be more than 15 million acre-feet supplied at Lees Ferry of virgin flow?

Mr. Hoover said they were appropriating 80 percent of the water, and they thought there would be pretty nearly 20 million acre-feet.

Mr. RITER. From what I have read, I understand that is what they believed. I was just a young kid going to school. I did not participate in those negotiations. But in reading back some of the record, it appears that back in 1922 they had the notion they were only apportioning part of the water.

Mr. ROGERS. Is that all, Mr. Morris?

Mr. MORRIS. That is all, Mr. Chairman.

Mr. ROGERS. Mr. Johnson?

Mr. JOHNSON. Mr. Chairman, first I would yield to my colleague from California, if he needs any additional time.

Mr. SAUND. You go right ahead.

Mr. JOHNSON. There are only one or two questions I would like to ask, Mr. Chairman.

I understood you this morning, or your associates, Mr. Palmer, to say that all projects, including these two here under consideration before the committee now, the San Juan-Chama and the Fryingpan-Arkansas, would only require 400,000 acre-feet of water.

Mr. PALMER. Mr. Riter supplied that information, Mr. Johnson. I believe the figure as you have given it is substantially correct. But let Mr. Riter verify that.

Mr. RITER. Yes, the figure of 4,503,000 also includes the depletion allowance for the proposed Animas-La Plata project, which is not presently before the committee directly.

Mr. JOHNSON. But then that figure is a very sound figure, 4,500,000 acre-feet of water, covering all of the projects now in existence?

Mr. RITER. Yes, sir.

Mr. JOHNSON. And you still say the 6,200,000 is also a correct figure, in your opinion?

Mr. RITER. Yes, sir.

Mr. JOHNSON. That is all the questions I have.

Mr. ROGERS. Mr. Aspinall, do you have any further questions?

Judge Saund, how much longer do you think your questioning will take you? Would you permit me to ask one or two? Then I will turn it over.

Mr. Palmer, to get the issue pointed up on this particular project, do you have the overall outside cost of the San Juan-Chama in mind?

Mr. PALMER. The overall cost of the initial phase?

Mr. ROGERS. Including the interest and everything. When we get through with this project and deliver it, what will it cost the American taxpayer in outlay or in expenditure?

Mr. BURNETT. The total construction cost is \$86 million.

Mr. ROGERS. No. What I am talking about is: How much will the American taxpayer have invested in this project for the entire situation? In other words, no matter what the purpose was, how much money will have been advanced by the American taxpayer when this is ready for operation?

Mr. BURNETT. Including the Navajo Indian project? Or just the San Juan-Chama project?

Mr. ROGERS. Including the Navajo Indian project.

Mr. BURNETT. Well, the actual money that has to be appropriated and spent to construct these projects is \$86 million plus \$135 million, or \$221 million for both projects.

Mr. ROGERS. \$241 million?

Mr. BURNETT. Yes, sir.

Mr. ROGERS. Now, the \$135 million is the Navajo Indian project?

Mr. BURNETT. Yes, sir.

Mr. ROGERS. In that \$135 million, are you talking about construction costs alone?

Mr. BURNETT. Construction costs only.

Mr. ROGERS. Has there been any projection of these figures to see how much money will be involved in this for all purposes, let us say, on the Navajo Indian project alone?

Mr. KEESEE. I do not have those figures. In other words, our \$135 million was the anticipated development of the project. What else did you have in mind, Mr. Rogers?

Mr. ROGERS. Well, whatever else there is. Is there anything else besides the \$135 million? If there is not, then that is all I want.

And let me tell you what I am getting at, so that we can get the matter cleared up.

Assume that the \$135 million is the outside cost of the project, the Navajo Indian project, let us say. Now, how much of that is repayable?

Mr. KEESEE. None of it, under the terms of the Leavitt Act; and for the upper Colorado River storage project, there was about 16 percent that would be deferred under the Leavitt Act. The remainder would be as a grant from the Federal Treasury.

Mr. ROGERS. Well, now, the 16 percent, then, would be the outside that would be repayable under any circumstances?

Mr. KEESEE. That would be approximately \$21 million.

Mr. ROGERS. All right. Now, the point is simply this: Is this not a case of the American people being required at this time to make a grant or a gift or whatever you want to call it to the Indians for a mistake that was made some years ago, when they put them out there?

Mr. KEESEE. That is right.

Mr. ROGERS. And I mean there is no need to beg the question about it, feasibility or nonfeasibility. If there were no people out there, we would not have to be building these projects, would we?

Mr. KEESEE. That is right.

Mr. ROGERS. And the history of treatment of the country.

Mr. KEESEE. That is correct.

Mr. ROGERS. We put the blame now is paying for a mistake.

Mr. KEESEE. Yes, sir.

Mr. ROGERS. I like to be a day of doing things that our great grandfathers did so it is not a new mistake.

I mean: Is that right?

Mr. KEESEE. That is right.

Mr. PALMER. Mr. Rogers' explanation to that.

I think it is not only pay better stated as an investment. My own personal conviction is to develop their reservation, and to become a self-sustaining people, they will become a far investment in the future of the country.

Mr. ROGERS. Well, of course if you can use that as a basis under the Reclamation Act or fuss about this program.

Mr. PALMER. That is correct.

Mr. ROGERS. Mr. Aspinall.

Mr. ASPINALL. However, for the Indians, you would as a reclamation project, we

Mr. PALMER. I believe the nature of the project that

Mr. ASPINALL. Well, Mr. to 1, is it not?

Mr. PALMER. That is my

Mr. ASPINALL. Not only the Government to be repaid because the Federal Treasury Mexico cannot pick it up for Is that not correct?

Mr. PALMER. That is correct.

Mr. ASPINALL. So it should

Mr. PALMER. That is correct.

Mr. ROGERS. Mr. Palmer, this ought to be documented for the Indians, so that we can get it later?

Mr. PALMER. I think it would

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to beg the question about were no people out there, ojects, would we?

Mr. KEESEE. That is right.

Mr. ROGERS. And the fact of the matter is simply this: that our history of treatment of the Indians has not been very rosy in this country.

Mr. KEESEE. That is correct.

Mr. ROGERS. We put the Indians out there, and what we are doing now is paying for a mistake that our ancestors made.

Mr. KEESEE. Yes, sir.

Mr. ROGERS. I like to bring that out, because we get accused every day of doing things that our grandchildren are going to have to pay for. So I think we ought to bring it out that our grandfathers or great grandfathers did some things we are having to pay for. So this is not a new mistake.

I mean: Is that right?

Mr. KEESEE. That is right.

Mr. PALMER. Mr. Rogers, I would like to add one bit of information to that.

I think it is not only paying for a mistake in part, but I think it is better stated as an investment in the future of the Navajo people. My own personal conviction is that if these people are allowed to develop their reservation, their area, their land and their water, and to become a self-sustaining and an economically productive people, they will become a far greater national asset. I think this is an investment in the future of the Navajo Nation.

Mr. ROGERS. Well, of course, I understand that, Mr. Palmer. But if you can use that as a component in determining the feasibility under the Reclamation Act as such, you would not have any difficulty or fuss about this program at all, would you?

Mr. PALMER. That is correct, sir.

Mr. ROGERS. Mr. Aspinall?

Mr. ASPINALL. However, if this were not an Indian project, one for the Indians, you would not be up here supporting this project as a reclamation project, would you, Mr. Palmer?

Mr. PALMER. I believe that there would be some question as to the nature of the project that could be supported at this time.

Mr. ASPINALL. Well, Mr. Palmer, the benefit-cost ratio is below 1 to 1, is it not?

Mr. PALMER. That is my point.

Mr. ASPINALL. Not only that. There would be no possibility for the Government to be repaid if it were a project for non-Indians, because the Federal Treasury has to pick it up, and the State of New Mexico cannot pick it up from their share of the upper basin funds. Is that not correct?

Mr. PALMER. That is correct, sir.

Mr. ASPINALL. So it should be looked at as purely an Indian project.

Mr. PALMER. That is correct.

Mr. ROGERS. Mr. Palmer, one further question: Do you not think this ought to be documented as payment on whatever debt we owe the Indians, so that we can get credit for it when they come back for more later?

Mr. PALMER. I think it would be completely appropriate.

Mr. ROGERS. I am sorry Mr. Haley is not here, because actually they are his wards, to a certain extent, and I want to be sure he gets credit for it.

Mr. SAUND?

Mr. SAUND. The chairman of the full committee and you have said that this is an investment in the future for the benefit of the Indians. I will go back to some figures, here. When you were being questioned this morning, it was brought out that the irrigation project, of the Navajo project, will cost \$155 million. And there is about a \$32 million cost of the reservoir to be assigned to the irrigation part of it. Was that brought out?

Mr. PALMER. Judge Saund, we agreed to supply a complete documentation on the basis that Mr. Hosmer asked for it, with the unanimous consent of the committee.

Mr. SAUND. I am just looking into the future. And these are figures which are taken from your own reports; \$155 million is the cost of the irrigation project, and then \$32 million. And you said this morning we can roughly figure there will be a 22-year period of construction and development. Now, the interest of \$187 million at 2.78 for 22 years. That all added up comes to \$266 million. That is my figure. You correct me when you submit the report. That is the actual cost to the American taxpayers till the time when the Indians will derive any benefit from it at the end of the development period and the construction period.

Mr. PALMER. No, sir; Judge Saund. These figures you have given us are not correct. But we will document that for the record.

Mr. ASPINALL. If my colleague will yield, let us get this straight. There is no interest on any money until it is appropriated. And if the money is not spent until the 22d year or the 21st year, it does not bear interest until the year it is appropriated and construction begins.

Mr. SAUND. All right.

Mr. PALMER, you tell me: If it is not \$80 million, is it \$70 million, or what is it? You do not spend all the money in the last 22 years. You start spending money a long time before that.

Mr. PALMER. This morning we testified that in the figures that are before the committee in House Document 424 of the 86th Congress, there is \$21 million interest in the construction figure.

Now, Judge Saund, we have agreed that we will supply for the committee, on the basis that was requested this morning, the information that the gentleman from California asked for. I think you will find, when that information gets to you, that the figures you have just presented result from adding two different sets of figures and coming out with a completely erroneous total.

Mr. SAUND. It may not be exactly \$60 million in interest, but I know it is not \$22 million, either.

But what I was driving at was: I have \$266 million. That will be the actual cost to the taxpayers until the time when the development and the construction is finished, in 22 years. And how many families are there? One thousand one hundred and twenty Indian families that are going to be on those farms.

Mr. PALMER. Again, Judge Saund, we do not agree with your figures. I suggest again we wait for the accurate figures to be sub-

mitted. And I think this morning, that this is family costs.

May I take this one of the functions, in other words, you are benefits that accrue to those nonfarm families to irrigation a residue developed this morning per acre basis.

Mr. SAUND. If my \$22 million. Even though be over \$200,000 investment.

Now, you invest that give so much more benefit into this project. The Indians any more much in favor of help think this is a good way of Indians.

And 3 percent of that dollars a year. And a on that. None of that investment to take care project in here under that could give \$10,000 a family. Now, this morning, flow at Lee Ferry, or what allow?

Mr. RITER. Whatever.

Mr. SAUND. Well, how feet? Or a million and

Mr. RITER. I do not know. In conditions, our study shows a feet.

Mr. SAUND. Would you spill would be fair?

Mr. RITER. Plus or minus

Mr. SAUND. All right.

Mr. RITER. No; 6.2.

Mr. SAUND. Fine. You we did not figure the spill.

it not? That is really the figure on at Lees Ferry, what feet the absolute maximum

Mr. RITER. Mr. Saund, probably control more. You

You understand that. The project is initial development

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mitted. And I think the point you have made was well developed this morning, that this is a high-cost project in terms of per acre or per family costs.

May I take this opportunity also to alert the committee that this is one of the functions of the allocation procedure we follow. In other words, you are not giving this project the benefit of those benefits that accrue to the nonfarm families on the reservation, and those nonfarm families outside of the reservation. You are allocating to irrigation a residual amount, which, as you well know, and as was developed this morning, is a high figure on a cost per farmer or cost per acre basis.

Mr. SAUND. If my figure is excessive, let us take your figure of the \$22 million. Even then, dividing it amongst these families, it will be over \$200,000 investment for one family.

Now, you invest that money at 3 percent. Mr. Palmer, you can give so much more benefit from that to the Indians than putting it into this project. There is no doubt about it. No one is for helping the Indians any more on this committee than I am. I think I am as much in favor of helping the Indians as anybody else. But I do not think this is a good way, to spend \$200,000 to take care of one family of Indians.

And 3 percent of that will be how much money? Six thousand dollars a year. And after that you are going to be paying interest on that. None of that money is reimbursable. So that is too high an investment to take care of the Indians. There is no use bringing this project in here under the guise of helping the Indians. I wish you could give \$10,000 a family to the Indians in my district.

Now, this morning, Mr. Riter, you spoke of that figure of 5.2, the flow at Lee Ferry, or whatever it was. Then how much spill do you allow?

Mr. RITER. Whatever is there.

Mr. SAUND. Well, how much? Fifty acre-feet? Or 10,000 acre-feet? Or a million and a half acre-feet? Just give me a figure.

Mr. RITER. I do not have the exact figure. For your 2020 conditions, our study shows an average annual spill of over a million acre-feet.

Mr. SAUND. Would you think that guessing a million acre-feet of spill would be fair?

Mr. RITER. Plus or minus, within reason.

Mr. SAUND. All right. Mr. Riter, your figure this morning was 5.2?

Mr. RITER. No; 6.2.

Mr. SAUND. Fine. You started out with 15, my figure was 14. And we did not figure the spill. If we figured the spill, it would be 14, would it not? That is really the amount of undepleted virgin flow you can figure on at Lees Ferry, which you can control. Is not 14 million acre-feet the absolute maximum of controllable supply at Lees Ferry?

Mr. RITER. Mr. Saund, if we built more reservoirs, then we could probably control more. You see, this is only an initial development. You understand that. What has been authorized in the storage project is initial development. The original proposal, back in the 1950's, was for about 48 million acre-feet of capacity. We are in the process of building 35 million acre-feet of capacity. If we had more capacity, we could control some of those spills.

Mr. SAUND. This morning we had a statement from two experts who said that the evaporation losses will outweigh the other gains.

Mr. RITER. Those things, Mr. Saund, have to be studied and appraised and looked at very carefully. I am sure this committee will scrutinize any proposal.

Mr. SAUND. Well, will you agree that there is 14 million acre-feet of controllable supply at Lees Ferry that you can depend on?

Mr. RITER. Well, I cannot agree on that.

Mr. SAUND. You do not want to agree on what every expert agrees on, that there is only 14 million acre-feet of controllable water supply at Lees Ferry. Now, when we start out at 14 million acre-feet, you said for the lower basin you allow only $7\frac{1}{2}$?

Mr. RITER. I said it would be at least $7\frac{1}{2}$.

Mr. SAUND. Then you said that the evaporation loss, you will consent, would be 70,000 acre-feet?

Mr. RITER. No; 700,000 acre-feet.

Mr. SAUND. And then you have 5.80. Then you take out of that 50,000 acre-feet?

Mr. RITER. Yes, sir.

Mr. SAUND. All right; 5.75 and 11.25 of that. That is 646.8. And this morning we figured on taking out the deductions, or the evaporation, and we came to 671.3.

Mr. RITER. I said, Mr. Saund, that this other use that New Mexico has tabulated, here, 112,500 acre-feet is based on New Mexico's assumption that there will be more water than the 14 million that you were figuring with me this morning.

Mr. SAUND. Mr. Palmer and Mr. Riter, do you want me to believe that here you are spending \$200,000 of the taxpayers' money to make it possible for a family of Indians to make a living? You mean to tell me that if the people of New Mexico want water for domestic and municipal use, you are not going to allow them to have 700,000 acre-feet in the future? You are going to cut out the expansion of the State of New Mexico altogether? That is what you are assuming, are you not?

Mr. PALMER. No, Judge Saund. This has not been a part of the testimony. The thing that we have been talking about, that you identified and handed out this morning, as table 1, is the statement of the State engineer of New Mexico, which predicates an entitlement of 783,300 acre-feet per year.

Now, there is committed at this time, including New Mexico's share of evaporation losses that are in that table that you handed out—there is committed at this time with these projects that are now before the committee some 637,000 acre-feet.

Now, all that Mr. Riter testified—and he did not testify that it would not be possible to deliver municipal water. He did not testify that the water was not there or might not be there. All he testified, and all that we are prepared to testify, as Department of Interior witnesses, is that any uses above the 637,000 acre-feet is on the area which we would want to examine closely.

Mr. SAUND. Will you look this over, Mr. Palmer? Is there any place where you do not agree with this statement? And at the bottom are indicated the sources of that information.

Mr. Palmer, what for the San Juan— Is it up in high elev

Mr. PALMER. It

Mr. SAUND. Well which is flowing to

Mr. PALMER. As hearings, the water mount interest to th

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Mr. Palmer, what is the quality of the water which will be diverted for the San Juan-Chama, the initial state of the San Juan-Chama? Is it up in high elevation?

Mr. PALMER. It is high-elevation water. It is good quality water.

Mr. SAUND. Well, what effect will that have on the quality of water which is flowing to the lower basin?

Mr. PALMER. As we discussed during the Fryingpan-Arkansas hearings, the water quality question is one which has been of paramount interest to the Department for a period of many years.

Since the early days of Hoover Dam, water quality observations have been underway. These were accentuated after the passage of the Colorado River Storage Act. Data have been assembled from a great number of stations. They are now being analyzed. And late in 1962 a report will be available for review. By January 1, 1963, I believe, we propose to have a completed report covering our observations on water quality problems.

Now, this is required under the terms of the Colorado River Storage Act. It is also reiterated in the proposed bill on the Fryingpan-Arkansas. And it is an activity, I assure you, that we are giving high priority to, and one that we will look forward to receiving the results from as soon as we can, and with great anticipation, because we believe it is a question that deserves the careful consideration and evaluation of the Department.

Mr. SAUND. Is it not a fact, Mr. Palmer, that \$1,500,000 of moneys was transferred from the Colorado River Dam Fund to the Colorado River development fund, and it was stated in that act that this is for the formation of a comprehensive plan and to make a study for the utilization of waters for irrigation, electrical power, and other purposes, in the States of the upper division and the States of the lower division, including supplies of quantity and quality of water, and all of the relevant factors. That was in 1940. And the Department has not made any report on that.

Mr. PALMER. There has been a biennial report issued on the results of observations. But what you want, and what you are asking us to give you now, is not only the biennial report of historical operation that we could supply you, but you need and want a projection of water quality. And this is the part that has not yet been completed, Judge Saund.

Mr. SAUND. This was in 1940. Now, Mr. Palmer, you will agree with me that this \$1,500,000 was a contribution by the people of California.

Mr. ASPINALL. Now, if any colleague will yield, I wish to take issue with my colleague on that.

We furnished a great deal of that water to produce the power that brought that money in. After a complete study, it was determined—and the State of California was a party to it—that this was the amount that was honestly and rightfully due the upper basin for these studies, so that the upper basin could get underway with its development.

Mr. SAUND. I agree with you, Mr. Chairman. There was nothing done which was not agreed to. All I am bringing out is the fact that it is the people of California who were assessed a higher price for power in order to have that money available. And they paid \$500,000 a year every year for development of the studies in the upper basin.

We are not sorry for that. We did that willingly. We agreed to do that. And \$1,500,000 of that money was made available to the Department in 1940.

I know that 3 years ago I offered a resolution which will direct the Department to make that study of the quality of water of the Colorado River. And the Department came out with a report that it was not necessary. That was 3 years ago. And this year, Mr. Palmer, you are coming out with a bill to divert water in the upper reaches of the Colorado River Basin, for the Fryingpan-Arkansas project, 68,000 acre-feet, and here 110,000 acre-feet, and you are building the capacity of that tunnel and conduit for 235 acre-feet annually.

When are we going to know that there will be a study and results of the study available, and what is going to be the effect on the quality of the water?

Mr. PALMER. Again, Judge Saund, I understand your interest. I understand the point of your question. I want simply again to repeat that the program for the completion of the study to turn over to this committee and others is January 1963.

You, of course, understand that when you observe the quality of water in a river system, as developments occur you have to be able to take a sounding on what impact those developments have on water quality before you can develop any projections.

Now, this phase of the study has been going forward on schedule, and I would like again to reiterate that I think the position that the Department took on the resolution to which you referred was simply that they are already required by law, the Colorado River Storage Act, to run the quality of water studies in which you are interested.

Mr. SAUND. Now, have you had a chance to look at this statement?

Mr. RITER. Yes, sir.

I think, sir, that this is a similar table to that which Mr. Reynolds criticized. I would like to point out a few things about it that I disagree with, if you do not mind.

Mr. ASPINALL. Would my colleague yield to me?

Does my colleague wish to have his own witnesses on the stand this afternoon?

Mr. SAUND. Yes, Mr. Chairman; if the Chair will allow them a chance to appear. We can use their testimony.

The Chairman knows and all the other members of the committee know that I have never questioned the witnesses unnecessarily. This I have to do. I wanted to bring out those points.

Mr. ASPINALL. If my colleague will let him state again, it is not the office of a member of this committee to argue with the witnesses. The questions should be asked and should be answered, and the witness should stand on that. No member of this committee has any right to ask the witness to agree with him. The witness does not have any right to ask the member to agree with him. Just get the answers to the questions.

Now, I would like to have Mr. Matthew and Mr. Ely come to the witness table before we wrap up these hearings, because I think that they have some material that this committee needs.

Mr. SAUND. Mr. Chairman, you are the chairman. Whatever you wish, I have to accept. I am just asking simple, plain questions. I certainly do not want to have an argument with the witnesses.

I will ask unanimity at this place, Mr. C. Mr. ROGERS. Is that the Chair hears it? (The chart referred to)

Navajo

1. Historic flow of San Juan
2. Potential upstream
 - (a) San Juan
 - (b) Ultimate Pass diversion
3. Estimated depleted
4. Assumed withdrawn
5. Estimated supply available
6. Estimated reservoir
7. Estimated spill-----
8. Estimated supply available
9. Estimated downstream
 - (a) Hammond
 - (b) Utah Construction
 - (c) Navajo Indian
 - (d) Municipal
 - (e) River regulation
10. Deficiency in supply

1. Data submitted by B
- 2-8 including Bureau of
- 2 (b) equals 979,000
- 8 equals sum, column
- 9 (a), (c), (d). USBR
- May 2, 1961.
- 9 (b). House subcommittee
- pages 72, 124.
- 9 (e). USBR study, column
- NOTE.—30,000 acre-feet a year
- (H. Doc. 424, 86th Cong., p.

Mr. SAUND. I have one question. Mr. Palmer and Mr. Riter, according to your interpretation of the two projects, Navajo and Grand Ditch, how would you stand in regard to the water answer, somewhat on this basis? Mr. PALMER. Judge Saund, we will willingly certify that the water rights that we can assemble, that we have allotted rights; and that

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I will ask unanimous consent to have this chart placed in the record at this place, Mr. Chairman.

Mr. ROGERS. Is there any objection?

The Chair hears none. It will be included in the record.

(The chart referred to follows:)

Navajo reservoir water budget, 1928-60 base period

[Acre-feet per year average]

1. Historic flow of San Juan River near Blanco.....		979, 000
2. Potential upstream depletions:		
(a) San Juan-Chama project, initial.....	105, 000	
(b) Ultimate Pine River project and Weminuche Pass diversion.....	79, 000	
		184, 000
3. Estimated depleted inflow to Navajo Reservoir.....		795, 000
4. Assumed withdrawal from storage.....		9, 000
		804, 000
5. Estimated supply available at reservoir.....		804, 000
6. Estimated reservoir evaporation.....	38, 000	
7. Estimated spill.....	215, 000	
		253, 000
8. Estimated supply available for release for downstream require- ments.....		551, 000
9. Estimated downstream requirements:		
(a) Hammond project and 800 acres misc.....	23, 000	
(b) Utah Construction Co. contract.....	55, 000	
(c) Navajo Indian project.....	508, 000	
(d) Municipal and Industrial.....	224, 000	
(e) River regulation and prior rights.....	20, 000	
		830, 000
10. Deficiency in supply.....		279, 000

REFERENCES BY LINE ITEMS

1. Data submitted by Reclamation Bureau for record, about May 1, 1961.
- 2-8 including. Bureau operation study submitted for record about May 1, 1961.
- 2(b) equals 979,000 minus column (1) of USBR study.
- 8 equals sum, columns (3), (4), and (5), Bureau study.
- 9 (a), (c), (d). USBR study, and New Mexico study No. 8 supplied for record May 2, 1961.
- 9(b). House subcommittee hearings, 86th Congress, 2d session, on H.R. 2352, pages 72, 124.
- 9(c). USBR study, column (5).

NOTE.—30,000 acre-feet a year present depletion between Navajo Dam site and Blanco (H. Doc. 424, 86th Cong., p. 322) omitted from both supply and requirements.

Mr. SAUND. I have one more question.

Mr. Palmer and Mr. Riter, you have indicated in your testimony that, according to your calculations, there is enough water supply under your interpretation, any interpretation you may have, for these two projects, Navajo and the initial stage of the San Juan-Chama. How would you stand in respect to future projects in the upper basin?

Mr. PALMER. Judge Saund, I believe the question has a logical answer, somewhat on this basis:

As we appear here to support the Navajo-San Juan-Chama project, we willingly certify that on the basis of the best hydrological data that we can assemble, the water is available; that it is within compacted rights; and that the investment of the Treasury of the people

of the United States for these projects is sound on the water supply question.

In the case of any other development that might be proposed, it would be contingent upon the departmental witnesses to appear before this committee again, and before any authorization proceeded or before any further consideration was given by this committee, the Department itself will have to be satisfied an available water supply existed and the witnesses would have to so certify.

In other words, what I am trying to summarize is this: That before we could come to this committee in support of a bill, we would have to be able to come to the committee and say that water was available for that project.

Now, there have been projects where we have told the committee quite frankly there was not enough water and we were not in favor of their development. On most of these, the committee has been satisfied with that explanation, and has not pressed for any further work on them.

In some instances the planning studies have revealed that a project of the size originally contemplated could not be built because of water supply questions and a project of lesser size has been proposed.

But in specific answer to your question, again, we would not appear before this committee on any future project authorization, unless we could make a finding that a water supply existed. And I believe this is the assurance that you seek. It is the assurance that I am pleased to offer you.

Mr. SAUND. That is all, Mr. Chairman.

Mr. ROGERS. Mr. Chenoweth?

Mr. CHENOWETH. No questions.

Mr. ROGERS. Thank you very much, Mr. Palmer and gentlemen.

Our next witness is Mr. Northcutt Ely, special counsel, Colorado River Board of California.

Mr. Ely, if you will come forward, you may be recognized.

Mr. ASPINALL. I ask unanimous consent, Mr. Chairman, that Mr. Ely be permitted to make his statement, and that he be followed by Mr. Matthew, making his statement, and that we question them together.

Mr. ROGERS. Is there any objection to the unanimous consent request?

If not, it will be granted.

The Chair hears no objection to it.

Mr. Matthew, you may come forward with Mr. Ely, if you will, and let Mr. Ely make his statement, and then you may proceed with yours, and we will proceed to examine you jointly and severally.

Do you have a copy of your statement?

STATEMENT OF NORTHCUTT ELY, SPECIAL COUNSEL, COLORADO RIVER BOARD OF CALIFORNIA, ACCOMPANIED BY FRED W. SIMPSON, CHAIRMAN, COLORADO RIVER BOARD OF CALIFORNIA

Mr. ELY. I have no prepared statement for you, Mr. Chairman. I apologize for that; but it is due to an emergency trip to California from which I just returned.

Mr. Chairman,
attorney general
Arizona v. Calif.
Colorado River Board
Simpson, chairman

Attorney General
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L COUNSEL, COLORADO
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 BOARD OF CALIFORNIA

r you, Mr. Chairman. I
 gency trip to California

Mr. Chairman, my name is Northcutt Ely. I am special assistant attorney general of the State of California in charge of the case of *Arizona v. California* for our State, and I am special counsel for the Colorado River Board of California. I am accompanied by Fred W. Simpson, chairman, the Colorado River Board of California.

Attorney General Stanley Mosk has been concerned that there be called to the attention of this committee certain of the significant features of the special master's report in *Arizona v. California*, as bearing upon the water supply questions with which you have been concerned here, and the Colorado River Board of California has desired that there be called to your attention some features of the particular bill that is before you, that may affect California adversely. As you know, the report would allocate the first 7.5 million acre-feet of consumptive use from the main stream $4\frac{4}{5}$ to California, $2\frac{2}{5}$ to Arizona, $\frac{3}{5}$ to Nevada, each year.

First, with respect to the special master's report: Until this report was filed, first in draft form, in May of 1960, and finally in the final form of the court on December 5, 1960, I had assumed that article III (a) and (b) of the Colorado River compact meant what they said literally; that is, that they apportion in perpetuity the consumptive use of specified quantities of water to the upper basin and to the lower basin, and that we might expect the upper basin to put to use so much of that apportionment as the storage capacity in the upper basin might make available for their use consistently with their obligations under article III (c) and (d). The quantity apportioned in article III (a) is $7\frac{1}{2}$ million acre-feet of consumptive use per annum.

The special master takes quite a different view of this language of article III (a) of the compact. He treats it as a ceiling on appropriations. That is to say, that the two basins, in effect, are competing with one another to appropriate water, each of them subject to a ceiling upon its appropriations.

In the course of the litigation before the special master, our experts testified that with the storage capacity that is authorized and under construction in the upper basin we could anticipate that, as Mr. Riter has testified here today, there would ultimately be put to use in the upper basin some quantity, between 6,200,000 and perhaps 6,800,000, if that could be done without interfering with the upper division's obligation under article III (d) and article III (c) of the compact, with which the committee is familiar. The master's report says there is nothing to show that Upper Basin uses will ever approach such quantities, or indeed exceed 4,800,000 acre-feet.

Article III (d), as you may recall, provides that the States of the upper division shall not deplete the flow at Lee Ferry to less than 75 million acre-feet in any period of 10 consecutive years, and article III (c) provides that in addition to that the upper divisions will make available quantities to supply one-half of the deficiency for Mexico if the surplus above 16 million acre-feet of consumptive use in the entire basin is insufficient to supply Mexico.

The effect of the master's report is to treat the apportionment in article III (a) as a ceiling on appropriations, not a reservation. He says that it is up to Congress to decide what the relative equities of the two basins shall be in competition with one another.

I should like to place in the record at this point, if I may, extracts from the special master's report.

May that be done?

Mr. ROGERS. Without objection, it may be included.

Mr. ASPINALL. Reserving the right to object, I presume that these extracts have not been taken out of context, have they?

Mr. ELY. We have attempted not to, Mr. Aspinall. We think these are fair quotations.

Mr. ASPINALL. Of course, we have a copy of the whole recommendation, as far as that is concerned.

With that understanding, Mr. Chairman, I withdraw my objection.

Mr. ROGERS. Without objection, the excerpts will be included at this point.

EXCERPTS FROM REPORT OF SPECIAL MASTER SIMON H. RIFKIND, DATED DEC. 5, 1960, IN ARIZONA V. CALIFORNIA, NOW BEFORE THE U.S. SUPREME COURT, NO. 9 ORIGINAL, OCTOBER TERM, 1960

A. INTERPRETATION OF ARTICLE III(A) OF THE COLORADO RIVER COMPACT

Article III (a) and (b) of the Colorado River compact provides:

"(a) There is hereby apportioned from the Colorado River System in perpetuity to the Upper Basin and to the Lower Basin, respectively, the exclusive beneficial consumptive use of 7,500,000 acre-feet of water per annum, which shall include all water necessary for the supply of any rights which may now exist.

"(b) In addition to the apportionment in paragraph (a), the Lower Basin is hereby given the right to increase its beneficial consumptive use of such waters by one million acre-feet per annum" (p. 373).

The special master interprets the apportionment in perpetuity of 7,500,000 acre-feet of beneficial consumptive use per annum made by article III(a) to each of the upper and lower Colorado River basins as follows:

"* * * Article II of the Compact divides the entire Colorado River Basin into Upper and Lower Basins, and Article III (a) and (b) apportions the use of water between the two Basins and not among states. This apportionment is accomplished by establishing a ceiling on the quantity of water which may be appropriated in each Basin as against the other. Although Article III (a) and (b) is not expressed in terms of appropriative rights, this is the purport of that Article. For example, it is clear that the Lower Basin may utilize and consume more than the 8,500,000 acre-feet of water per annum apportioned to it by subdivisions (a) and (b) of Article III of the Compact, if the water is actually available, but against the Upper Basin it can acquire appropriative rights to no greater quantity than is sufficient to satisfy a consumptive use of that magnitude * * *" (p. 140).

"The limits established by the Compact on the acquisition of appropriative rights are applicable to the main stream of the Colorado River and to its tributaries" (p. 142).

"As used in the Compact, beneficial consumptive use was intended to provide a standard for measuring the amount of water each Basin might appropriate. This was necessary since Article III (a) and (b) imposed limits on appropriative rights * * *" (p. 148).

B. EXPECTED UPPER BASIN DEVELOPMENT

"Lastly, lower basin supply is affected by upper basin uses. Increased upper basin uses will diminish the lower basin supply except as the upper basin is limited by article III of the compact. Yet no one can say with certainty what increase may occur in upper basin uses or at what time" (p. 110).

"A second and control studies on which California flow at Lee Ferry by betw there is nothing to indic exceeded 2,200,000 acre-fe to anywhere near 6,500,00 of depletion on instruction it would occur. In sharp in the report of the Senat project and potential reser mates that future upper l feet per annum (depletion extensive storage capacity basin were eventually cons

"Moreover, if ever the uses in the Colorado River resolve them. No new proje affect lower basin main str Basin without congressiona U.S.C. sections 401 et seq. *United States v. Rio Grand Atkinson*, 313 U.S. 508 (1942), No. 503—October term, 1941. *United States v. Republic S* as a practical matter, it is the help of Congress.

"No new main stream pro Nevada, and California her Ferry will not exceed, unde acre-feet per annum. Thu California's own assumption Congress to determine the extent to which California's

Mr. ELY. There are t with the reporter I want where he says:

This apportionment is acc water which may be appro

And at page 149:

I regard article III (a) : not as a source of supply.

And again at page 149

For compact purposes, an appropriations, not to the su

The second point to v question of water supply for that purpose I sha committee not only copie to which I have just refer ask your attention.

In September 1960, th port on the rates to be c power. This report make that can be summarized as

⁴¹ S. Rept. No. 128, 84th Cong., 84th Cong., 1st sess. (1955), p. 6

this point, if I may, extracts

be included.
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of the whole recommenda-

n, I withdraw my objection.
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MON H. RIFKIND, DATED DEC. 5,
 THE U.S. SUPREME COURT, NO. 9

THE COLORADO RIVER COMPACT

r compact provides:
 Colorado River System in perpe-
 basin, respectively, the exclusive
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ment in perpetuity of 7,500,000
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 ns as follows:

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DEVELOPMENT

basin uses. Increased upper
 except as the upper basin is
 one can say with certainty
 at what time" (p. 110).
 • • •

"A second and controlling assumption made in the Erickson and Stetson studies on which California relies is that the upper basin will deplete the virgin flow at Lee Ferry by between 6,500,000 and 6,800,000 acre-feet per annum. Yet there is nothing to indicate that the upper basin depletions, which have never exceeded 2,200,000 acre-feet per annum measured at Lee Ferry, will expand to anywhere near 6,500,000 acre-feet. Again, the witnesses assumed this amount of depletion on instruction from counsel; they did not express the opinion that it would occur. In sharp conflict with this assumption is the estimate expressed in the report of the Senate committee which studied the Colorado River storage project and potential reservoir construction in the upper basin. That report estimates that future upper basin consumptive use will not exceed 4,800,000 acre-feet per annum (depletion of the flow at Lee Ferry would be less), even if the extensive storage capacity envisaged but not as yet authorized for the upper basin were eventually constructed."

"Moreover, if ever the equities between California's existing uses and new uses in the Colorado River Basin have to be resolved, it will be for Congress to resolve them. No new projects, whether in the lower or upper basin, which would affect lower basin main stream supply can be constructed in the Colorado River Basin without congressional action or acquiescence. Rivers and Harbors Act, 33 U.S.C. sections 401 et seq. See *United States v. Arizona*, 295 U.S. 174 (1935); *United States v. Rio Grande Irrigation Co.*, 174 U.S. 890 (1899); *Oklahoma v. Atkinson*, 313 U.S. 508 (1941); *United States v. Grand River Dam Authority*, No. 503—October term, 1959; *Wisconsin v. Illinois*, 278 U.S. 367, 411 (1929); *United States v. Republic Steel Corp.*, No. 56—October term, 1959. Furthermore, as a practical matter, it is virtually impossible to finance such projects without the help of Congress.

"No new main stream projects have been authorized by Congress in Arizona or Nevada, and California herself recognizes that the upper basin depletion at Lee Ferry will not exceed, under existing and presently authorized projects, 3,840,000 acre-feet per annum. Thus unless Congress authorizes new projects, even on California's own assumptions, her existing uses cannot be endangered. It is for Congress to determine the limits of new construction in the basin and thus the extent to which California's existing uses risk curtailment" (pp. 114-115).

Mr. ELY. There are three sentences in the report I have just filed with the reporter I want to call your attention to. One is at page 140, where he says:

This apportionment is accomplished by establishing a ceiling on the quantity of water which may be appropriated in each basin as against the other.

And at page 149:

I regard article III (a) and (b) as a limitation on appropriative rights and not as a source of supply.

And again at page 149:

For compact purposes, article III (a) and (b) can refer only to limits on appropriations, not to the supply of water itself.

The second point to which I want to direct your attention is this question of water supply which has been discussed here today. And for that purpose I shall ask that there be made available to the committee not only copies of excerpts from the special master's report, to which I have just referred, but some other material to which I shall ask your attention.

In September 1960, the Reclamation Bureau made available a report on the rates to be charged for Colorado River Storage Project power. This report makes available as of very recent date information that can be summarized as follows.

⁴¹ S. Rept. No. 128, 84th Cong., 1st sess. (1955), p. 4. See also H. Rept. No. 1087, 84th Cong., 1st sess. (1955), p. 6 (pp. 111-112).

Under conditions as they are anticipated for the year 1975, upper basin depletions are expected to be about 4 million acre-feet per year, and the residual flow out of Lake Mead is expected to be about 9,800,000 acre-feet.

By the year 2020, the upper basin depletions are projected to have grown to about 5,400,000 acre-feet, and the residual flow out of Lake Mead will be reduced to about 8½ million acre-feet.

The Bureau studies are based upon the assumption of the availability of a so-called virgin flow or undepleted flow at Lee Ferry, in excess of 15 million acre-feet, but the significant point is that of this about 1,200,000 acre-feet is not usable, because it is spilled. It is in excess of the regulatory capacity of the reservoirs existing and authorized, and it happens because there were 6 tremendous years prior to 1930 that produced uncontrollable floods.

The truly controllable, usable supply at Lee Ferry is not over 14 million acre-feet. The apparent supply is inflated to the extent of 1,200,000 acre-feet by these spectacular floods that are in excess of the capacities of reservoirs to control them. Consequently, the 1,200,000 acre-feet of supply is a fictitious element of supply. This was thoroughly developed in the testimony in Arizona versus California, and it is confirmed by the latest of these Bureau studies.

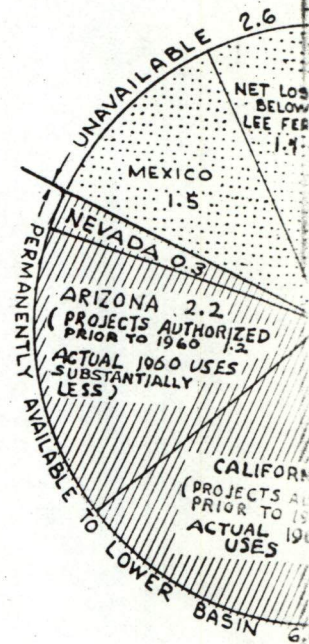
If you now have before you the chart which I hold in my hand (exhibit 2), I shall explain it. It relates to this Bureau study of September 1960.

Mr. ROGERS. I do not think we have those charts yet, Mr. Ely.

Mr. ELY. And I shall ask your attention to an accompanying table captioned "Water Supply Available to the Lower Basin and California in Light of Special Master's Report and Proposed Decree in Arizona Suit."

I will refer for the moment only to the chart.
(The chart referred to follows:)

IF THE MASTER'S
BY THE SU
TOTAL USABLE MAINS
ACRE FEET PER AN
UNCONTROLLABLE
WHICH OCCURRE
(All figures in mill
rounded to



for the year 1975, upper million acre-feet per year, expected to be about 9,800,-

ions are projected to have residual flow out of Lake acre-feet.

assumption of the avail- leted flow at Lee Ferry, gnificant point is that of because it is spilled. It e reservoirs existing and were 6 tremendous years oods.

Lee Ferry is not over 14 inflated to the extent of s that are in excess of the nsequently, the 1,200,000 supply. This was thora versus California, and studies.

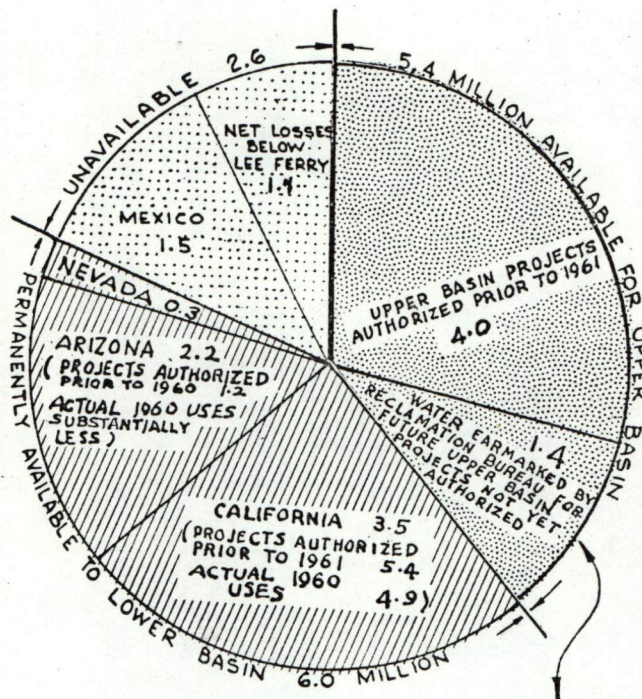
hich I hold in my hand to this Bureau study of

charts yet, Mr. Ely. o an accompanying table Lower Basin and Cali- and Proposed Decree in

IF THE MASTER'S REPORT IS SUSTAINED
BY THE SUPREME COURT

TOTAL USABLE MAINSTREAM SUPPLY 14 MILLION
ACRE FEET PER ANNUM NET OF "SPILLS" OF
UNCONTROLLABLE FLOODS SUCH AS THOSE
WHICH OCCURRED PRIOR TO 1930

(All figures in millions of acre-feet per annum
rounded to nearest 100,000)



UNTIL USED BY THE UPPER
BASIN, THE RIFKIND DECREE
WOULD DIVIDE THIS 1.4
MILLION IN SUCH FASHION
AS TO GIVE THE FOLLOWING
TOTALS :

ARIZONA	2.8 -
CALIFORNIA	4.4 -
NEVADA	.3 -
	<hr/>
	7.5 - (7.4 Rounded)

Mr. Ely. If you will look at the chart, exhibit 1), the circumference of this chart represents 14 million acre-feet. That is the usable, controllable, virgin flow, the undepleted flow, the "whole universe" at Lees Ferry.

Now, if you go around it counterclockwise, the two light areas to the left of the top center indicate water which is not available for use in the United States. It comprises a million and a half acre-feet guaranteed to Mexico at the boundary, and 1,100,000 acre-feet, which is the minimum of the losses below Hoover Dam which are not usable.

Consequently, there must be deducted at least 2,600,000 acre-feet, which is not available to either basin, and that leaves available for an accounting between the upper basin and the lower basin, for potential consumptive use, the residue of about 11,400,000 acre-feet.

The shaded portions of this chart show the potential distribution of that total usable resource of 11,400,000 acre-feet.

If you will now start at the top of the chart and go clockwise, the first of the shaded areas is captioned "Upper Basin Projects Authorized Prior to 1961," 4 million acre-feet.

Those are projects already authorized, under construction, or expected to be constructed.

If you deduct that from 11,400,000, you have something like 7,400,000 acre-feet left as usable water, either for expansion in the upper basin or for use in the lower basin.

The next segment, as we proceed clockwise is captioned "1.4 million, Water Earmarked by Reclamation Bureau for Future Reclamation Projects Not Yet Authorized": This increment represents the difference between the 1975 depletions of 4 million acre-feet projected in the September 1960, Bureau study and the upper basin depletions projected for the year 2020 of 5,400,000 acre-feet.

If you now continue clockwise, you find three segments here for the three lower basin States, Arizona, California, and Nevada. These are the shares of the residue which they would have under the special master's decree.

By subtraction, you will have discovered that the quantity available to the lower basin, after the upper basin expands its depletions to 5,400,000 acre-feet, is not over 6 million acre-feet.

The special master's formula would apportion that by fractions or percentages, and Nevada would have just under 300,000 acre-feet, Arizona would have 2,200,000 acre-feet, California 3,500,000 acre-feet.

I may pause here to say that Arizona's projects which have been authorized would require about 1,200,000 acre-feet, and she, in 1960, was using substantially less; so that Arizona could increase her uses by about a million acre-feet above the requirements of existing and authorized projects if this formula were approved by the Supreme Court.

If you now look at California's segment, you will find that if the total supply available to Arizona, California, and Nevada is about 6 million acre-feet, California's share under the master's report would be about 3.5 million.

By contrast, the projects actually in existence in California—there are three of them—have been constructed to use 5.4 million acre-feet, and in 1960 they in fact used 4.9 million acre-feet. So the reduction

in California uses below those would be from 4.9 to 3.5 million acre-feet.

By coincidence, this equals the increase in upper basin depletion.

What this all boils down to is that per basin depletions above the minimum result in an exactly corresponding increase in basin depletion, and if—I emphasize this—if constructed, there is a reduction in California.

Something has to give. The Colorado River to sustain both the central Arizona project without California.

The projects which are being authorized would require altogether a time would require altogether a time authorized and built, then, as this morning, the total Upper Basin is 5,400,000 acre-feet, far below the compact but their expansion of 500,000 acre-feet effect of diminishing the existing four seventy-fifths of that or at Arizona project is built.

In other words, under the master's report is approved by the committee subsequently authorizes that California would have approximately 3.5 million acre-feet of uses of nearly a million.

That is how serious the water supply question is. This does not mean that the projects in Arizona are to be chided for their ambitious Arizona is to be reproached for it California is to be blamed for attempting one-half billion dollars of investment projects that are now at risk.

It does indicate the necessity of new projects.

Congressman Saund has before the House a bill which would authorize a complete study of the water supply question before new projects are authorized and should be done. There are assumptions, in the presentations in the budget for new projects. You cannot water budget is one budget that has row it. You cannot print it.

Now, it is quite true that there is more water than 14 million acre-feet available in the Colorado River basin. You find more than 14 million acre-feet in the present, unless you go back more than 100 years.

If you plan to use in the Colorado River basin and the mainstream below Lees Ferry, including reservoir losses, you

in California uses below those which actually occurred in 1960 would be from 4.9 to 3.5 million acre-feet, or about, 1,400,000 acre-feet.

By coincidence, this equals the 1,400,000 acre-feet of projected increase in upper basin depletions between 1975 and 2020.

What this all boils down to is simply this: that any expansion of upper basin depletions above the current level of 4 million acre-feet will result in an exactly corresponding reduction in the Lower Basin supply, and if—I emphasize this “if”—the central Arizona project is constructed, there is a reduction in California’s existing uses.

Something has to give. There is not sufficient water in the Colorado River to sustain both the increase in Upper Basin use and the central Arizona project without destroying existing projects in California.

The projects which are before the committee at the present time would require altogether about 500,000 acre-feet. If they are authorized and built, then, as Mr. Johnson’s question indicated this morning, the total Upper Basin depletion would be about 4½ million acre-feet, far below the compact apportionment to the Upper Basin, but their expansion of 500,000 acre-feet would nevertheless have the effect of diminishing the existing uses in California by precisely forty-four seventy-fifths of that or about 300,000 acre-feet, if the central Arizona project is built.

In other words, under the master’s report, if 500,000 acre-feet of depletions are added to the burden on the main stream, and if the master’s report is approved by the Supreme Court, and if this committee subsequently authorizes the central Arizona project, California would have approximately 4 million acre-feet, and the Metropolitan Water District would have less than 200,000, as against present uses of nearly a million.

That is how serious the water supply question is.

This does not mean that the proponents of Upper Basin projects are to be chided for their ambitions to develop their States, or that Arizona is to be reproached for its ambitions, nor, indeed, that California is to be blamed for attempting to sustain the usefulness of the one-half billion dollars of investment that we have made in our three projects that are now at risk.

It does indicate the necessity of extreme caution in planning new projects.

Congressman Saund has before the committee a resolution which would authorize a complete study and investigation of this water supply question before new projects are authorized. We think it is sound and should be done. There are too many loose ends, too many assumptions, in the presentations made by those seeking authorization for new projects. You cannot possibly stretch the water. The water budget is one budget that has to be balanced. You cannot borrow it. You cannot print it.

Now, it is quite true that there is, on the basis of longtime average, more water than 14 million acre-feet. But even at that, you cannot find more than 14 million acre-feet in any period of years ending with the present, unless you go back more than 40 years.

If you plan to use in the Colorado River Basin, that is, the upper basin and the mainstream below Lee Ferry, more than 14 million acre-feet, including reservoir losses, you are assuming that you are going

to have available in the future water flows that have existed for more than 40 years, that has not been seen in the river since before the Harding administration; that you are going to somehow manage to carry over water in storage for more than 40 years, more nearly a half century.

As someone indicated this morning, prior to 1922 there were no gages at Lee Ferry. All of the record prior to that time was estimated. The estimates may be good or bad. But the fact is that if you take, as the Colorado River compact requires, a running aggregate of the flow at Lee Ferry by 10-year periods, 1896 to 1905, 1897 to 1906, and so on, you will find that for the first 27 of those overlapping 10-year periods, the flow at Lee Ferry was in 26 out of the 27 periods in excess of any that you can find in any of the succeeding 27-year periods.

For some reason, when the gage went in at Lee Ferry in 1921, all of a sudden the inflation went out of the figures. Either those great floods never existed, or they were overestimated, or if they did exist, they were in the dim, distant past.

And you cannot plan projects on the basis that this good fortune will return. But even if the pre-1921 flows should come again, more than a million acre-feet per year, on an average, would be uncontrollable spill.

If you have before you the mimeographed sheet, I should like to refer—

May I have both of these placed in the record as I go along?

Mr. ROGERS. Yes; without objection. The chart will be included in the record at the point that you started explaining it, and the mimeographed paper will be included at this point. (The chart referred to appears on p. 263.)

Mr. ELY. Thank you, sir.

(The mimeographed sheet referred to follows:)

WATER SUPPLY AVAILABLE TO LOWER BASIN AND CALIFORNIA IN LIGHT OF SPECIAL MASTER'S REPORT AND PROPOSED DECREE IN ARIZONA SUIT

	<i>Million acre-feet</i>		
Average available water supply of Colorado River, annual undepleted (natural) flow at Lee Ferry, is.....			14
Of this, the Mexican Water Treaty (1.5 million) and unavoidable losses below Lee Ferry (1.2 million) make unavailable.....			2.7
So that the total usable undepleted supply is.....			11.3
Estimated annual water use in upper basin for existing and pre-1949 authorized projects, is.....			2.55
And with addition of Colorado storage project and participating projects and other miscellaneous projects, is.....			3.9
And with addition of San Juan-Chama, Navaho, Fryingpan-Arkansas, and Savory-Pot Hook, is.....			4.4
And with addition of other presently contemplated projects, is.....			5.5
If upper basin use is.....	3.9	4.4	5.5
Then, under proposed decree, water supply for Arizona, California, and Nevada would be.....	7.4	6.9	5.8
California's share (assuming that Nevada and Arizona use the water the master allocates them) would be... Or less than full constructed capacity of California projects by.....	4.3	4.05	3.4
Water supply for metropolitan water district would be... Or in percent of full capacity.....	1.1	1.35	2.0
	0.45	0.20	0
	37	17	—

NOTE.—California's present use (1960), 4.9 million acre-feet.

Mr. ELY. The m Supply Available to Master's Report and figures I have just g the Colorado River, million acre-feet. (ble losses below Lee deduct these, then, basins.

The projects that add up to 3.9 millio This would be incr lion by the San Jua the Savory-Pot Hoo lies will be built by million. (The corr million.)

The lower half of these upper basin project. Arizona project. or only the use mad residue available for million; and of the This is 1,100,000 acre es. It would give California 450,000 ac

If you now proceed Fryingpan projects, for California-Arizona's share would be would have only 200.

And if you go ahead projected by the Bu result. Arizona, Cal divide up. Californ less than the capacity the metropolitan wa

All of these figures which would be decre the Supreme Court. me, that Nevada wot award to her.

I now invite your a a memorandum to th torney General Mosk, record without taking

Mr. ROGERS. Witho this point.

that have existed for more
the river since before the
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years, more nearly a half

r to 1922 there were no
or to that time was esti-

For the fact is that if
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896 to 1905, 1897 to 1906,
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Lee Ferry in 1921, all of
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explaining it, and the
his point. (The chart

ows:)

CALIFORNIA IN LIGHT OF SPECIAL
IN ARIZONA SUIT

	Million acre-feet		
er, annual undepleted	14		
and unavoidable losses	2.7		
	11.3		
sting and pre-1949 au-			
participating projects	2.55		
	3.9		
Fryingpan-Arkansas,			
ed projects, is	4.4		
	5.5		
	3.9	4.4	5.5
Arizona,			
	7.4	6.9	5.8
Arizona			
ld be	4.3	4.05	3.4
ifornia			
	1.1	1.35	2.0
ld be	0.45	0.20	0
	37	17	—

Mr. ELY. The mimeographed sheet, exhibit 3, captioned "Water Supply Available to Lower Basin and California in Light of Special Master's Report and Proposed Decree in Arizona Suit," tabulates the figures I have just given you. The average available water supply of the Colorado River, the annual undepleted flow, is on the order of 14 million acre-feet. Of this, the Mexican Water Treaty, and unavoidable losses below Lees Ferry, make unavailable 2.7 million. If you deduct these, then, you have 11.3 million acre-feet for use in both basins.

The projects that have already been authorized in the upper basin add up to 3.9 million, rounded to 4 million on my chart (exhibit 2).

This would be increased by a half million acre-feet to about 4.4 million by the San Juan-Chama, the Navajo, the Fryingpan-Arkansas, the Savery-Pot Hook projects. Other projects that the Bureau believes will be built by the year 2020, would raise these depletions to 5.5 million. (The corresponding figure on my chart, rounded, is 5.4 million.)

The lower half of the table shows the results if you go ahead with these upper basin projects, and if you subsequently authorize the central Arizona project. If the Upper Basin use is 3.9 million acre-feet, or only the use made by existing and authorized projects, then the residue available for Arizona, California, and Nevada would be 7.4 million; and of the master formula California's share would be 4.3. This is 1,100,000 acre-feet less than the capacity of our existing projects. It would give the Metropolitan Water District of Southern California 450,000 acre-feet, or 37 percent of its designed capacity.

If you now proceed to authorize the Navajo-San Juan-Chama and Fryingpan projects, increasing depletions to 4.4 million, the residue for California-Arizona-Nevada would shrink to 6.9 million, California's share would be 4.05 million, and the metropolitan water district would have only 200,000 acre-feet, or 17 percent of its capacity.

And if you go ahead with the upper basin projects to the depletions projected by the Bureau to the year 2020, the last column shows the result. Arizona, California, and Nevada would have 5.8 million to divide up. California's share would be 3.4 million, which is 2 million less than the capacity of our existing projects with nothing at all for the metropolitan water district.

All of these figures assume that Arizona will put to use the water which would be decreed to her if the master's report were approved by the Supreme Court. And they assume, also, Mr. Matthew reminds me, that Nevada would put to use 300,000, which the report would award to her.

I now invite your attention to the next document, exhibit 4, which is a memorandum to the California congressional delegation from Attorney General Mosk, dated April 4, I should like to place that in your record without taking time to dwell on it.

Mr. ROGERS. Without objection, the statement will be included at this point.

(The statement referred to follows:)

STATE OF CALIFORNIA
OFFICE OF THE ATTORNEY GENERAL
DEPARTMENT OF JUSTICE
State Building, Los Angeles

APRIL 4, 1961.

MEMORANDUM

To Members of the California Congressional Delegation:

Let me express my appreciation for the audience you gave to Northcutt Ely, our special assistant attorney general, to hear about the Colorado River litigation.

I have been asked by some members of the California delegation in Congress for a recommendation with respect to the position which should be taken with respect to Federal legislation to authorize new projects in the Upper Colorado River Basin to use Colorado River system water. Legislation for three such projects is now pending before the Congress.

The responsibility for the decisions which must be taken rests collectively with the Congress, and I am confident that each member of the California delegation, if possessed of the full facts, will discharge his individual responsibility wisely. To recapitulate briefly, these are the important facts:

First. There is still enough water in the Colorado River system as a whole for some new projects. This is water to which California in *Arizona v. California* has laid no claim, despite the fact that we fully recognize that California projects will be short of Colorado River water in the future, even if we prevail in that litigation. We laid no claim because we recognize the limitations imposed on us by the Colorado River compact and the California Limitation Act.

Second. If the Colorado River compact is recognized as what both Arizona and California contend it is—an apportionment in perpetuity to the upper basin of beneficial consumptive use of 7,500,000 acre-feet per annum—all significant expansion in the future will take place in the upper basin. However, the special master's report submitted to the Supreme Court last December in *Arizona v. California* characterizes the compact as a "ceiling on appropriation." The master has told the Supreme Court that our claim of disaster to California projects, and in particular the metropolitan water district, is unfounded because "there is nothing to indicate that the upper basin depletions, which have never exceeded 2,200,000 acre-feet per annum measured at Lees Ferry, will expand to anywhere near 6,500,000 acre-feet." The master may be at least partially correct that there is no disaster to California if the principle of prior appropriation—first in time, first in right—applies between the two basins within the limits of a "ceiling" imposed on each basin by the compact. The upper basin and the lower basin are then competing in a race to appropriate the unappropriated water.

Third. The special master's characterization of the Colorado River compact is at odds with the basic premise on which all Colorado River development has proceeded. Hence, it seems unwise to assume, until the Court has acted, that it will endorse this view of the compact. The factual situation was accurately described by the United States in 1952, when it sought leave to intervene in *Arizona v. California*: "Severally, the States of the upper basin of the Colorado River have apportioned among themselves the 7,500,000 acre-feet of water annually allotted to that basin by the Colorado River compact. Development of that basin is going forward premised upon that apportionment."

Fourth. The unused water within the Colorado River system is much more limited than anyone had reason to suppose until recently. It would be reckless, indeed, to permit new projects in both upper and lower basins to be built, both basins planning to consume the same very small margin of water not required by existing and authorized projects. Our engineers tell me that recent Bureau of Reclamation studies confirm that this margin for expansion in both basins combined probably does not exceed 1.5 million acre-feet, even if California is restricted to the quantity we were using when the trial in *Arizona v. California* ended 3 years ago. The three pending upper basin projects would use 500,000 acre-feet of this. Arizona hopes to expand her own uses 1,700,000 acre-feet.

Projects built to consume the same entire Colorado River region, its people. One solution would be to defer project until the decision in *Arizona* more than a year from now. Another requisite to authorization of any new supplies of the Colorado River Basin would preclude the possibility of resources. The difficulties inherent to the decree, in view of the uncertainty I think it can best be left to the course to pursue in the light of the made in the interval before *Arizona v. California*.

Sincerely yours,

Mr. ELY. It simply states Attorney points I have already mentioned. Members of the California delegation what should be done about new budget is out of balance.

Next, I should like to call to your summary from California's brief an excerpt from the brief, and it possible the issues that are now of water supply to which I have find this valuable, and I ask for record.

Mr. ROGERS. The summary of Mr. ELY. Yes, sir.

Mr. ROGERS. Is there objection?

Mr. ASPINALL. Reserving the summary of the argument on the other

Mr. ELY. I should be very happy if you do not have it, I will make and supply them to you.

Mr. ASPINALL. I withdraw my

Mr. ROGERS. Without objection prepared by Mr. Ely at this point the understanding that the summary side of the case will be furnished (The summary of argument re

[Excerpt from the brief filed jointly by the District of Southern California, Palmdale District, Coachella Valley County Water San Diego, and the County of San Diego in *Arizona v. California*]

SUMMARY OF

PRELIMINARY

The master proposes a resolution of to the issues pleaded and litigated. They were brought by the parties to this Court during the course of 3 years of trial case. He concludes that the question minable: Is there a dependable water project?

The master proposes a decree which of the Central Arizona project in no

Projects built to consume the same water twice would spell disaster for the entire Colorado River region, its people, farms, and industries.

One solution would be to defer action on any new Colorado River Basin project until the decision in *Arizona v. California* becomes final, probably not more than a year from now. Another solution would be to require, as a prerequisite to authorization of any new project, a complete inventory of the water supplies of the Colorado River Basin and a legislative determination which would preclude the possibility of over commitment of the limited water resources. The difficulties inherent in the latter solution are very great, prior to the decree, in view of the uncertainties inherent in the litigation. Therefore, I think it can best be left to the judgment of members of our delegation what course to pursue in the light of the precise legislative proposals that may be made in the interval before *Arizona v. California* is decided.

Sincerely yours,

STANLEY MOSK, *Attorney General*.

Mr. ELY. It simply states Attorney General Mosk's concern on the points I have already mentioned. He does not seek to tell the members of the California delegation or this committee or anyone else what should be done about new projects, but points out that the water budget is out of balance.

Next, I should like to call to your attention, without reading it, the summary from California's brief in the U.S. Supreme Court. This is an excerpt from the brief, and it attempts to outline as succinctly as possible the issues that are now before the Court, including the issue of water supply to which I have just referred. I believe you will find this valuable, and I ask that it, too, be incorporated in your record.

Mr. ROGERS. The summary of the argument, Mr. Ely?

Mr. ELY. Yes, sir.

Mr. ROGERS. Is there objection?

Mr. ASPINALL. Reserving the right to object: Do we have the summary of the argument on the other side of this case, too, for the record?

Mr. ELY. I should be very happy to see it placed in the record, and if you do not have it, I will make abstracts from our opponents' briefs and supply them to you.

Mr. ASPINALL. I withdraw my objection, Mr. Chairman.

Mr. ROGERS. Without objection, the summary of the argument prepared by Mr. Ely at this point will be included in the record, with the understanding that the summary of the argument on the other side of the case will be furnished and included in the record.

(The summary of argument referred to follows:)

[Excerpt from the brief filed jointly by the State of California, the Metropolitan Water District of Southern California, Palo Verde Irrigation District, Imperial Irrigation District, Coachella Valley County Water District, the city of Los Angeles, the city of San Diego, and the County of San Diego in the U.S. Supreme Court on May 22, 1961, in *Arizona v. California*]

SUMMARY OF THE ARGUMENT

PRELIMINARY STATEMENT

The master proposes a resolution of this suit which is only obliquely related to the issues pleaded and litigated. The master concludes that the issues which were brought by the parties to this Court, referred to the master, and litigated during the course of 3 years of trial, are irrelevant to the disposition of the case. He concludes that the question which precipitated the suit is undeterminable: Is there a dependable water supply for the proposed Central Arizona project?

The master proposes a decree which, if adopted, will affect the construction of the Central Arizona project in no perceivable way if Arizona and Congress

decide to make diversions for that project from any of the planned alternative diversion points on the main Colorado River above Lake Mead (about 275 miles of the main stream of the Colorado River in the lower basin), newly defined by the master as a "tributary," and excluded from this adjudication. If the Central Arizona project should make diversions above Lake Mead (the 1960 annual report of the Arizona Interstate Stream Commission states that surveys for such diversions are now underway)¹ the master's decision proposes that the principal protagonists begin anew in this Court. On the next trip, California as a "mainstream" user sues Arizona as a "tributary" user under the principles of priority of appropriation and equitable apportionment which the report preserves for that future suit, but which are otherwise abolished by the master in the "mainstream," defined by the master as the Colorado River from Lake Mead to Mexico. This unattractive prospect results from the master's divorcing the project act from the Colorado River Compact.

Arizona brought the present suit to quiet an asserted title to 3,800,000 acre-feet of consumptive use of the waters of the Colorado River system (i.e., main stream and tributaries) in the lower basin. Arizona asserted, and all parties recognized, that Arizona's claim (alleged to include 1,700,000 acre-feet Arizona was not using), and the claims of California for existing and long-established projects, were mutually exclusive. California had built three projects at a cost in excess of a half billion dollars of public investment.

That controversy exists solely by reason of the Colorado River compact. Were it not for the apportionment in perpetuity which the compact makes to the upper basin of the consumptive use of 7,500,000 acre-feet per annum, there would be an adequate supply of unappropriated water available for Arizona's proposed Central Arizona project without impinging on any rights or requirements of the other lower basin States.

Issues joined in the pleadings and the evidence taken during the 3 years of trial related in large part to the pleaded and long-standing controversy over the meaning of the compact as "enthroned" by the Boulder Canyon Project Act.² Major issues litigated were (1) the meaning and method of measurement of "beneficial consumptive use" under the Colorado River compact as applied to lower basin tributaries; (2) Arizona's asserted identification of her uses on the Gila River System with the 1 million acre-feet specified for the lower basin by Article III(b) of the compact. Their significance lay in the fact that the Project Act had incorporated the Colorado River Compact; to what extent, therefore, must Arizona account for her uses on the tributaries against the 3,800,000 acre-feet which she sought? Her claim was based (1) on provisions of that act which had exacted from California a limitation on California's uses (duly enacted by the California Legislature), in the event that Arizona should fail to ratify the compact, and (2) on a contract with the Secretary of the Interior.

The master has resolved most of the pleaded and litigated issues relating to the compact in accordance with California's contentions. Arizona's uses on the tributaries are encompassed by the compact, and measured as California contended. He holds, however, that the compact is not relevant to this controversy (rept. 138); that the explicit incorporation of the compact into the limitation on California must be excised; that the compact includes the tributaries in the apportionment it makes to the lower basin, but the California Limitation Act and the Project Act exclude them (rept. 173); that the compact's apportionments in perpetuity to each basin are ceilings on appropriations (rept. 140, 149); that there is nothing to show that the upper basin users will ever appropriate and use anything approaching the quantity of water within that ceiling (rept. 111). He rejects California's offer to prove that the upper basin, by about the year 1990, will reach or approach the limits of its use physically possible consistent with the compact (rept. 112 n.41).

Upon the master's reasoning, the Arizona and California claims are not mutually exclusive: "Existing California uses are in no danger of curtailment unless and until many vast new projects, some of which are not even contemplated at this time, are approved by Congress and constructed." (rept. 115.) If there were sufficient water available upon application of the master's for-

¹ See p. 125, *infra*.

² The Senate committee which reported the Boulder Canyon project bill described it as "enthroning the Colorado River compact." S. Rept. No. 592, to accompany S. 728 (4th Swing-Johnson bill), 70th Cong., 1st sess., pt. 1, at 16 (1928). All of pt. 1 of the above report is in evidence as California Exhibit 203 (Tr. 7,715).

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any of the planned alternative Lake Mead (about 275 miles lower basin), newly defined from this adjudication. If the above Lake Mead (the 1960 Commission states that surveys master's decision proposes that On the next trip, California "tributary" user under the apportionment which the otherwise abolished by the Colorado River Compact results from the master's Compact.

asserted title to 3,800,000 acre-feet Colorado River system (i.e., main basin) asserted, and all parties to the 1,700,000 acre-feet Arizona Compact existing and long-established had built three projects at a investment. the Colorado River compact. by which the compact makes 500,000 acre-feet per annum, appropriated water available for out impinging on any rights

taken during the 3 years of long-standing controversy over Boulder Canyon Project Act.² method of measurement of Colorado River compact as applied identification of her uses acre-feet specified for the lower basin. significance lay in the fact that Colorado River Compact; to what extent, the tributaries against the compact was based (1) on provisions a limitation on California's Compact, in the event that Arizona contract with the Secretary

and litigated issues relating contentions. Arizona's uses and measured as California is not relevant to this condition of the compact into the compact includes the tributaries, but the California Compact (rept. 173); that the compact are ceilings on appropriations that the upper basin users limiting the quantity of water California's offer to prove that approach the limits of Compact (rept. 112 n.41).

California claims are not in no danger of curtailment which are not even contemplated constructed." (rept. 115.) indication of the master's for-

mula to supply California's existing uses, there would necessarily be more water available to Arizona than Arizona sought in her complaint.

The master's decision generates two great unresolved paradoxes:

(1) It is neither possible nor necessary to determine the dependable water supply, if the master's premises with respect to the compact are correct. The upper basin's apportionment, except to the undetermined extent of existing upper basin appropriations, is no longer treated as an existing claim against the lower basin; the claims therefore do not exceed the supply; on these premises the controversy is not justiciable. But he concludes that it is justiciable. Although this is a jurisdictional issue, we postpone its treatment to part 5 of the argument, since the relationship of the compact (which the master holds irrelevant) to the Project Act is at the heart of every substantive issue earlier considered.

(2) In 1928, the Arizona delegation in Congress unanimously, strenuously, and emphatically resisted the Boulder Canyon Project Act, and Arizona continued to do so in three suits in this Court, in Congress, and in every public forum available. In 1960, the master discovered that, contrary to every contention earlier made, the Project Act had in fact allocated to Arizona the lion's share of the stored water made available by the Boulder Canyon Project. This paradox is revealed only when the dependable water supply is determined. Absent such a determination, it is impossible to test the result accomplished by the Project Act against its legislative objectives.

I. INTRODUCTION: THE BASIS OF WATER RIGHTS

The source of California's water rights is the law of equitable apportionment and priority of appropriation confirmed, not abrogated, by the Project Act. Appropriation is the law of the arid West created by imperative necessity. That law is more firmly established in the Colorado River Basin than anywhere else. This is not by accident, but because this is the area where water is most precious. California water users have initiated appropriations by licenses and permits to appropriate and by Federal water contracts; they have diligently prosecuted construction of works to put those waters to beneficial use; and today great projects in California are beneficially using the water. Under the principles of equitable apportionment and priority of appropriation, California's projects have prior rights to the use of all water necessary to sustain them,³ whether these rights are considered as derived from State or Federal law, because Federal statutes and State law embody identical principles.

There is no disagreement about the source and characteristics of water rights in the lower basin prior to June 25, 1929, the date upon which, by Presidential proclamation, the Boulder Canyon Project Act, the Colorado River compact (ratified by six States), and the California Limitation Act became simultaneously effective: The controlling law was equitable apportionment and priority of appropriation. Priority of appropriation, the principal ingredient of equitable apportionment, contains three fundamental elements: (1) Water rights are founded upon beneficial use of water and are lost by nonuse; (2) the water user prior in time is prior in right (the priority concept); (3) the water user who initiates an appropriative right and who diligently constructs a project to put the water to beneficial use is given a priority from the date of initiation of his project. This relation-back principle protects the diligent appropriator from losing his water supply before his project is completed to a water user whose project is later initiated but earlier completed. Equitable apportionment, applied consistently by this Court in interstate suits between States which internally apply principles of priority of appropriation, modifies priorities to the extent necessary to take equitable considerations into account; the primary respect in which priority of appropriation is thus modified is the protection of existing economies built upon interstate priorities which are junior. This Court has never countenanced the impairment of destruction of an existing economy, even though founded on junior interstate priorities, for the benefit of a project not yet built. (*Wyoming v. Colorado*, 259 U.S. 419 (1922); *Nebraska v. Wyoming*, 325 U.S. 589 (1945).) A fortiori, the Court has protected economies which are

³ In pt. 2 we discuss the quantitative limitation imposed upon these rights by the statutory compact between the United States and California evidenced by the Boulder Canyon Project Act and the reciprocal California Limitation Act. This limitation did not destroy the priorities of these rights, but limited their magnitude to stated quantities.

Canyon project bill described it No. 592, to accompany S. 728 16 (1928). All of pt. 1 of the (715).

built on senior rights. Such is the California economy which is sustained by the Colorado River aqueduct of the Metropolitan Water District of Southern California. This project would be the primary victim of the special master's recommended decree. (See pp. 260-261, 266-270, 272-276 *infra*.)

The special master concludes that the Boulder Canyon Project Act, by implication, destroyed the principles of priority of appropriation and equitable apportionment in the "main stream" (the truncated main Colorado River as defined by the report) and all water rights founded upon that law (excepting only certain narrowly defined "present perfected rights" existing in 1929), although (a) those principles survive and control water rights in every part of the Colorado River system in the lower basin except the "main stream" and although (b) "main stream" appropriative rights survive vestigially to permit senior "main stream" users to vindicate their rights against upstream junior "tributary" users (including, as a "tributary," the main Colorado River above Lake Mead). (Rept. 316-318, 325.)

By thus abrogating on the "main stream" the water law principles which have been settled in the West for a hundred years, and all interstate water rights depending upon those principles, the master proposes, in 1961, to remit all existing projects and all future projects to a pro rata share of a water supply left undetermined and, according to the master, undeterminable.

II. CONSTRUCTION OF THE LIMITATION ON CALIFORNIA'S RIGHTS

Our disagreement with the special master begins with the event which took place on June 25, 1929, when the President's proclamation made simultaneously effective (1) the Boulder Canyon Project Act, (2) the California Limitation Act, and (3) the Colorado River compact. There is agreement that prior to that date all rights of all States in the lower basin were based on the law of equitable apportionment and priority of appropriation. There is also agreement that the Boulder Canyon Project Act, section 4(a), first paragraph, together with the California Limitation Act placed limits on those rights in California. We sharply disagree with the interpretation the special master has placed upon that statutory limitation. We also sharply disagree that our rights within that quantitative limitation were at any time shorn of priority by the Project Act, the Limitation Act, or the Secretary's water delivery contracts.

In the California Limitation Act, California agreed to limit her uses of Colorado River waters in consideration of the passage of the Project Act, in response to Congress' specification of the terms of the agreement tendered in the first paragraph of section 4(a) of the Boulder Canyon Project Act. The specified limitation is that California should agree that her aggregate annual consumptive uses of Colorado River waters, including "all water necessary for the supply of any rights which now exist," shall not exceed 4.4 million acre-feet of (1) the "waters apportioned to the lower basin States by paragraph (a) of article III of the Colorado River compact," plus (2) not more than one half of any "excess or surplus waters unapportioned by said compact." The California Limitation Act, accepting that agreement, repeats the specified words virtually in haec verba.

Article III(a) of the Colorado River compact apportions, from both the main stream and the tributaries of the Colorado River system, 7,500,000 acre-feet of beneficial consumptive use in perpetuity to each basin. The phrase "excess or surplus waters unapportioned" does not appear in the compact, but article III(a) of the compact is the only compact provision which in terms purports to apportion water between the basins. The issue has long been whether the 1 million acre-feet of increase in beneficial uses permitted the lower basin in article III(b) can be construed as an apportionment within the meaning of the limitation's phrase, "excess or surplus waters unapportioned." California has insisted that the waters specified in article III(b) of the compact are "excess or surplus waters unapportioned" and Arizona has insisted that they are "apportioned." This phrase clearly refers to the compact although it is not clear which compact classification is referenced. (See *infra* pp. 72-73, 107, note 9.)

The master rewrites the words of the limitation agreement. He says that the words do not refer to the Colorado River compact (which is irrelevant), nor to any of its provisions, nor to the main stream and the tributaries in the lower basin (Rept. 173):

"Thus I hold that section 4(a) of the Project Act and the California Limitation Act refer only to the water stored in Lake Mead and flowing in the main

stream below Ho deals with the C including the entire

The master holds "7,500,000 acre-feet" the limitation against some source other than the intention and the limitation. But the limitation in the nature were relevant to the limitation into the limitation into that this meaning

The master's position unsupported in the master relies, the construction of those fourth lawsuit over River compact in the limitation was insisted under the California Project Act in the compact. The limitation lower basin quantities reducing the possibility which Congress requires ratify the Colorado law of the river is a must have only one Act by specific in the meanings which the title of the lower basin

The master's patent (1) It permits the related to the compact express definitions, but here decided.

(2) It creates—if it effect at all beyond the between lower basin class which can be imagined feet from which California supply available from compact would dictate basin. The utter impossible adequate to sustain 7.5 million feet, not by diminishing do, but by inflating the

(3) It creates an effect rights are on a basis of priorities in unequal quantities in the rest of the Colorado and priority are preserved against the users on all the two systems of rights together without total compact is possible. The Court

* (Footnote ours.) Because 10 million acre-feet to the losses, including Mexican 2 feet per annum.

Referring to this construction it, I think we should be virtue in patent law: less economies have come to depend

onomy which is sustained by a Water District of Southern California as the special master's (272-276 infra.)

Canyon Project Act, by implication and equitable apportionment in Colorado River as defined in that law (excepting only existing in 1929), although (a) in every part of the Colorado River "main stream" and although (b) to permit senior "main stream junior" "tributary" users at Lake Mead). (Rept.

er law principles which have all interstate water rights determined in 1961, to remit all existing of a water supply left unable.

CALIFORNIA'S RIGHTS

with the event which took place simultaneously with the California Limitation Act, the event that prior to that date on the law of equitable apportionment is also agreement that the California Compact, together with the California Limitation Act, sharply has placed upon that statute within that quantitative Project Act, the Limita-

to limit her uses of Colorado River in response to the Project Act, in response to the first paragraph of the Act. The specified limitation on annual consumptive uses necessary for the supply of any water in the lower basin is 10 million acre-feet of (1) the lower basin in article III (a) of article III than one half of any "excess" water available in the California Limitation Act. The California Compact virtually in haec verba provides for the main stream, 7,500,000 acre-feet of water in the lower basin. The phrase "excess or surplus" in the compact, but article III (a) in terms purports to apportion whether the 1 million acre-feet in the lower basin in article III (b) of the limitation's meaning. California has insisted that the "excess or surplus" water are "apportioned." This is clear which compact classifies (9.)

reement. He says that the compact is irrelevant, nor to the tributaries in the lower

and the California Limitation Act and flowing in the main

stream below Hoover Dam,⁴ despite the fact that article III(a) of the compact deals with the Colorado River system, which is defined in article II(a) as including the entire main stream and the tributaries."

The master holds that the words in the limitation are "shorthand" meaning "7,500,000 acre-feet per annum" (Rept. 173), a figure which does not appear in the limitation agreement, but which the master holds must be derived from some source other than the Colorado River compact. He regards as irrelevant the intention and the understanding of the California Legislature in agreeing to the limitation. But if the intention and understanding of the California Legislature were relevant, California must be conclusively presumed to have accepted the limitation interpreted as the master now interprets it, although he concedes that this meaning contradicts the literal meaning of the offer to California.

The master's proposal, he admits, is a patentable novelty.⁵ It is entirely unsupported in the language of the statute, in the legislative history upon which the master relies, and in 30 years of judicial, administrative, and practical construction of those words. It occurred to no one until after the trial in Arizona's fourth lawsuit over these documents had closed. The reference to the Colorado River compact in the limitation was deliberate, rational, and purposeful. The limitation was insisted upon by the upper basin States to protect their apportionment under the Colorado River compact and required by section 4(a) of the Project Act in the event, and only in the event, that Arizona did not ratify the compact. The limitation, by restricting California's appropriative rights in the lower basin quantitatively, left a margin for exploitation by Arizona, thereby reducing the possibility that Arizona, unrestricted by the Colorado River compact, would invade the upper basin's apportionment. The compact purpose, by which Congress required a limitation only in consequence of Arizona's failure to ratify the Colorado River compact, is defeated unless it is recognized that the law of the river is a seamless web: The words in article III(a) of the compact must have only one meaning, whether read in the compact or read in the Project Act by specific incorporation. The quantitative difference between the two meanings which the master discovers is 2 million acre-feet per annum, the magnitude of the lower basin supply which is consumed on the tributaries.

The master's patentable novelty has these results:

(1) It permits the master to resolve the major issues in a 30-year controversy related to the compact in California's favor, and in accord with the compact's express definitions, but to dismiss the compact as irrelevant to anything to be here decided.

(2) It creates—if the upper basin's compact apportionment is to be given any effect at all beyond the upper basin's present appropriations—a disparity between lower basin claims and supply far more severe than the worst drought which can be imagined. California's 4,400,000 acre-feet and the 3,100,000 acre-feet from which California is excluded must be satisfied, if at all, from the supply available from a newly created "mainstream" alone, and not—as the compact would dictate—from the Colorado and its tributaries in the lower basin. The utter impossibility of finding a permanent supply in the mainstream adequate to sustain 7.5 million acre-feet of claims of the three States, undiminished by their uses on the tributaries, creates a shortage of some 2 million acre-feet, not by diminishing the mainstream supply physically, as a drought would do, but by inflating the claims against that supply.

(3) It creates an entirely new river (the "mainstream"), in which water rights are on a basis of "sovereign parity"—a concept that States have equal priorities in unequal quantities of water—entirely different from water rights in the rest of the Colorado River system, except that equitable apportionment and priority are preserved as the basis and source of every "mainstream" right against the users on all of the tributaries which feed water to that river. How the two systems of rights can conceivably be adjudicated or administered together without total confusion is left unexplained, and we think no explanation is possible. The Court will be left with that problem as soon as a central

⁴ (Footnote ours.) Because of loss to nature's toll and the Mexican Treaty, 7,500,000 acre-feet of consumptive use from the truncated "main stream" requires a flow of about 10 million acre-feet to the lower basin at Lees Ferry. The California projection of net losses, including Mexican Treaty requirements, below Lee Ferry is about 2.5 million acre-feet per annum.

⁵ Referring to this construction, the master conceded: "If we were issuing patents on it, I think we should have to claim novelty" (Tr. 22,762). Novelty is a rewarded virtue in patent law; less can be said for it in construing a statute upon which whole economies have come to depend.

Arizona project diversion from the master's newly christened tributary above Lake Mead is again presented for Federal authorization, or for construction as a non-Federal project. (See pp. 7 supra and infra.)

The master's rewriting the limitation rests on inferences from the Project Act which no one discovered prior to the master's draft report. It rests upon the master's selection of legislative history, but the master fails to disclose the two controlling facts:

(1) No Member of Congress, even by remote inference, suggested that the Project Act created a "mainstream" from Lake Mead to Mexico, with a separate basis for interstate water rights.

(2) Agreement has been universal that the Project Act is controlled by the Colorado River compact in the unlikely event that any inconsistencies between the Project Act and the compact might be discovered.

III. DESTRUCTION OF PRIORITIES BY A CONTRACTUAL ALLOCATION SCHEME

The shortage—or more accurately the disparity between the mainstream supply and the claims against it which have been inflated by exempting the uses on the tributaries from the limitation accounting—is distributed by resort to a "contractual allocation scheme." This is deduced from the contracts which the Secretary has made for storage and delivery of water. The master constructs a proration formula, undiscovered and undiscoverable from the Secretary's regulations or from any of the Secretary's contracts. California is to receive not 4,400,000 acre-feet, but forty-four seventy-fifths of an undetermined and undeterminable quantity. The numerator the master finds in the one figure which appears in the limitation. The denominator is 7,500,000 acre-feet, but not found in the limitation nor (according to the master) can it be taken from the compact. It is derived from his interpretation of a tristate compact which the Project Act authorized the States of Arizona, California, and Nevada to make, but which none ratified. Although the master holds (correctly) that Congress neither imposed this apportionment on the States nor directed the Secretary to follow it, the master concludes that the Secretary's contracts substantially effectuate that nugatory tristate compact. He strikes down as invalid, however, the Secretary's provisions in the Arizona and Nevada contracts which were placed there to make the accounting of these contracts conform to the compact and limitation accounting; the master's argument does not permit him to concede that the Colorado River compact and the limitation accounting are compatible. The result he reaches, derived from this rejected tristate compact, is even more unfavorable to California than that tristate agreement would have been. (See *infra*.)

If the master is wrong in rewriting the limitation to delete the incorporation of the Colorado River compact, he cannot possibly find his "forty-four seventy-fifths" formula.

The converse is not necessarily true. Even if the master could divorce the compact from the limitation and substitute the newly invented "mainstream" for the Colorado River system, it does not follow, except by the discovery of "sovereign parity," that the shortage thus created ought to be prorated at all. We say that, subject to the quantitative limitation on California, shortages should be borne by application of the doctrine of equitable apportionment, including the principles of priority and protection of existing uses; section 8 of the Reclamation Act adopts those principles.

To reach the master's proration result the Court must overrule its holding in *Arizona v. California*, 283 U.S. 423, 464 (1931) (expressly identified as such in the Court's opinion by Mr. Justice Brandeis), that the law of prior appropriation survived the enactment of the Project Act. The Court must override the express language of section 18 and section 14 of the Project Act, and overrule pro tanto two decisions of this Court which have accorded section 8 of the Reclamation Act interstate effect. *Nebraska v. Wyoming*, 325 U.S. 589, 612-616 (1945); see *Wyoming v. Colorado*, 259 U.S. 419, 463-471 (1922). The Court must find that Congress delegated to the Secretary a power to make an interstate allocation of perpetual water rights, although Members of Congress were virtually unanimous in their belief that Congress did not have that power to exercise by statute, much less to delegate to the Secretary of the Interior.

If the master is right that water supply will be abundant, the objective proposed by California presents no hazard to any existing project in any neighboring State, and it presents for a future project only the hazard that must be

recognized and assumed by the State of West. The risk ought not to be cast on the shoulders of going economies, by the application of a "river" discovered 30 years too late.

IV. NONEXISTENCE OF THE MASTER'S

The question of the validity of the limitation is reached only if it is concluded (1) that the Secretary should delete its incorporation of the compact from the Project Act, (2) that the Secretary should delete the "mainstream," and (3) that he should delete the "contractual allocation scheme."

The "contractual allocation scheme" is a fiction. No Secretary of the Interior ever purports to allocate water by contracts themselves contradicting the compact. In his allocation scheme, the master not only rewrites the contracts, but he also rewrites the compact. Thus he expressly reducing the Secretary's contracts to the procrustean bed of the compact, upon by the master to create the compact which recognizes the rights of New Mexico and recognizes "present perfected rights" which must also be written out of the compact. The master's "contractual allocation scheme" is a fiction.

The master assumes California's "contractual allocation" by entering contracts which violate the Colorado River compact which California had ratified.

Moreover, if any Secretary made any contract which violated the compact, it must be construed consistently with the compact's systemwide concept of apportionment. California's 4,400,000 acre-feet per year of uses in the lower basin are 7,500,000 acre-feet of systemwide consumptive uses in excess of 962,000 acre-feet thereof.

In any event, and however the limitation (if any) requires that shortages be prorated in inverse order of priority under the compact and equitable apportionment, thereby giving priority to the compact. No contract purports to provide otherwise.

Very little could have been said in support of the master's elaborate structure had it been proposed in a case where it would have been limited to Members of Congress who were implacable in their opposition to the master's invention which bears the patent date of

V. WATER SUPPLY

The master says that water supply is abundant, but that the bill of complaint claimed and described a shortage. (2) irrelevant, it is possible that the shortage is not anyone. If so, there is no justification for the master's

Much of what the master says about water supply he ascribes to deficiencies in the data available. In fact, the data available in any prior case in which water supply was in question, we believe, is jurisdictional. In any case, a basic and compelling principle of law is that a decree is concealed. However, the master's objective has been to achieve the result presumably intended by the projects was clear: It intended to make the All-American Canal, the Palo Verde

* Rept. 104; Arizona complaint, par. VII.

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recognized and assumed by the sponsors of any new project anywhere in the West. The risk ought not to be cast upon projects which have become the basis of going economies, by the application of novel interpretations of the "law of the river" discovered 30 years too late.

IV. NONEXISTENCE OF THE MASTER'S CONTRACTUAL ALLOCATION SCHEME

The question of the validity of the master's "contractual allocation scheme" is reached only if it is concluded (1) that the limitation must be rewritten to delete its incorporation of the compact, and (2) that Congress validly delegated to the Secretary of the Interior the power to forever allocate water rights in the "mainstream," and (3) that he did so.

The "contractual allocation scheme" founders on the incontrovertible fact that no Secretary of the Interior ever purported to make any such allocation. The contracts themselves contradict the existence of any such allocation. To find his allocation scheme, the master not only rewrites the statutes, but he must also rewrite the contracts. Thus he excises from the contracts the clauses expressly reducing the Secretary's delivery obligations by reason of the contractees' uses above Lake Mead. (Rep. 237-247.) Even these excisions do not fit the contracts to the procrustean bed. The very water delivery contracts relied upon by the master to create the contractual allocation likewise expressly recognize the rights of New Mexico and Utah; the Arizona contract specifically recognizes "present perfected rights"—obviously as of 1944. These provisions must also be written out of the contracts to discover any correlation between the master's "contractual allocation scheme" and the contracts as they were executed.

The master assumes California agencies voluntarily accepted a "Federal allocation" by entering contracts which were even harsher to California than the tristate compact which California had refused to ratify.

Moreover, if any Secretary made any "allocation" to California, that allocation must be construed consistently with the limitation on California incorporating the compact's systemwide concepts. So construed, the Secretary "allocated" to California 4,400,000 acre-feet per annum whenever the systemwide consumptive uses in the lower basin are 7,500,000 acre-feet per annum, and one-half of any systemwide consumptive uses in excess of 7,500,000 acre-feet per annum, up to 962,000 acre-feet thereof.

In any event, and however the limitation is construed, the Secretarial "allocation" (if any) requires that shortages in "Article III(a) waters" shall be borne in inverse order of priority under the principles of priority of appropriation and equitable apportionment, thereby protecting California's existing projects. No contract purports to provide otherwise.

Very little could have been said in 1928, we think, in support of the master's elaborate structure had it been proposed in Congress. Clearly any enthusiasm would have been limited to Members of Congress from Arizona, who were in fact implacable in their opposition to the Project Act. Less can be said for it as an invention which bears the patent date of 1960.

V. WATER SUPPLY AND JUSTICIABILITY

The master says that water supply cannot be determined within a margin of error which, in fact, is larger than the total quantity which Arizona in her bill of complaint claimed and described as unused.⁶ If the master is correct that the Colorado River compact is (1) a ceiling on appropriations, and (2) irrelevant, it is possible that water supply cannot be determined by anyone. If so, there is no justiciable controversy before the Court.

Much of what the master says about the difficulties of determining water supply he ascribes to deficiencies in the science of hydrology and in the hydrologic data available. In fact, the data are better than those available to the Court in any prior case in which water supply was determined. Determination of water supply, we believe, is jurisdictional. Moreover, without such a determination, a basic and compelling fact about the impact of the recommended decree is concealed. However inappropriate Congress language may have been to achieve the result presumably intended, its intent with respect to specific projects was clear: It intended to make it possible to supply, in California, the All-American Canal, the Palo Verde Irrigation District, and the Metro-

⁶ Rept. 104; Arizona complaint, par. VII, p. 21.

politan Water District of Southern California. This intent was recognized, affirmed, and asserted by both friend and foe of the project act. (See *infra*.)

That intent is not frustrated alone by supervening drought. We recognize fully that nature has already impaired the supply on which we relied. But the purpose intended by Congress could not have been achieved, if the master reads it correctly, even if the full supply anticipated were available; the injury to California results from the master's rewriting the applicable law and the water delivery contracts. In so doing, he relieves Arizona from the deductions which her pleadings conceded should be made from the quantities claimed under that State's contract with the Secretary, and awards substantially more water than those pleadings demanded.

The compelling inference from the facts of water supply, if they are developed, is that the master has recommended a decision based on error. It is an error the consequences of which can only be described by the word "disaster."

We ask that the decree of this Court recognize that no limitation has been imposed on California restricting her to use less than 4,400,000 acre-feet per annum of the waters apportioned to the lower basin States by article III (a) of the Colorado River compact from the main stream and the tributaries, plus one-half of the excess or surplus waters unapportioned by that compact. We ask that the appropriate priorities of our existing projects within that 4,400,000 acre-feet be protected, and that our rights in one-half of the excess or surplus be recognized.

CONCLUSION

California does not ask that any water be required to run to the ocean unused. We do not ask to be relieved of any obligation which our State has fairly assumed. We ask a decision that will fully protect the rights and virtually all of the ultimate requirements of all existing projects in Arizona and Nevada competing with California for water from the main Colorado River.

EXHIBIT 6

(ARIZONA)

SUMMARY OF THE ARGUMENT

I. *The Water Dealt With by the Project Act and the Limitation Act*

Neither construction of Hoover Dam nor the vast benefits resulting from its operation, which have been and will continue to be enjoyed by the parties to this action, could have been realized without the authorization of Congress. That authorization was given in the Project Act by Congress in the exercise of its plenary power over navigable waters.

The Project Act did not become effective, however, until certain conditions precedent, explicitly set forth in § 4(a) of the statute itself, had been fulfilled. These conditions were: (A) ratification of the Compact within six months after June 25, 1929, the effective date of the Act, by all seven Colorado River Basin states; (B) failing such seven-state ratification (a) approval of the Compact by six states, including California, and their waiver of the Compact requirement that seven states ratify; (b) enactment by California of the Limitation Act and (c) presidential proclamation of the effectiveness of the Project Act.

Seven-state ratification of the Compact within the prescribed six-month period did not occur. But the alternative conditions laid down by Congress for effectiveness of the Project Act were met in every respect (Rep. 26-27).

In specifying the conditions for effectiveness of the Project Act, Congress required that California should " * * * agree irrevocably and unconditionally with the United States and for the benefit of the States of Arizona, Colorado, Nevada, New Mexico, Utah, and Wyoming, as an express covenant and in consideration of the passage of this Act, that the aggregate annual consumptive use (diversions less returns to the river) of water of and from the Colorado River for use in the State of California, including all uses under contracts made under the provisions of this Act and all water necessary for the supply of any rights which may now exist, shall not exceed four million four hundred thousand acre-feet of the waters apportioned to the lower basin State by paragraph (a) of Article III of the Colorado River compact, plus not more than one-half of

any excess or surplus water un-

to be subject to the terms of said compact. California complied with this which, in terms practically identical, " * * * the State of California irrevocably and unconditionally with the States of Arizona, Colorado, Nevada, New Mexico, Utah, and Wyoming, as an express covenant and in consideration of the passage of this Act, that the aggregate annual consumptive use (diversions less returns to the river) of water of and from the Colorado River for use in the State of California, including all uses under contracts made under the provisions of this Act and all water necessary for the supply of any rights which may now exist, shall not exceed four million four hundred thousand acre-feet of the waters apportioned to the lower basin State by paragraph (a) of Article III of the Colorado River compact, plus not more than one-half of any excess or surplus water un-

The Special Master concluded that the phrase, "waters apportioned to the Lower Basin by Article III of the Colorado River compact," includes only water in the main stream of the Colorado River, and consequently, under the Limitation Act, California is limited to 7.5 million acre-feet. (*Id.* 173 *et seq.*)

In addition, the Special Master concluded that the Compact entitles California to be part of the water dealt with in § 4(a) and to the balance in excess of 7.5 million acre-feet available in each year in Nevada and the balance in excess of 7.5 million acre-feet in Arizona equally (Rep. 174).

Arizona agrees with these conclusions and asks for their adoption by the Court.

The Master reached these results by a study of the project and legislative history of the Project Act. The Compact has utility as a device to determine the supply of main stream water and that the Compact is not a limitation on the water of Lake Mead and from the main stream of the Colorado River in Arizona, California and Nevada.

It makes little difference, therefore, whether the Compact contemplates (A) that the Compact entitles California to be part of the water dealt with in § 4(a) and to the balance in excess of 7.5 million acre-feet available in each year in Nevada and the balance in excess of 7.5 million acre-feet in Arizona equally (Rep. 174).

By referring in § 4(a) to the water of and from the Colorado River for use in the State of California, including all uses under contracts made under the provisions of this Act and all water necessary for the supply of any rights which may now exist, shall not exceed four million four hundred thousand acre-feet of the waters apportioned to the lower basin State by paragraph (a) of Article III of the Colorado River compact, plus not more than one-half of

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to be subject to the terms of said compact. California complied with this which, in terms practically identical, " * * * the State of California irrevocably and unconditionally with the States of Arizona, Colorado, Nevada, New Mexico, Utah, and Wyoming, as an express covenant and in consideration of the passage of this Act, that the aggregate annual consumptive use (diversions less returns to the river) of water of and from the Colorado River for use in the State of California, including all uses under contracts made under the provisions of this Act and all water necessary for the supply of any rights which may now exist, shall not exceed four million four hundred thousand acre-feet of the waters apportioned to the lower basin State by paragraph (a) of Article III of the Colorado River compact, plus not more than one-half of

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any excess or surplus water unapportioned by said compact, such uses always to be subject to the terms of said compact" (Project Act, § 4(a)).

California complied with this condition by enactment of the Limitation Act which, in terms practically identical with those of the Project Act, provided that " * * * the State of California as of the date of such proclamation agrees irrevocably and unconditionally with the United States and for the benefit of the states of Arizona, Colorado, Nevada, New Mexico, Utah, and Wyoming as an express covenant and in consideration of the passage of the said 'Boulder canyon project act' that the aggregate annual consumptive use (diversions less returns to the river) of water of and from the Colorado river for use in the State of California including all uses under contracts made under the provisions of said 'Boulder canyon project act,' and all water necessary for the supply of any rights which may now exist, shall not exceed four million four hundred thousand acre-feet of the waters apportioned to the lower basin states by paragraph 'a' of article three of the said Colorado river compact, plus not more than one-half of any excess or surplus waters unapportioned by said compact, such uses always to be subject to the terms of said compact" (Limitation Act, § 1).

The Special Master concluded that the provisions, general operative scheme and legislative history of the Project Act establish that both § 4(a) of the Project Act and the Limitation Act refer only to water in Lake Mead and flowing in the main stream below Hoover Dam (Rep. 138, 151-52, 173-83). Therefore, he found that the phrase, "waters apportioned to the lower basin States by paragraph (a) of Article III of the Colorado River compact", was intended by Congress to refer only to water in the main stream, and not to water of tributaries. Hence, when Congress thus made reference to the 7.5 million acre-feet per annum apportioned to the Lower Basin by Article III(a) of the Compact, Congress was dealing with main stream water only, *i.e.*, water in Lake Mead and in the main stream below Hoover Dam; and consequently, by virtue of § 4(a) of the Project Act and the Limitation Act, California is limited to 4.4 million acre-feet of that water (Rep. 173 *et seq.*).

In addition, the Special Master concluded that Congress considered the limitation on California to be part of an overall allocation of the entire quantity of water dealt with in § 4(a) among three states only: of the first 7.5 million acre-feet available in each year, 4.4 to California, 2.8 to Arizona and .3 to Nevada and the balance in excess of 7.5 million acre-feet to California and Arizona equally (Rep. 174).

Arizona agrees with these conclusions of the Special Master and urges their adoption by the Court.

The Master reached these results solely on the basis of the terms, purposes and legislative history of the Project Act. He considered, and we agree, that the Compact has utility as a decisive factor in this case only insofar as it serves to determine the supply of main stream water legally available in the Lower Basin and that the Compact is not relevant to the allocation of water from Lake Mead and from the main stream of the river below Hoover Dam among Arizona, California and Nevada (Rep. 138-41).

It makes little difference, therefore, whether the apportionment provisions of Article III(a) of the Compact refer to main stream water only, as Arizona contends (A Exc. 3), or whether those provisions cover both main stream and tributary water, as the Master construes them (Rep. 173). Whatever may be the correct interpretation of Article III(a), considered independently and apart from the Project Act, it is the construction put upon Article III(a) by Congress in enacting the Project Act, which made the Compact effective, and that construction alone, which is controlling.

As the Special Master has found, the evidence is clear that Congress, in enacting § 4(a), intended to provide for the apportionment of main stream water exclusively—not water of tributaries as well (Rep. 173 *et seq.*).

By referring in § 4(a) to provisions of Article III(a) of the Compact, either Congress construed those provisions as dealing with main stream water only, or, if it regarded them as including tributaries, it in effect modified the terms of the Compact referred to by limiting their application to main stream water.

In either event, the effect of § 4(a) and the Limitation Act is to restrict California to the annual consumptive use of 4.4 million acre-feet of water from the main stream of the Colorado River plus one-half the excess or surplus above the first 7.5 million acre-feet of such water available in any one year for use in the Lower Basin.

II. The statutory apportionment

Section 4(a) of the Project Act, in addition to requiring limitations on California's use of main stream water as a condition precedent to its effectiveness, authorized Arizona, California and Nevada to enter into an agreement which should provide, among other things:

"(1) That of the 7,500,000 acre-feet annually apportioned to the lower basin by paragraph (a) of Article III of the Colorado River compact, there shall be apportioned to the State of Nevada 300,000 acre-feet and to the State of Arizona 2,800,000 acre-feet for exclusive beneficial consumptive use in perpetuity, and (2) that the State of Arizona may annually use one-half of the excess or surplus waters unapportioned by the Colorado River compact * * *."

No such interstate compact has been made.

Section 5 of the Project Act, after authorizing the Secretary of the Interior to contract for the storage and delivery of water in Lake Mead, provides:

"Contracts respecting water for irrigation and domestic uses shall be for permanent service and shall conform to paragraph (a) of section 4 of this Act. No person shall have or be entitled to have the use for any purpose of the water stored as aforesaid except by contract made as herein stated."

Section 8(b) authorized Arizona, California and Nevada, or any two of them, to provide by compact for an equitable division of Colorado River water on different terms from those suggested by Congress in § 4(a), subject to congressional approval and consent, but provided that any such compact should be subordinate to the Secretary's water delivery contracts made prior to congressional approval of the compact (Appendix B, p. 20a).

The Special Master has found that by these provisions Congress authorized the Secretary of the Interior to enter into water delivery contracts which, in the absence of an interstate compact, would control the allocation of main stream water among Arizona, California and Nevada (Rep. 99-100, 152-54, 201). But the Master has rejected Arizona's contention that § 4(a) establishes a mandatory formula of water allocation which the Secretary is required "precisely to follow" in his water delivery contracts (Rep. 162-63).

Arizona adheres to her position before the Special Master and urges its adoption by the Court (A Exc. 7, 8). It is Arizona's contention that all contracts made by the Secretary pursuant to the authority granted him by § 5 of the Project Act must conform to the formula for the allocation of water established by § 4(a). The formula of water allocation established by §§ 4(a) and 5 does not leave to the Secretary's discretion the determination of the quantity of water to be delivered within each state pursuant to contract. The statute fixed a formula for the apportionment of water stored in Lake Mead among the states of Arizona, California and Nevada and this formula is mandatory upon the Secretary and controls his water delivery contracts.

As a corollary, it follows that Arizona's existing water delivery contract, insofar as it does not conform to the formula established by the Project Act, is beyond the contractual competence of the contracting parties, exceeds the authority of the Secretary and is without legal effect (A Exc. 7).

Furthermore, the provisions of Article 7(b), (d), (f) and (g) of Arizona's water delivery contract are invalid because they are contrary to the provision of § 5 of the Project Act, which requires that "contracts respecting water for irrigation and domestic uses shall be for permanent service," and because they introduce tributary considerations into a main stream apportionment (A Exc. 8).

III. Appropriative and "Perfected Rights"

The Project and Limitation Acts and the Secretary's water delivery contracts made pursuant thereto complete the "statutory apportionment" among Arizona, California, and Nevada of main stream water in Lake Mead and downstream from Lake Mead (Rep. 100, 138, 152). Arizona agrees with the Special Master's holding that "this case involves a statutory, not an equitable, apportionment" of water (Rep. 100) and that "the doctrine of equitable apportionment, and the law of appropriation are * * * irrelevant to the allocation of such water among the three states." (Rep. 138; see Rep. 152).

Congress, by virtue of the structures erected under authority of the Project Act, has impounded substantially all the water of the main stream of the Colorado River (Rep. 153). Congress has done this in the exercise of its dominion and plenary power over navigable waters of the United States.

Assuming that appropriative rights in the use of the water of the Colorado River had vested before the Project Act, the enactment of the statute divested

them in the absence of a compact preserved.

The Special Master has found (18a-19a) was intended to protect the Lower Basin by the Compact (A Exc. 3).

Arizona disagrees (A Exc. 3). The Special Master's perfected rights in pursuance of the Compact was intended to comply with the Compact (A Exc. 3). The Upper Basin from claims of water in the Lower Basin against the Compact (A Exc. 3). Article VIII provides for satisfaction and makes no provision for satisfaction in § 6 of the Project Act to meet for the protection of the Upper Basin.

Assuming, however, that the Compact agrees with his conclusion that the rights acquired in compliance with the Compact such rights represent actual delivery of water applied to defined areas (Rep. 308).

Further, it is Arizona's position that only those rights which were reserved in the Compact was signed, and not as of the date it was signed. Arizona asserts that the Compact rather than as of the date it was signed.

II. Claims of the United States

The Master has found that the United States has a claim to the water of the tributaries in the Lake Mead (Rep. 321-24).

Arizona agrees with the Special Master's holding that the Compact between Arizona and New Mexico with respect to the Gila River between these two states. The Master's resolution of the Compact with respect to the reservation of water (Rep. 332-35) (A Exc. 29-30).

Gila National Forest.—The Gila National Forest was created as a public reservation in 1899, and was subsequently enlarged.

The Master also found that the Gila National Forest was created from entry, to reserve the land which the forest was created (Rep. 10-28). The United States has the right to reserve the Gila National Forest in quantities reasonably necessary for the Gila National Forest, with priority date of the forest (Rep. 10-28).

SUMMARY

Arizona has filed exceptions to the Special Master's Recommended Decree which divests the water of the Colorado River of the United States and other federal establishments (Rep. 10-28).

Relying basically on a single exception to the reservation of water of a nonnavigable stream created by treaty in the Territory of Arizona, the federal government has the right to reserve the nonnavigable streams for the benefit of the United States.

¹ Unless otherwise indicated, italics are for emphasis.

² *Winters v. United States*, 207 U.S. 568.

requiring limitations on California to its effectiveness, authority to an agreement which should

apportioned to the lower basin River compact, there shall be met also to the State of Arizona for its beneficial use in perpetuity, and (2) one-half of the excess or surplus water ***."

the Secretary of the Interior in Lake Mead, provides: "and domestic uses shall be for (a) of section 4 of this Act. for any purpose of the water herein stated."

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provisions Congress authorized delivery contracts which, in control the allocation of main (Rep. 99-100, 152-54, 201). tion that § 4(a) establishes a the Secretary is required "pre-Rep. 162-63).

Special Master and urges its adoption's contention that all contracts granted him by § 5 of the allocation of water established by §§ 4(a) and 5 does determination of the quantity of water to contract. The statute stored in Lake Mead among the his formula is mandatory upon contracts.

existing water delivery contract, established by the Project Act, is acting parties, exceeds the subject (Exc. 7).

(d), (f) and (g) of Arizona's are contrary to the provision "contracts respecting water for rent service," and because they stream apportionment (A Exc. 8).

Secretary's water delivery contracts apportionment" among Arizona, in Lake Mead and downstream agrees with the Special Master's an equitable, apportionment" of able apportionment, and the law cation of such water among the

under authority of the Project of the main stream of the Colorado in the exercise of its dominion nited States.

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them in the absence of a congressional intention that they be recognized and preserved.

The Special Master has found that § 6 of the Project Act (Appendix B, pp. 18a-19a) was intended to protect water rights in the main stream of the Colorado River within the Lower Basin states "perfected" as of June 25, 1929 (the effective date of the Act), against possible shortages in the water apportioned to the Lower Basin by the Compact (Rep. 234, 308-13).

Arizona disagrees (A Exc. 5, 6). The clause in § 6—"satisfaction of present perfected rights in pursuance of Article VIII of said Colorado River compact"—was intended to comply with the provisions of Article VIII, which discharged the Upper Basin from claims of "rights, if any, by appropriators or users of water in the Lower Basin against appropriators or users of water in the Upper Basin", after storage capacity of 5,000,000 acre-feet had been provided in the main Colorado River within or for the benefit of the Lower Basin. In short, Article VIII provides for satisfaction of perfected rights only basin versus basin and makes no provision for satisfaction of intrabasin rights. Congress intended in § 6 of the Project Act to meet the requirements of Article VIII of the Compact for the protection of the Upper Basin, and nothing more.

Assuming, however, that the Master's construction of § 6 is correct, Arizona agrees with his conclusion that the protection there provided covers only rights acquired in compliance with state law and is effective only to the extent that such rights represent actual diversions and beneficial use of specific quantities of water applied to defined areas of land or to particular domestic or industrial uses (Rep. 308).

Further, it is Arizona's position that the term "present perfected rights" refers only to those rights which were perfected as of November 24, 1922, the date the Compact was signed, and not as of June 25, 1929, the effective date of the Project Act. Arizona asserts that the Compact speaks as of the date it was signed rather than as of the date it was confirmed and approved (A Exc. 6).

II. Claims of the United States to Tributary Water

The Master has found that there is no justiciable controversy with respect to any of the tributaries in the Lower Basin except the Gila River System (Rep. 321-24).

Arizona agrees with the Special Master's disposition of the dispute between Arizona and New Mexico with respect to the allocation of the waters of the Gila River between these two states. Arizona disagrees, however, with the Master's resolution of the controversy between it and the United States with respect to the reservation of water for use in the Gila National Forest (Rep. 332-35) (A Exc. 29-30).

Gila National Forest.—The Master found that the Gila National Forest was created as a public reservation by a presidential proclamation dated March 2, 1899, and was subsequently enlarged and modified (Rep. 342).

The Master also found that the United States intended, when it withdrew this forest from entry, to reserve the water necessary to fulfill the purposes for which the forest was created (Rep. 342). Accordingly, he has concluded that the United States has the right to divert water from the Gila and San Francisco Rivers in quantities reasonably necessary to fulfill the purposes of the Gila National Forest, with priority dates as of the date of withdrawal for forest purposes of each area of the forest within which the water is used (Rep. 343).

SUMMARY OF THE ARGUMENT

Arizona has filed exceptions to those parts of the Special Master's Report and Recommended Decree which sustained certain claims of the United States to main stream water of the Colorado River for use on Indian Reservations and other federal establishments created out of public land in Arizona (A Exc. 10-28).

Relying basically on a single decision of this Court,¹ which involved the reservation of water of a nonnavigable stream for use on an Indian Reservation created by treaty in the Territory of Montana, the Master has concluded that the federal government has the power to reserve water of both navigable and nonnavigable streams for the benefit of all federal establishments, regardless of

¹ Unless otherwise indicated, italics appearing in quotations in this brief have been added for emphasis.

² *Winters v. United States*, 207 U.S. 564 (1908).

whether the reservation is made by treaty, statute or executive order. He also fails to recognize any distinction between the power of the United States to dispose of navigable water within a territory and its power to dispose of navigable water within a state.

In upholding claims of the United States on behalf of Indian tribes, the Special Master has conceived and applied the principle that the very establishment of an Indian Reservation impliedly reserves in perpetuity for use on the Reservation whatever quantity of water may be required in the indefinite future to irrigate every irrigable acre within the Reservation, without regard to the actual needs of the Indians on the Reservation. The resulting water rights are held to be of fixed magnitude and priority and appurtenant to defined lands, so that their use is not restricted to Indians but may be transferred to non-Indians (Rep. 254-66).

The questions regarding water rights of the United States for use in the Lake Mead National Recreation Area and in the Lake Havasu and Imperial Wildlife Refuges are similarly dealt with by application of the same principles invoked in the Special Master's treatment of Indian Reservations (Rep. 297-300).

The Master's Report does not examine into the source of the federal power to reserve water of a navigable stream for use on federal establishments. Rather the Master states that "it is unnecessary, for the purposes of this case, to explore the origin or limits of such power to reserve water against subsequent appropriators" (Rep. 259).³

The Special Master fails to recognize the distinction between the legal principles applicable to navigable waters and those which govern nonnavigable streams. He fails to give effect to the well-established rule that, when a state is admitted to the Union, dominion over its navigable water passes from the United States to the newly created state. Thereafter the federal government is without power to reserve the water of a navigable stream for use on federal establishments,⁴ since its only authority over such water is that which is vested in it by the Commerce Clause and the treatymaking provisions of the Constitution.

Prior to statehood, the right of the United States in navigable water of a territory, unlike its title to territorial land, is not absolute but the right is held for the benefit of the people and in trust for the future state.

The power of the United States to reserve navigable water of a territory prior to statehood for use on federal establishments resides exclusively in Congress under the so-called "Public Property Clause" of the Constitution (art. IV, § 3, cl. 2), which provides that "the Congress shall have the power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States". No authority exists in the Executive Department of the federal government to dispose of navigable waters for federal purposes by executive order or otherwise in the absence of a definite and explicit delegation from Congress.

In any event, wherever the power to reserve these rights may be held to reside, it must be exercised in a manner clearly manifesting the intent to make a reservation of water. An inference that such rights were reserved in *navigable water* may not be drawn simply from the fact that an Indian Reservation is created in a generally arid region adjacent or proximate to a navigable stream.

The Colorado River Indian Reservation was created by Act of Congress and enlarged by executive orders. The Fort Mohave and Cocopah Indian Reservations were created and the former was enlarged by executive orders. None of these instruments can be construed to contain an express manifestation of intent to reserve water of the Colorado River for the benefit of the Indians or Indian lands. In fact, they contain no mention of water at all. Had the Master considered these documents in the light of the applicable legal principles, he would have found no such manifestation of intent as is required to reserve navigable water and would therefore have been obliged to conclude, contrary to his Report, that there had been no reservation of water.

Finally, even should it be held that water from the Colorado River was reserved by implication for the benefit of these Indian Reservations, the quan-

³ In fairness and candor we should advise the Court that neither the briefs nor oral arguments of the parties before the Special Master presented these considerations to him in any substantial degree.

⁴ All Federal establishments on the mainstream of the Colorado River in Arizona, except the Colorado River and Fort Mohave Indian Reservations, were created after Arizona became a state.

tity of water of the Indian of the potential use of water in various instances, un-

The Special Master's Report on the Colorado River Reservation in Nevada and Fort Mohave Reservation in Arizona is a gross injustice to the Colorado River zone's share of the water. No jurisdiction has been a reservation as to what passes between the states on behalf of other Colorado River states.

We suggest to employ private law between states, Indian tribes and the laws of the Reservations. Federal government principles should be applied on behalf against state.

The Special Master's finding of title (Rep. 342), but he finds that the States intended to reserve the forest in San Francisco (Rep. 342) and divert water from the forest in quantities reasonable as of the forest within water rights in the Colorado River subordinate to the National Forest to the State of Arizona. Although the Special Master that the Gila National Forest in this litigation, the intent to reserve water intended the act by the laws of the

Since Nevada and Colorado River, to be adequately reserved to the sovereign States, rights are concerned with water claims that deprive Nevada of

While the total States, Nevada's unique in that it

statute or executive order. He has the power of the United States Territory and its power to dispose of

on behalf of Indian tribes, the principle that the very establishment in perpetuity for use on the may be required in the indefinite of the Reservation, without regard to the Reservation. The resulting water priority and appurtenant to defined Indians but may be transferred to

United States for use in the Lake like Hualapai and Imperial Wildlife of the same principles invoked in Reservations (Rep. 297-300).

the source of the federal power on federal establishments. Rather than the purposes of this case, to explore water against subsequent appro-

distinction between the legal principle which govern nonnavigable established rule that, when a state navigable water passes from the thereafter the federal government is navigable stream for use on federal for such water is that which is in treaty-making provisions of the

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these rights may be held to reside, vesting the intent to make a reservation were reserved in navigable that an Indian Reservation is proximate to a navigable stream. created by Act of Congress and Cocopah Indian Reservations by executive orders. None of express manifestation of intent benefit of the Indians or Indian water at all. Had the Master applicable legal principles, he that as is required to reserve navigable to conclude, contrary to water.

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tity of water reserved should be measured by the reasonably foreseeable needs of the Indians as shown by past experience rather than by the possible needs of the potentially irrigable acres. The holding of the Master permits the maximum use of water and leads to results which are inequitable and indeed, in some instances, unrealistic.

The Special Master has held that uses of water from the main stream of the Colorado River on federal establishments are chargeable to the entitlement of the state in which the use occurs (Rep. 247). Thus uses on the Colorado River, Fort Mohave and Cocopah Indian Reservations in Arizona are charge to Arizona's share of main stream Colorado River water, even though that state has no jurisdiction or control over such uses. Therefore, whether or not there has been a reservation of water for federal establishments, the question is presented as to what principles should be applied by this Court in order to determine, as between the United States on behalf of these Reservations and Arizona on behalf of other users within the state, rights to the use of Arizona's share of Colorado River water.

We suggest that the same general considerations which have led the Court to employ principles of equitable apportionment in the allocation of water between states, absent a statutory apportionment, are applicable here. While Indian tribes today do not have the status of a true sovereign, nevertheless the laws of the state are generally without force within the boundaries of Indian Reservations within the state. In addition, since Indians are wards of the federal government, a true sovereign, it is peculiarly appropriate that equitable principles should be applied in weighing the claims of the United States on their behalf against those of the State of Arizona on behalf of other users within the state.

The Special Master has found that there is not sufficient evidence to make a finding of the ultimate water requirements of the Gila National Forest (Rep. 342), but he finds that in withdrawing lands for the use of the forest the United States intended to reserve rights to the use of so much water from the Gila and San Francisco Rivers as might be reasonably needed to fulfill the purposes of the forest (Rep. 342). He concludes that the United States has the right to divert water from the main stream of the Gila and San Francisco Rivers in quantities reasonably necessary to fulfill the purposes of the forest, with priority dates as of the date of withdrawal for forest purposes of each area of the forest within which the water is used (Rep. 343). He also states that private rights in the Gila River System recognized by the Recommended Decree are subordinate to the rights of the United States to divert water for the Gila National Forest to the extent that the private rights are junior in time (Rep. 335).

Although Arizona is not in agreement with the conclusion of the Special Master that the United States possesses the power to reserve water for use in the Gila National Forest, it is not necessary that that question be resolved in this litigation, since congressional legislation demonstrates that there was no intent to reserve water for national forests, but to the contrary that Congress intended the acquisition of rights to water for national forests to be governed by the laws of the State in which the forests are located.

EXHIBIT 7

(NEVADA)

SUMMARY OF ARGUMENT

I

Since Nevada is one of the three sovereign States in the Lower Basin of the Colorado River, she believed that it was necessary, if her rights therein were to be adequately protected, to intervene in this action. As one of these three sovereign States, Nevada stands on a par so far as the quality of her legal rights are concerned with the other two States of the Lower Basin. The quantities of water claimed by the complainant and defendants, if fully allowed, would deprive Nevada of her equitable share.

While the total of Nevada's claim is smaller than that of the other two States, Nevada's need for this claimed water is far more urgent. For she is unique in that the portion of her area lying within the drainage area of the

Colorado River, has no other source of water. On the other hand, each of the other States has alternative sources.

As is true in all lengthy hearings, we find in this case, and especially after the Special Master's Report, that the issues have greatly sharpened. The basic one now is as to the proper one theory for allocating the mainstream water among the three Lower Basin States. It is Nevada's position that, as a sovereign State, she has a basic minimum right which entitles her to at least the amount of water awarded in the Special Master's Report, under whatever legal theory may be used.

While the Report awards Nevada a smaller amount of water than her proof indicates that she would be entitled to, Nevada has not excepted to this because it seems equitable under all the circumstances. Nevada has filed exceptions to some of the more or less ancillary or subsidiary conclusions of the Special Master. In not excepting to the basic award, Nevada emphatically asserts that she is not waiving the right to urge an allocation to her in at least the amount now recommended if the Court should determine that this case should be decided on any other or different theory than that followed by the Special Master.

II

The 300,000 acre-feet of the Colorado River mainstream water allocated to Nevada by the Special Master's Report is the bare minimum which will be required for existing and future uses. In fact, it will not be sufficient to provide for her growth and development as far in the future as the year 2000. It is conservatively estimated that by that time, Southern Nevada will require a beneficial consumptive use of 431,600 acre-feet of water from Lake Mead, more than 35 percent of the amount allotted by the Special Master.

The portion of the affected region included within Clark County, which area encompasses the City of Las Vegas, the principal metropolitan center, has had a fantastic growth. With a population of only 3,031 in 1910, Clark County jumped to 16,414 in 1940, and then an explosive increase to 115,000 in 1956, and to 127,016 in 1960. The rate of population growth in Nevada in the last seven years is greater than that of any other State. Clark County has shown a greater rate of increase than Nevada, Arizona, New Mexico or California; having increased almost 35 times since 1910. Compared with areas of similar climate, such as Los Angeles, Phoenix and Albuquerque, it has shown a greater growth. It is a sound and reasonable forecast that this population will increase to at least 600,000 people by the year 2000.

There are present in the area all of the factors making for sound growth. Large industrial developments, which are the outgrowth of great plants built by the United States during World War II, are located in that area, and are continuing to expand. These industries derive adequate water supplies from Lake Mead and low-cost electric power from the Hoover Dam installation. There is available for future industrial growth these factors of adequate water supply, low cost electric power, natural gas, and an attractive climate which reduces construction costs. The area is well supplied with all types of transportation, both railroad, air and adequate highways. There is ample room for attractive homesite tracts which fit into the currently popular trend toward desert living. With both nearby mountains and the large man-made lakes on the Colorado River, the area is supreme in its recreational and entertainment facilities, and attracts thousands of tourists annually.

As a result of all these factors, it is very evident that by the year 2000, the net consumptive use requirements from Lake Mead (diversions less return flows) for the affected Nevada area will be:

	Acre-feet
Domestic uses.....	305,700
Industrial uses.....	97,000
Irrigation uses.....	28,900
Total.....	431,600

Nevada is unique in not having any available source of water other than mainstream Colorado River water. On the other hand, both the States of Arizona and California are cooperating with the United States in the current rapidly progressing development of methods of converting salt or brackish waters into water of usable quality at a low economic cost. Arizona has large

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amounts of this type of water which will be capable of reconversion, as does also California, including limitless quantities of available sea water. Also, California has a great surplus of water in the northern part of the State, the transportation of which to the southern part of the State has been authorized by its Legislature, approved by the voters of the State and the initial steps of which are now in progress.

All of the foregoing, in Nevada's opinion, are factors to be taken into account in allocating the waters of the mainstream among the three affected sovereign States. To Nevada, this water is indispensable.

III

The Special Master found the Project Act and the Limitation Act to be the sole controlling statutes in allocating mainstream Colorado River water among the three States. It is Nevada's position that the Compact, the Project Act, the Limitation Act, and the general Reclamation Law⁵ must all be considered together as an integrated and interwoven body of law. Together they comprise a single "bundle" or "package" from which the rights of the parties in this action must be determined.

By Articles III(a) and III(b) of the Compact, there was an apportionment of beneficial consumptive use of water of the entire Colorado River System in the amount of 7,500,000 acre feet to the Upper Basin and 8,500,000 acre feet to the Lower Basin. By Article III(d) of the Compact, the Lower Basin must, in every 10-year period, permit 75,000,000 acre feet to pass Lee Ferry and into the Lower Basin. The Compact additionally makes provision for supplying the water granted to Mexico by the Mexican Treaty.

It does not allocate specific amounts of water to the separate Lower Basin States, either in exact quantities or percentages of flow or in any manner, and it is inevitably true that in the Lower Colorado River Basin, which is in the midst of one of the greatest population explosions in history, that there must be an allocation of mainstream water among the three Lower Basin States.

In the Project Act, Congress provided as a condition precedent for it becoming effective (in the event all seven States did not ratify the Compact—and they did not), that California should by appropriate legislation limit its demands for water from the Colorado River.

For very real and cogent reasons, California promptly passed the Limitation Act, limiting her right to use of Colorado River water to 4,400,000 acre-feet of the total Compact apportionment of the 7,500,000 acre-feet made by Article III(a) of that document, and one-half of any excess or surplus.

The Special Master has defined the additional 1,000,000 acre-feet of water apportioned to the Lower Basin by Article III(b) of the Compact as excess or surplus water. In Nevada's opinion, there is much reason to believe that this so-called III(b) water is not excess or surplus, but water apportioned by the Compact. In any event, the allocation to California recommended in the Special Master's Report is generous to California's claim and that State is in no position to complain. By reason of her Limitation Act, she cannot claim more water than as awarded in the Special Master's Report.

The Special Master interprets Section 4(a) of the Project Act as being a precise, definite and conclusive direction by the Congress to the Secretary of the Interior to allocate the mainstream water among the three States by contracts. He holds that the contracts which have been made by the Secretary with Nevada awarding her 200,000 acre-feet of water; with the State of Arizona, awarding her 2,800,000 acre-feet of water; and with California awarding her 4,400,000 acre-feet of water all out of the first 7,500,000 acre-feet available in the mainstream, are dictated by and are in accordance with this statutory allocation.

There is no question that the United States had the right to construct and operate Hoover Dam and to create the resulting storage behind it for irrigation purposes, either under the General Welfare Clause of the Constitution (Art. I, Sec. 8), *United States v. Gerlach Livestock Co.*, 339 U.S. 725, 738 (1950) or, conceding the navigability of the Colorado River, under the Commerce Clause (Art. I, Sec. 8). *United States v. Twin City Power Co.*, 350 U.S. 222 (1955);

⁵ Act of Congress approved June 17, 1902 (32 Stat. 388, 43 U.S.C. 1311), and acts amendatory thereof or supplementary thereto.

United States v. Chandler Dunbar Co., 229 U.S. 53 (1912); *United States v. Appalachian Power Co.*, 311 U.S. 377, 426 (1940), and to control and dispose of such stored waters. *Ivanhoe Irrigation District v. McCracken*, 357 U.S. 275, 295 (1958).

It follows that with the construction of Hoover Dam in the Colorado River and the resultant complete control of all the water reaching the impoundment of Lake Mead, that the United States would be in control of the waters of that stream and that the waters thereafter used would be such stored waters.

Regardless of the specific language of Section 5 of the Project Act requiring the Secretary of the Interior to make contracts for the delivery of stored water, the Secretary had the basic right and obligation under the general Reclamation Law, to make contracts for the delivery of stored water. Obviously such contracts would be necessary to avoid utter chaos.

There was nothing in any existing law which provided that such contracts should be limited only to projects then in being. On the other hand, the underlying basic rights of the sovereign States would indicate the necessity of protecting the rights of the more slowly developing uses in Arizona and in Nevada against the then great uses being insisted upon by California, which had progressed more rapidly in her development. There was no abuse of discretion on the part of the Secretary in making the contracts as he did.

By the time this action had been commenced, the Federal Government by a series of dams financed, constructed and operated by it, had taken physical control of the Colorado River from Lake Mead to the Mexican border, and of all waters stored in or flowing through that stretch of the river. By reason of this legal and factual situation, it is perfectly proper at this time to find that the contracts made by the Secretary are valid. In the case of the State of Nevada, its contract for 300,000 acre feet of consumptive use of mainstream water is a valid, binding and controlling document; with the single exception that Article 5(a), which purports to diminish this total amount by Nevada's upstream tributary uses is, as the Special Master finds, invalid. This paragraph was wrongfully inserted in the contract, is contrary to the terms of the Project Act, and is *ultra vires*.

The Secretary's contracts, when interpreted in the light of the Compact, the Project Act, the Limitation Act and the general Reclamation Law, allocate the mainstream waters among the three States in the precise amounts which the legislative history of the Project Act clearly shows that the Senators from the affected States believed were being allocated to those States.

The basic allocation of mainstream water evidenced by these contracts should be upheld, whatever interpretation is made of the literal language of the Project Act.

IV

The division of mainstream water proposed in the Special Master's decree is a fair and just allocation. It can be upheld under either the theory of statutory allocation adopted by the Special Master, or that of a judicial equitable apportionment of these waters.

During the hearing, the United States and Arizona relied on a contract allocation authorized by the Project Act, a theory substantially similar to that followed by the Special Master. California has always urged what she describes as an equitable apportionment theory, but in reality, restricts it to a mere judicial confirmation of existing rights. While Nevada asked for a true judicial equitable apportionment which would give effect to her future needs.

Nevada is willing to accept allocation of mainstream water as made by the Special Master, even though it is less than the total amount revealed by her evidence as being needed by the year 2000. In her opinion, the award to her of the 300,000 acre-feet of consumptive use, in accordance with her contract with the United States can be sustained on any one of several theories. It can be sustained under the theory of statutory allocation adopted by the Special Master. If we were to assume that there were no Project Act and that Hoover Dam had been built under the general Reclamation Law, and that the Secretary had made a similar contract, that contract could, in that situation have been upheld in an action such as this. Or, if we consider this action as one for a judicial equitable apportionment, it is proper to use the contracts made by the Secretary, such as that with Nevada, as a yardstick, and as evidence of a water right which could and should be sustained in any such decree.

The voluminous record dividing this urgently Master stated that he of the Project Act in judicial authority in of 7,500,000 acre feet of the allotments to the share. And he further provisions for protecting of extreme drouth. Ne decree are logical and pr

Nevada has filed onl Recommended Decree, al Exception Number I r it clear that in Nevada Colorado River Commis contracts between the S Special Master points of different from that of Ar Commission is an active of water diverted from actual uses are, and will be a multitude of users an and confusion.

Exception Number II r be amended to provide th supply so-called "present when the allocations of s in the alternative, Nevada acre-feet) be fixed below make contributions to oth Nevada will be domestic u of life and the continuati be temporarily suspended large quantity of perfect other two States, each of the major portion of thei be reduced or even suspen rights is very vital to her water would have minimal

Exception Number III r power to supervise the ope to control the delivery of t that these duties be impos that it is more just and e subject to the control of th many capacities and there proprietary water demands water users. The Special Secretary the owner, the a Colorado River water. This

Exception Number IV r is given the management a to promulgate Rules and R and plan that will be follow cations and scheduling deliv as this, the various water w would be an invitation to a all parties knowing in advan is to be operated, the possibl vanced planning could be had

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Hoover Dam in the Colorado River project. The water reaching the impoundment is in control of the waters of that project. It could be such stored waters. Section 5 of the Project Act requiring the delivery of stored water, is under the general Reclamation Act. Obviously such con-

tract provided that such contracts be on the other hand, the under-lying uses in Arizona and in Nevada by California, which had pro-vided no abuse of discretion on the part of the Federal Government by a contract by it, had taken physical control to the Mexican border, and of all of the river. By reason of this contract at this time to find that the case of the State of Nevada, the use of mainstream water is a single exception that Article amount by Nevada's upstream contract, is invalid. This paragraph was to the terms of the Project Act,

in the light of the Compact, the Reclamation Law, allocate the precise amounts which the contract shows that the Senators from the those States. The contract should be in the literal language of the Proj-

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water as made by the total amount revealed by her opinion, the award to her in accordance with her contract one of several theories. It can be adopted by the Special Master under the Project Act and that Hoover Dam Law, and that the Secretary of the Interior, in that situation have been considered this action as one for a use of the contracts made by the contract, and as evidence of a contract in any such decree.

The voluminous record in this case justifies the use of the judicial power in dividing this urgently needed water among the three States. While the Special Master stated that he followed the statutory allocation made by Section 4(a) of the Project Act in his basic division, he definitely recommends the use of judicial authority in providing that in years when there is less than a total of 7,500,000 acre feet of mainstream water available for consumptive use, that the allotments to the States should be reduced so that they take on a pro rata share. And he further recommends the use of judicial authority in his provisions for protecting prior perfected rights, regardless of state lines, in years of extreme drouth. Nevada believes all of these basic features of the proposed decree are logical and proper.

V

Nevada has filed only four exceptions to the Special Master's Report and Recommended Decree, all of which are more or less of a perfecting nature.

Exception Number I requests apt language in the final decree herein to make it clear that in Nevada, the basic contract with the State acting through the Colorado River Commission of Nevada is sufficient and that additional sub-contracts between the Secretary and the actual users are not necessary. The Special Master points out in his Report (page 210) that the Nevada contract, different from that of Arizona, does not require such sub-contracts. The Nevada Commission is an active operating body controlling the diversion and delivery of water diverted from Lake Mead and making the payments therefor. The actual uses are, and will be, domestic and industrial in the main. There will be a multitude of users and to attempt sub-contracts for all would result in chaos and confusion.

Exception Number II requests that the provisions of the recommended decree be amended to provide that no part of Nevada's allocation of water be used to supply so-called "present perfected rights" in Arizona and California in years when the allocations of such States are not sufficient to supply such rights, or in the alternative, Nevada asks that a minimum figure (she suggests 250,000 acre-feet) be fixed below which Nevada's allocations should not be reduced to make contributions to others. This is necessary because the principal uses in Nevada will be domestic uses and industrial uses in the nature of the sustenance of life and the continuation of business. They are not of the nature that can be temporarily suspended in years of short supply. Nor does Nevada have any large quantity of perfected rights on the mainstream. On the other hand, the other two States, each of whom have large quantities of perfected rights, use the major portion of their water for irrigation use, a type of use which can be reduced or even suspended in short water years. A minimum on Nevada's rights is very vital to her and because of her small share of the mainstream water would have minimal detrimental effect on the other two States.

Exception Number III requests that the Court appoint a Commissioner with power to supervise the operation of the Colorado River in the Lower Basin and to control the delivery of the waters thereof. The Special Master recommends that these duties be imposed on the Secretary of the Interior. Nevada believes that it is more just and equitable to have such an independent Commissioner, subject to the control of this Court. The Secretary of the Interior operates in many capacities and there is much chance of a conflict of interest between the proprietary water demands of many of the agencies under him and those of other water users. The Special Master's suggestion, in effect, would constitute the Secretary the owner, the attorney, the judge and the jury with respect to the Colorado River water. This would not seem to be a desirable situation.

Exception Number IV requests that the decree provide that whatever official is given the management and control of the lower Colorado River be required to promulgate Rules and Regulations setting forth in detail the manner, method and plan that will be followed in operating the river in determining annual allocations and scheduling deliveries. Absent a set of Rules and Regulations such as this, the various water users would be left in constant uncertainty and there would be an invitation to unnecessary controversy. On the other hand, with all parties knowing in advance the Rules and Regulations under which the river is to be operated, the possibility of friction would be removed and intelligent advanced planning could be had by the various water using agencies.

SAN JUAN-CHAMA RECLAMATION PROJECT

EXHIBIT 8

(UNITED STATES)

SUMMARY OF ARGUMENT

A. Our first two exceptions, which are here treated together, concern the question of whether Arizona and Nevada are to be charged with consumptive use of water upstream from Lake Mead, or whether their full allocations may be taken from Lake Mead and from the mainstream below without regard to the extent that they may have lessened the amount of water flowing into Lake Mead. It is the position of the United States that the authority of the Secretary of the Interior under Section 5 of the Boulder Canyon Project Act to contract for the storage and delivery of water includes the authority to make appropriate adjustments for upstream use. The Special Master rejected this position, holding that the only power of physical control, and therefore the only authority to contract, existed with respect to the water in Lake Mead and the mainstream below Lake Mead.

The provisions of the Boulder Canyon Project Act, when read in the light of its history, indicate an intent to authorize the Secretary of the Interior to divide the mainstream waters available in the Lower Basin. Hoover Dam was constructed to impound and regulate those waters. This purpose would be impaired by permitting Arizona and Nevada to make diversions upstream without a corresponding reduction in their entitlements to stored water.

The Special Master's rejection of this proposition rests in part on a theory that to make adjustments for upstream uses would impair the permanency of the Secretary's contracts in violation of the Project Act and also in violation of State law. But, as the United States understands the effect of making such deductions for upstream use, existing contract rights would not be curtailed. Either the upstream uses would be subject to prior contract, or, if they are prior, would result in authority to the Secretary to limit the quantity of water to be allocated by contract to less than the full amount. In either event, no existing contracts would lose their required permanency.

We believe that this interpretation gives added certainty to the allocations under the Project Act and would give some protection to California's established projects.

B. Our third exception relates to the extent that Congress has subjected the authority of the Secretary of the Interior under the Boulder Canyon Project Act to State law. Although the Special Master refused to pass upon the legality of rights of the United States to make deliveries under contracts it has made, he did include in his findings a statement that rights under those contracts would be subject to internal State law. This position is also reflected in his recommended decree. We urge that these conclusions should be disapproved.

As we read the Project Act, the Secretary is given full authority to build a dam, store mainstream water, and deliver it to users under contracts to be executed by him. We believe that this affirmative authority is not limited by a requirement that he comply with State law. This is in accord with general principles under which the United States may perform its functions without regulation by the States. It is also in accord with decisions of this Court with respect to the authority granted the federal government in comparable statutes dealing with the use of water where it has been held that control of the operation of these federal projects shall rest entirely in the Secretary. And it is in accord with 59 years of administrative practice under the reclamation laws.

The countervailing argument is that by Section 18 of the Project Act Congress subjected the authority of the Secretary to State law. Both the legislative history of this section and the interpretation of comparable provisions of the Reclamation Act and the Federal Power Act indicate that Section 18 does not mean what the Special Master believed.

C. Our fourth exception takes issue with a single sentence in the Special Master's report in which he held that the Nevada contract, unlike the Arizona contract, contemplated that the State should subdivide the allocation among users. Our position is that Section 5 of the Project Act requires that deliveries from Lake Mead be made to users only pursuant to contracts with the Secretary of the Interior. Insofar as the contract with Nevada contemplates use by Nevada, it may fulfill the requirements of Section 5. With respect to other users, we urge that the language of the Nevada contract does not show an

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intent to depart from the and followed in Arizona and D. Finally, we excepted right of the United States federal work on those of the theory that he who recha

Mr. ELY. The last two your attention are two n near, Los Angeles, Calif. March 7, 1961, is captio nments Due to Shortage of Mr. Hill's study and stati depletions rise above the y jected for 1975, some ki existing uses in the low constructed.

The yellow-backed doe 1961, by Mr. Hill, is capt Water Due to Shortage of These companion studie informed and objective st available.

Mr. Hill, as some of yo report for the State of Co a Senate document, on this I shall ask to have the record, Mr. Chairman.

Mr. ASPINALL. Mr. Cha these in the file?

Mr. ELY. They are reas you will find considerable in Mr. ASPINALL. They are be approximately 6,500,000 basin?

Mr. ELY. Mr. Hill's repor studies then available. Th figures now available.

Mr. ROGERS. Is there obj of these two documents?

The Chair hears none. record.

(The documents referred

Mr. STANLEY MOSK,
Attorney General of the State of C
Sacramento, Calif.

DEAR SIR: Pursuant to request of the special master to the Sup of the special master to the Sup State of Arizona v. State of Cal Federal and State agencies, and to determine the impact of the re States of the lower basin, and up There is submitted herewith m States of the upper basin. This h

intent to depart from the procedure required by Section 5 of the Project Act and followed in Arizona and California.

D. Finally, we excepted to the failure of the Special Master to recognize the right of the United States to use on its wildlife refuges water reclaimed by federal work on those refuges. Our position here is simply predicated on the theory that he who reclaims water may use it.

Mr. ELY. The last two matters to which I should now like to call your attention are two reports by Raymond A. Hill, consulting engineer, Los Angeles, Calif. The red-backed document, exhibit 9, dated March 7, 1961, is captioned "Limitations on Upper Basin Developments Due to Shortage of Colorado River Supply," and the burden of Mr. Hill's study and statistics is to indicate that, whenever upper basin depletions rise above the present level of about 4 million acre-feet projected for 1975, some kind of curtailment must be expected in the existing uses in the lower basin if the central Arizona project is constructed.

The yellow-backed document, exhibit 10, which is dated May 18, 1961, by Mr. Hill, is captioned "Limitations on Lower Basin Uses of Water Due to Shortage of Colorado River Supply."

These companion studies are the most recent and I believe the best informed and objective studies of this water supply problem that are available.

Mr. Hill, as some of you know, in 1953 or thereabouts, prepared a report for the State of Colorado, which was subsequently printed as a Senate document, on this same general subject.

I shall ask to have these two documents also incorporated in your record, Mr. Chairman.

Mr. ASPINALL. Mr. Chairman, would it not be just as well to have these in the file?

Mr. ELY. They are reasonably short, Mr. Aspinall, and I believe you will find considerable interest in them.

Mr. ASPINALL. They are propounded on the idea that there would be approximately 6,500,000 acre-feet of water for use by the upper basin?

Mr. ELY. Mr. Hill's report of 1953 did so, based on the water-supply studies then available. This brings it down to date in terms of the figures now available.

Mr. ROGERS. Is there objection to the incorporation in the record of these two documents?

The Chair hears none. The documents will be included in the record.

(The documents referred to follow:)

LEEDS, HILL, & JEWETT, INC.,
Los Angeles, Calif., March 7, 1961.

Mr. STANLEY MOSK,
Attorney General of the State of California,
Sacramento, Calif.

DEAR SIR: Pursuant to requests from your office, I have reviewed the report of the special master to the Supreme Court of the United States in the action, *State of Arizona v. State of California*, published and unpublished reports of Federal and State agencies, and my own report of 1953 to the State of Colorado, to determine the impact of the recommended decree on California, on the other States of the lower basin, and upon the States of the upper basin.

There is submitted herewith my report on the impact of this decree on the States of the upper basin. This has been limited primarily to the extent of the

shortage of water to be borne by the upper basin and the resulting impact on each upper basin State, if California's existing uses are not to be curtailed under the apportionment formula recommended by the special master. The limitations imposed upon upper basin developments by physical conditions and by the provisions of article III (c) and (d) of the Colorado River compact can readily be evaluated from the data presented in this report.

In brief, I find, if California's existing uses are not to be curtailed under the recommended decree, that the water supply available to the upper basin from the Colorado River system will be exhausted by existing projects, by projects under construction, by projects already authorized, and other projects proposed for construction during the next 20 years.

Respectfully submitted.

RAYMOND A. HILL.

LIMITATIONS ON UPPER BASIN DEVELOPMENTS DUE TO SHORTAGE OF COLORADO RIVER SUPPLY

(March 7, 1961)

When the Colorado River compact was entered into in 1922 there was apportioned from the Colorado River system in perpetuity to the upper basin the exclusive beneficial consumptive use of 7,500,000 acre-feet of water per annum, including all water necessary for the supply of any rights then existing. However, Simon H. Rifkind, special master, in his report of December 5, 1960, to the Supreme Court of the United States in the action, *State of Arizona v. State of California*, stated:

"This apportionment is accomplished by establishing a ceiling on the quantity of water which may be appropriated in each basin as against the other (p. 140). "I regard article III (a) and (b) as a limitation on appropriative rights and not as a source of supply (p. 149).

"For compact purposes, article III (a) and (b) can refer only to limits on appropriations, not to the supply of water itself" (p. 149).

The States of the upper basin have proceeded on the assumption that they were entitled to consume the quantity of water apportioned to them by the compact in disregard of any developments in the lower basin, subject only to physical limitations on the available water supply and compliance with the provisions of article III (c) and (d) of the Colorado River compact. The Colorado River storage project and participating projects, now under construction, have been considered to be only a major step toward such full development of the water resources of the upper basin.

The special master, however, questioned this premise. He in effect assumed that the upper basin will be limited to about two-thirds of its "ceiling" on appropriations. The following statements in the report are significant in this connection:

"A second and controlling assumption * * * is that the upper basin will deplete the virgin flow at Lees Ferry by between 6,500,000 and 6,800,000 acre-feet per annum. Yet there is nothing to indicate that the upper basin depletions, which have never exceeded 2,200,000 acre-feet per annum measured at Lees Ferry, will expand to anywhere near 6,500,000 acre-feet. * * * In sharp conflict with this assumption is the estimate expressed in the report of the Senate committee which studied the Colorado River storage project and potential reservoir construction in the upper basin. That report estimates that future upper basin consumptive use will not exceed 4,800,000 acre-feet per annum (depletion of the flow at Lees Ferry would be less), even if the extensive storage capacity envisaged but not as yet authorized for the upper basin were eventually constructed" (pp. 111-112).

Then on page 115 of his report the master concluded:

"Existing California uses are in no danger of curtailment unless and until many vast new projects, some of which are not even contemplated at this time, are approved by Congress and constructed."

In this connection, the master stated on the preceding page:

"Moreover, if ever the equities between California's existing uses and new uses in the Colorado River Basin have to be resolved, it will be for Congress to resolve them. No new projects, whether in the lower or upper basins, which would affect lower basin main stream supply can be constructed in the Colorado River Basin without congressional action or acquiescence."

The magnitude of su were set forth in the fo "According to the ev presently consume 4.48 See page 128, infra. in this report, that a 7,667,770 acre-feet of satisfy all of Californi

The total consumpti (footnote, p. 128) to main stream water u creased to 7,872,774 ac

The total quantity Colorado River at Le would be about 10 m feet per year, because reservoir and channel between Lees Ferry a

The delivery of an in Colorado River at ment of 7.5 million : would require that Lees Ferry be at lea has been far less tha be valid, a very sev The undepleted or page 118 of the repor

TABLE A-

Measurements of commenced until at tic records of the h year and subsequen to 1922 could be gr for the period 1909-

R. D. Goodrich, Engineering Repor

"(1) On the bas Upper Colorado Ri acre-feet annually. if sufficient carryo to properly regulat

The writer, in a (p. 7):

"When this (Co flow of Colorado more than 15 mill case and that the depletions of the cated in section (4

In testimony be 1958, the writer recent years has supply was no n regulation of infl from 1926 to 1956

er basin and the resulting impact on existing uses are not to be curtailed as recommended by the special master. The developments by physical conditions and) of the Colorado River compact can be found in this report.

ses are not to be curtailed under the water available to the upper basin from existing projects, by projects authorized, and other projects proposed

RAYMOND A. HILL.

ENTS TO SHORTAGE OF COLORADO SUPPLY

1961)

entered into in 1922 there was apportioned to the upper basin the expenditure of 6,000 acre-feet of water per annum, of any rights then existing. How- his report of December 5, 1960, to the action, *State of Arizona v. State*

establishing a ceiling on the quantity of water in the upper basin as against the other (p. 140). limitation on appropriate rights and

and (b) can refer only to limits on "self" (p. 149).

ed on the assumption that they were apportioned to them by the compact of the upper basin, subject only to physical and compliance with the provisions of the Colorado River compact. The Colorado River now under construction, have been such full development of the water

his premise. He in effect assumed that two-thirds of its "ceiling" on the report are significant in this

* is that the upper basin will deplete 6,500,000 and 6,800,000 acre-feet of water from the upper basin depletions. feet per annum measured at Lees Ferry, 10 acre-feet. * * * In sharp conflict with the report of the Senate committee on the Colorado River compact project and potential reservoir storage estimates that future upper basin depletion of water per annum (depletion of water) if the extensive storage capacity of the upper basin were eventually con-

concluded: "The possibility of curtailment unless and until the compact is amended is not even contemplated at this time."

preceding page: "California's existing uses and new uses are resolved, it will be for Congress to determine the lower or upper basins, which can be constructed in the Colorado River basin in acquiescence."

The magnitude of such uses and the total supply of main stream water needed were set forth in the footnote on page 104 which reads:

"According to the evidence presented in this case, existing California projects presently consume 4,483,885 acre-feet of water per annum from the main stream. See page 128, *infra*. This means, under the apportionment formula proposed in this report, that a total supply of main stream water sufficient to satisfy 7,667,770 acre-feet of consumptive uses in the lower basin per annum would satisfy all of California's present uses."

The total consumptive use in California, however, had increased prior to 1958 (footnote, p. 128) to 4,586,392 acre-feet. The corresponding total supply of main stream water under the apportionment formula proposed would be increased to 7,872,774 acre-feet per year.

The total quantity of water required to be delivered by the upper basin in Colorado River at Lees Ferry to avoid curtailment of existing California uses would be about 10 million acre-feet per year, more probably 10.5 million acre-feet per year, because of deliveries to Mexico pursuant to the treaty of 1944 and reservoir and channel losses and operational wastes not offset by tributary inflow between Lees Ferry and the international boundary.

MAGNITUDE OF SHORTAGE

The delivery of an average of at least 10 million acre-feet per year of water in Colorado River at Lees Ferry, without limitation of the original apportionment of 7.5 million acre-feet for beneficial consumptive use in the upper basin, would require that the average natural undepleted flow of Colorado River at Lees Ferry be at least 17.5 million acre-feet per year. The true natural supply has been far less than this quantity. Hence, if the premise of the special master be valid, a very severe shortage of water will be imposed on the upper basin.

The undepleted or virgin flow of Colorado River at Lees Ferry, as given on page 118 of the report of the special master, is quoted below:

TABLE A.—Average annual virgin flow for selected periods

Period	Acre-feet per year
1909-56	15,211,000
1914-56	14,920,000
1922-56	14,008,000
1930-56	13,085,000

Measurements of the actual flow of Colorado River at Lees Ferry were not commenced until about the beginning of the water year 1921-22, so that authentic records of the historical flow at Lees Ferry are available only for that water year and subsequent years. Estimates of the magnitude of the actual flow prior to 1922 could be grossly in error; hence the estimates of the average virgin flow for the period 1909-56 and the period 1914-56 are questionable.

R. D. Goodrich, then Chief Engineer, Upper Colorado River Commission, in Engineering Report No. 22 dated November 14, 1955, concluded:

"(1) On the basis of all the data now available, the present 'safe yield' of the Upper Colorado River at Lees Ferry appears to be from 13 million to 14 million acre-feet annually. This yield is more than ample for the projects now proposed if sufficient carryover storage is provided on the main stem and larger tributaries to properly regulate flow to the lower basin."

The writer, in a report to the State of Colorado, dated October 31, 1953, stated (p. 7):

"When this (Colorado River) compact was negotiated it was thought that the flow of Colorado River under natural conditions would average considerably more than 15 million acre-feet per year. It is now evident that such is not the case and that the provisions of section (d) of article III will probably limit depletions of the waters of the upper basin to some amount less than that allocated in section (a) of the same article."

In testimony before the special master in the action, *Arizona v. California* in 1958, the writer pointed out that the flow of Colorado River at Lees Ferry in recent years has been much below normal, and that the dependable undepleted supply was no more than 13.7 million acre-feet per year, involving complete regulation of inflow to reservoirs for long periods, such as the historical period from 1926 to 1956 and thereafter until the reservoirs might refill.

The assumption that any larger virgin flow of Colorado River could be put to beneficial use depends on estimates of flow at Lees Ferry prior to 1922 and on the feasibility of complete regulation in reservoirs of the variable flow of Colorado River over periods of 50 or more consecutive years. It should be accepted by all concerned, therefore, that 14 million acre-feet per year is the upper limit of the dependable supply obtainable from the undepleted or virgin flow of Colorado River at Lees Ferry.

The upper limit of depletions of the natural or virgin flow of Colorado River at Lees Ferry is thus no more than 4 million acre-feet per year if California's existing uses are not to be curtailed under the apportionment set forth in the decree recommended by the special master to the U.S. Supreme Court. The resulting shortage in the supply of water, required for development of the upper basin, is almost one-half of the total supply envisioned by the Compact Commission in 1922 as being available for use in that basin.

PROJECTS FORECLOSED

It is generally recognized that depletions caused by projects in operation or authorized prior to 1949 for construction in the upper basin will amount to 2,548,000 acre-feet per year. This amount of depletion is broken down among the States of the upper basin in H.D. No. 364, 83d Congress, 2d session, page 148, as follows:

Arizona.....	acre-feet per year--	11,000
Colorado.....	do.....	1,591,000
New Mexico.....	do.....	79,000
Utah.....	do.....	628,000
Wyoming.....	do.....	239,000

There would thus remain available to the upper basin only about 1,450,000 acre-feet per year for all other purposes, if California's existing uses be not curtailed under the decree recommended by the special master. The impact of any such restriction on the upper basin as a whole would be more severe on some States than others.

Arizona has only a minor interest in the upper basin, and its foreseeable needs are fully covered by the allocation to it of 50,000 acre-feet per year as provided in article III of the Upper Colorado River Basin Compact of 1948.

Under the provisions of that article, Colorado is apportioned 51.75 percent of the remainder of the supply available for use each year in the upper basin from the Colorado River System. Depletions and reservoir losses due to existing and projected developments in Colorado, if sufficient water were to be physically and legally available, are given in table B. It is apparent from this tabulation that the projected depletions in Colorado would exceed, before 1980, Colorado's share of the 4 million acre-feet per year available.

This share would permit full uses on all existing projects, all participating projects, and the Collbran project. It could permit development of the proposed Fryingpan-Arkansas project, but only by severely limiting the future development of the Blue River project of the city of Denver. All of the future participating priority projects in Colorado would be foreclosed, including the Savory-Pot Hook project serving areas in both Wyoming and Colorado and the Animas-La Plata project serving areas in both New Mexico and Colorado. Neither would there be any room for expanded municipal and industrial uses of water in Colorado. The great mineral resources of western Colorado would have to remain undeveloped because of lack of water if the premise of the special master be valid.

The impact on New Mexico would be more severe because the projected depletions in New Mexico would exceed its share (11.25 percent) of the supply available to the upper basin by about 1975, as shown in table C. Depletions by existing projects and the participating projects under construction would then amount to 88,000 acre-feet per year. The New Mexico share of losses from the storage project reservoirs now under construction will be about 78,000 acre-feet per year. This leaves only about 280,000 acre-feet per year for all other projects in New Mexico.

The San Juan-Chama project, proposed for early construction, would deplete Colorado River by 110,000 acre-feet per year. Depletions due to the proposed Navajo project are expected to amount to 125,000 acre-feet in 1975, and within 10 years later to 252,000 acre-feet per year. It is apparent that there would

not be sufficient water be curtailed under the Court of the United States.

The impact on Utah in this State, shown per year prior to 1949 before 1949 for construction the 23 percent available curtailed under the decree of course, bear its share so that there would be participating projects in Utah.

Wyoming would be 4 million acre-feet water as projected (table B) feet and participating to deplete the flow of water by 156,000 acre-feet Savory-Pot Hook project extent of 65,000 acre-feet per year. There municipal and industrial

The total projected Ferry is recapitulated expansion of existing shown in that table as

Tot

The foregoing estimates Ferry were based on Reclamation and water depletions differs little Reclamation, but they conform to constructed dates of sub

In my opinion, they force early development upper Colorado River glowingly described Reclamation, as follows

"The Upper Colorado settlement, and limit future which will be

"The future of the most important resource rather than allowed rapids of the colorful

"The Upper Colorado it has canyons with hydroelectric power it has oil shales and other atomic and nonmetallic ores.

"But, these many awakened. The future widening scale and resources of water,

"The future begins

of Colorado River could be put at Lees Ferry prior to 1922 and reservoirs of the variable flow of consecutive years. It should be 4 million acre-feet per year is the amount from the undepleted or virgin

virgin flow of Colorado River 4 million acre-feet per year if California's apportionment set forth in the U.S. Supreme Court. The amount for development of the upper basin is provided by the Compact Commission.

used by projects in operation or the upper basin will amount to depletion is broken down among the 83d Congress, 2d session, page

acre-feet per year--	11, 000
do-----	1, 591, 000
do-----	79, 000
do-----	628, 000
do-----	239, 000

per basin only about 1,450,000 California's existing uses be not a special master. The impact a whole would be more severe

per basin, and its foreseeable of 50,000 acre-feet per year as the River Basin Compact of 1948.

is apportioned 51.75 percent of the year in the upper basin from reservoir losses due to existing water were to be physically apparent from this tabulation exceed, before 1980, Colorado's

ing projects, all participating permit development of the project severely limiting the future of Denver. All of the future would be foreclosed, including the Wyoming and Colorado and with New Mexico and Colorado. municipal and industrial uses western Colorado would water if the premise of the

re because the projected depletion (5 percent) of the supply available in table C. Depletions by existing construction would then Mexico share of losses from the on will be about 78,000 acre-feet per year for all other

ly construction, would deplete depletions due to the proposed 4 million acre-feet in 1975, and within is apparent that there would

not be sufficient water for both of these projects, if California uses are not to be curtailed under the decree recommended by the special master to the Supreme Court of the United States.

The impact on Utah would be even more severe because projected depletions in this State, shown on table D, would exceed its share of 4 million acre-feet per year prior to 1975. Depletions by existing projects and those authorized before 1949 for construction in Utah alone account for more than two-thirds of the 23 percent available to that State, if California's existing uses are not to be curtailed under the decree recommended by the special master. Utah must, of course, bear its share of reservoir losses from Colorado River storage projects, so that there would be little more than half enough water available for participating projects in Utah, already authorized and in part under construction.

Wyoming would be in a somewhat better position, but its 14-percent share of 4 million acre-feet would be exhausted soon after 1980 if developments proceed as projected (table E). Depletions by existing projects amount to 239,000 acre-feet and participating projects to Colorado River storage project are estimated to deplete the flow of Colorado River by 104,000 acre-feet in 1980 and eventually by 156,000 acre-feet per year. The Sublette project and the portion of the Savory-Pot Hook project in Wyoming are expected to deplete the river to the extent of 65,000 acre-feet in 1980, and eventually to the extent of 118,000 acre-feet per year. There would remain, therefore, a very small margin, if any, for municipal and industrial uses unless the participating projects were cut back.

The total projected depletion of the virgin flow of Colorado River at Lees Ferry is recapitulated in table F with the assumption that there would be no expansion of existing uses in the upper basin portion of Arizona. The totals shown in that table are summarized below:

Total of projected depletions in upper basin

Year	Acre-feet
1965-----	2, 779, 000
1970-----	3, 526, 000
1980-----	4, 855, 000
1990-----	5, 629, 000
2000-----	6, 134, 000

The foregoing estimates of depletion of the flow of Colorado River at Lees Ferry were based on published and unpublished reports of the U.S. Bureau of Reclamation and various State agencies. The magnitude of these projected depletions differs little from that set forth in earlier reports by the Bureau of Reclamation, but the probable time of development has been condensed to conform to construction schedules, the status of feasibility reports, and estimated dates of submission of other feasibility reports.

In my opinion, the economic potential of the upper basin justifies and will force early development to the limit of the water supply available, now that the upper Colorado River storage project is under construction. This situation is glowingly described in a pamphlet recently issued by the U.S. Bureau of Reclamation, as follows:

"The Upper Colorado River Basin may have been late in exploration, slow in settlement, and limited in development, but the upper basin boldly faces a new future which will see its many resources utilized on an ever-widening scale.

"The future of the Upper Colorado River Basin lies in its resources. The most important resource is water—water which is corralled and put to work rather than allowed to plunge wildly toward the sea, wasting its energy in the rapids of the colorful canyons.

"The Upper Colorado River Basin has the water—it has land to be irrigated—it has canyons with damsites where much water can be stored and where hydroelectric power can be produced—it has petroleum, coal, and natural gas—it has oil shales and rare hydrocarbons—it has mineral resources of uranium and other atomic ores, of many strategic metals, of phosphate and other needed nonmetallic ores.

"But, these many resources are largely dormant—sleeping giants yet to be awakened. The future will see the use of upper basin resources on an ever-widening scale under a development program which will bring together the resources of water, power, land, and minerals * * *

"The future begins to unfold for the Upper Colorado River Basin."

INHERENT CONFLICT

If California's existing uses are in no danger of curtailment under the apportionment formula recommended by the special master to the Supreme Court of the United States, the burden of the inevitable shortage of water supply will fall on the upper basin States.

Arizona and Nevada would be free to develop and use much more water from the mainstream of Colorado River than they could use beneficially on existing projects supplied from that source. Hence, to make use of the water apportioned to them under the recommended decree, Arizona and Nevada would have to construct new projects. These projects would be as feasible as any of the projected projects in the upper basin. Neither Arizona nor Nevada can be expected to forgo use of the water apportioned to them. Their new projects will thus be competitive with every new project in the upper basin.

California, even under the presumption that its existing uses are in no danger of curtailment, will still be dependent upon the unused part of the water apportioned to the other States in both the upper basin and lower basin. This will be true even to the extent of supplying water through existing works in California to meet demands that are already greater than those stated in the report of the special master.

It is not to be expected, on the other hand, that Colorado or New Mexico or Utah or Wyoming will acquiesce willingly in limitations on their development sufficient to insure enough water, under the apportionment formula recommended by the special master, to satisfy existing California uses.

It follows, therefore, that should the Supreme Court resolve the present controversy between Arizona and California in accord with the recommendations of its special master, there will be created a new and greater conflict involving all the States of the Colorado River Basin.

The opinion of the special master, quoted below, thus has particular significance:

"* * * if ever the equities between California's existing uses and new uses in the Colorado River Basin have to be resolved, it will be for Congress to resolve them. No new projects, whether in the lower or upper basin, which would affect lower basin mainstream supply can be constructed in the Colorado River Basin without congressional action or acquiescence."

LOS ANGELES, CALIF., March 7, 1961.

RAYMOND A. HILL.

TABLE B.—Projected depletions in Colorado of flow of Colorado River at Lees Ferry

[In thousands of acre-feet]

Project or service	Expected depletions				
	1965	1970	1980	1990	2000
Depletions by existing projects and projects authorized before 1949.....	1,591	1,591	1,591	1,591	1,591
Participating projects—CRSP.....	24	35	35	35	35
Other current projects.....	17	67	162	222	272
Future participating projects.....	17	97	311	520	601
Municipal and industrial.....	1	16	220	335	460
Share of reservoir losses.....	52	155	357	409	477
Total expected depletion.....	1,702	1,961	2,676	3,112	3,436

TABLE C.—Projected depletions in upper basin

[In thousands of acre-feet]

Project or service
Depletions by existing projects and projects authorized before 1949.....
Participating projects—CRSP.....
Other current projects.....
Future participating projects.....
Future municipal and industrial.....
Share of reservoir losses.....
Total expected depletion.....

TABLE D.—Projected depletions in lower basin

[In thousands of acre-feet]

Project or service
Depletions by existing projects and those authorized before 1949.....
Participating projects—CRSP.....
Other current projects.....
Future participating projects.....
Future municipal and industrial.....
Share of reservoir losses.....
Total expected depletion.....

TABLE E.—Projected depletions in West

[In thousands of acre-feet]

Project or service
Depletions by existing projects and those authorized before 1949.....
Participating projects—CRSP.....
Other current projects.....
Future participating projects.....
Future municipal and industrial.....
Share in reservoir losses.....
Total expected depletion.....

TABLE F.—Projected depletion in upper basin

[In thousands of acre-feet]

State responsible
Arizona, existing uses.....
Colorado.....
New Mexico.....
Utah.....
Wyoming.....
Total projected depletions.....

TABLE C.—Projected depletions in New Mexico of flow of Colorado River at Lees Ferry

[In thousands of acre-feet]

Project or service	Expected depletions				
	1965	1970	1980	1990	2000
Depletions by existing projects and projects authorized before 1949.....	79	79	79	79	79
Participating projects—CRSP.....	9	9	9	9	9
Other current projects.....	20	171	367	425	426
Future participating projects.....		13	27	39	39
Future municipal and industrial.....					
Share of reservoir losses.....	11	34	78	89	104
Total expected depletion.....	119	306	560	642	657

TABLE D.—Projected depletions in Utah of flow of Colorado River at Lees Ferry

[In thousands of acre-feet]

Project or service	Expected depletions				
	1965	1970	1980	1990	2000
Depletions by existing projects and those authorized before 1949.....	628	628	628	628	628
Participating projects—CRSP.....	20	173	233	255	255
Other current projects.....					
Future participating projects.....	5	10	13	13	13
Future municipal and industrial.....			40	120	190
Share of reservoir losses.....	23	69	159	182	212
Total expected depletion.....	676	880	1,073	1,198	1,298

TABLE E.—Projected depletions in Wyoming of flow of Colorado River at Lees Ferry

[In thousands of acre-feet]

Project or service	Expected depletions				
	1965	1970	1980	1990	2000
Depletions by existing projects and those authorized before 1949.....	239	239	239	239	239
Participating projects—CRSP.....	14	44	104	156	156
Other current projects.....					
Future participating projects.....	4	38	65	100	118
Future municipal and industrial.....		5	30	60	90
Share in reservoir losses.....	14	42	97	111	129
Total expected depletion.....	271	368	535	666	732

TABLE F.—Projected depletion in upper basin of flow of Colorado River at Lees Ferry

[In thousands of acre-feet]

State responsible	1965	1970	1980	1990	2000
Arizona, existing uses.....	11	11	11	11	11
Colorado.....	1,702	1,961	2,676	3,112	3,436
New Mexico.....	119	306	560	642	657
Utah.....	676	880	1,073	1,198	1,298
Wyoming.....	271	368	535	666	732
Total projected depletions.....	2,779	3,526	4,855	5,629	6,134

PROJECT

curtailment under the ap-
aster to the Supreme Court
ortage of water supply will

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isting uses and new uses in
be for Congress to resolve
upper basin, which would
ected in the Colorado River

RAYMOND A. HILL.

of Colorado River at Lees

Expected depletions				
1970	1980	1990	2000	
1,591	1,591	1,591	1,591	
	35	35	35	
	162	222	272	
	311	520	601	
16	230	335	460	
155	357	409	477	
1,961	2,676	3,112	3,436	

LEEDS, HILL & JEWETT, INC.,
Los Angeles, Calif., May 18, 1961.

Mr. STANLEY MOSK,
Attorney General of the State of California,
Sacramento, Calif.

DEAR SIR: Pursuant to requests from your office, I have reviewed the report of the special master to the Supreme Court of the United States in the action, *State of Arizona v. State of California*, and published and unpublished reports of Federal and State agencies, to determine the impact of the recommended decree on California, on the other States of the lower basin, and upon the States of the upper basin. My report concerning the upper basin was submitted to you on March 7, 1961. There is submitted herewith my report on the impact of this decree on the States of the lower basin and particularly on California. In brief, I find that:

- (1) Irrespective of the recommended decree, there soon will be insufficient water in the Colorado River to fulfill the delivery obligations of the Secretary of the Interior under existing contracts, an aggregate of 8,462,000 acre-feet per year.
- (2) The supply apportioned to California by the recommended decree would only temporarily satisfy existing uses in California.
- (3) The supply of water permanently available to California from Colorado River, if the recommended decree be entered, will not exceed 3,300,000 acre-feet per year, three-quarters of the minimum supply that otherwise would be available.

Respectfully submitted.

RAYMOND A. HILL.

LIMITATIONS ON LOWER BASIN USES OF WATER DUE TO SHORTAGE OF
COLORADO RIVER SUPPLY

(May 18, 1961)

When the Colorado River compact was entered into in 1922 there was apportioned from the Colorado River system in perpetuity to the upper basin and to the lower basin, respectively, the exclusive beneficial consumptive use of 7,500,000 acre-feet of water per annum, which included all water necessary for the supply of any rights then existing, and in addition the lower basin was given the right to increase its beneficial consumptive use of such waters by 1 million acre-feet per annum. Provision was made in that compact for further equitable apportionment of the beneficial uses of the waters of the Colorado River system, which, by definition, included all tributaries within the United States.

However, Simon H. Rifkind, special master, in his report of December 5, 1960, to the Supreme Court of the United States in the action, *State of Arizona v. State of California*, treated the tributaries separately from the mainstream of Colorado River and apportioned the supply available for diversion from Colorado River for beneficial consumptive use in Arizona, California, and Nevada, as follows:

"(1) If sufficient main stream water is available for release, as determined by the Secretary of the Interior, to satisfy 7,500,000 acre-feet of annual consumptive use in the aforesaid three States, then, of such 7,500,000 acre-feet of consumptive use, there shall be apportioned 2,800,000 acre-feet for use in Arizona, 4,400,000 acre-feet for use in California, and 300,000 acre-feet for use in Nevada;

"(2) If sufficient main stream water is available for release, as determined by the Secretary of the Interior, to satisfy annual consumptive use in the aforesaid States in excess of 7,500,000 acre-feet, such excess consumptive use is surplus, and 50 percent thereof shall be apportioned for use in Arizona and 50 percent for use in California; provided, however, that if the United States so contracts with Nevada, then 46 percent of such surplus shall be apportioned for use in Arizona and 4 percent for use in Nevada.

"(3) If sufficient main stream water is available for release, as determined by the Secretary of the Interior, to satisfy annual consumptive use of 7,500,000 acre-feet in the aforesaid three States, then the available annual consumptive use shall be apportioned as follows: For use in Arizona, 2.8 million acre-feet; for use in California, 4.4 million acre-feet; and for use in Nevada, 0.3 million acre-feet.

"(4) Any main stream water consumptively used within a State shall be charged to its apportionment, regardless of the purpose for which it was released;"

The impact of the recommended decree of the lower basin thus depends upon what will in fact be available from the Colorado River in Arizona, California, and Nevada.

Contrary to the belief of the special master, the flow of the Colorado River is not large enough to satisfy demands upon it. The flow varies widely from month to month and from all other streams in the semiarid region in only one respect: Its erratic flow is not desired degree by storage in reservoirs at the present time.

Actual measurements of the flow of the Colorado River commenced until just prior to the 1920s. The values listed on page 117 of the report for the period between October 1895 and September 1958 are the flow of major tributaries of Colorado River. The average discharge of Colorado River for the actual measurements were begun was 11,374,700 acre-feet as compared to an average for the same year.

The questionable validity of the average for 1922 is borne out by the tabulation of actual values in the first half of this table as compared to a range in the same period of 9,145,400 to 11,600,000 acre-feet. Significantly, in 26 of the 58 periods, the flow was greater than the aggregate flow.

It is generally recognized also that the flow has been improved over the years. The average in the older systems of measurement was 11,374,700 acre-feet for consideration of any larger supply of water flow at Lees Ferry: an average of 11,374,700 acre-feet through 1958, and less if the dry year of 1957 is included.

Such long-term averages can be used to supply only if the erratic flow of the Colorado River in reservoirs upstream from all projects in the lower basin. The average for shorter periods of time is shown in the following table.

TABLE A.—Average historical flow of Colorado River of different periods

Length of period	Smallest average	Greater average
5 years	9,145,400	11,600,000
10 years	10,151,000	11,600,000
15 years	11,374,700	11,600,000
20 years	11,600,000	11,600,000

If, as stated by the special master, the flow of the Colorado River is not large enough to satisfy demands upon it, it is unlikely that Hoover Dam could be used to store total inflow into an average year. The flow of one would have to consider the flow of the Colorado River per year shown in the present report, however, because there has been a large amount of storage available in primary reservoirs on the Colorado River to any desired degree.

Three reservoirs below Lees Ferry, with a total capacity of 29,226,000 acre-feet, are now being constructed.

I have reviewed the report of the United States in the action, published and unpublished reports on the impact of the recommended decree on the Colorado River basin, and upon the States of California, Arizona, and Nevada. This report was submitted to you on the impact of this report on California. In brief, the amount of water available from the Colorado River will be insufficient to meet the requirements of the Secretary of the Interior, approximately 8,462,000 acre-feet per year. The amount recommended by the decree would be approximately 3,300,000 acre-feet per year. The amount of water available from California from Colorado River would exceed 3,300,000 acre-feet per year, but that otherwise would be insufficient to meet the requirements of the Secretary of the Interior.

RAYMOND A. HILL.

DUPLICATE TO SHORTAGE OF

In 1922 there was approximately 10,151,000 acre-feet of water available from the upper basin and to the lower basin. The amount of water available for the assumed use of 7,500,000 acre-feet per year was necessary for the supply of the Colorado River basin was given the right of first priority by 1 million acre-feet per year. The amount of water available for further equitable apportionment of the Colorado River system, which is available from the States of California, Arizona, and Nevada, as follows: 1. California, 3,300,000 acre-feet per year; 2. Arizona, 2,800,000 acre-feet per year; 3. Nevada, 4,000,000 acre-feet per year.

release, as determined by the Secretary of the Interior, for the assumed use in the aforementioned States of 7,500,000 acre-feet per year. The amount of water available for use in Arizona and 50 percent of the amount available for the United States shall be apportioned for use in California, Arizona, and Nevada, as follows:

release, as determined by the Secretary of the Interior, for the assumed use of 7,500,000 acre-feet per year. The amount of water available for use in California, Arizona, and Nevada, as follows:

within a State shall be apportioned for use for which it was

The impact of the recommended decree on California and on the other States of the lower basin thus depends upon the quantity of main stream water that will in fact be available from Lake Mead for beneficial consumptive use in Arizona, California, and Nevada.

WATER SUPPLY

Contrary to the belief of the special master, Colorado River is an ordinary stream, larger than most in the western portion of the United States but not large enough to satisfy demands upon it. It is true that the flow of Colorado River varies widely from month to month and from year to year, but no more so than in all other streams in the semiarid regions of the world. Colorado River is unique in only one respect: Its erratic flow will be controlled and be regulated to any desired degree by storage in reservoirs now in service or under construction at the present time.

Actual measurements of the flow of Colorado River at Lees Ferry were not commenced until just prior to the beginning of the 1921-22 water year. The values listed on page 117 of the report of the special master for the water years between October 1895 and September 1921 were derived by correlation with the flow of major tributaries of Colorado River. It is significant, therefore, that the average discharge of Colorado River at Lees Ferry for these 26 years before actual measurements were begun was computed to be 15,485,000 acre-feet per year as compared to an average for the succeeding 37 years of 12,371,000 acre-feet per year.

The questionable validity of the reported discharges at Lees Ferry prior to 1922 is borne out by the tabulation on page 146 of the report of the special master. This lists the aggregate flow in 54 successive 10-year periods. The range of values in the first half of this table was from 168.6 million to 133.7 million acre-feet as compared to a range in the second half from 140 million to 101.5 million acre-feet. Significantly, in 26 of the first 27 of these 10-year periods the aggregate flow was greater than the aggregate flow in any 1 of the succeeding 27 10-year periods.

It is generally recognized also that standards of measurements of streamflow have been improved over the years to minimize the magnitude of errors inherent in the older systems of measurement. Hence, there is little, if any, justification for consideration of any larger supply under historical conditions than the measured flow at Lees Ferry: an average of 12,371,000 acre-feet per year from 1922 through 1958, and less if the dry years just past be added to the record.

Such long-term averages can be used as a measure of the available water supply only if the erratic flow of the Colorado River can be regulated completely in reservoirs upstream from all principal points of diversion of water for use in the lower basin. The average supply that was available historically over shorter periods of time is shown in the following tabulation:

TABLE A.—Average historical flow of Colorado River at Lees Ferry for periods of different lengths since 1921

[Quantities in acre-feet per year]

Length of period	Smallest average	Greatest average	Length of period	Smallest average	Greatest average
5 years	9,145,400	15,642,400	25 years	11,281,200	12,558,500
10 years	10,151,000	14,098,600	30 years	11,832,900	12,603,200
15 years	11,374,700	12,819,600	35 years	12,147,600	12,183,600
20 years	11,600,000	12,644,300			

If, as stated by the special master on page 109 of his report, it were most unlikely that Hoover Dam could be operated flexibly enough to translate the total inflow into an average yearly release over a period longer than 10 years, one would have to consider the wide range from 10,151,000 to 14,098,600 acre-feet per year shown in the preceding table. His assumption was unwarranted, however, because there has been almost enough and there soon will be enough storage available in primary reservoirs for regulation of the erratic flow of Colorado River to any desired degree.

Three reservoirs below Lees Ferry, having an aggregate usable capacity of 29,226,000 acre-feet, are now being operated to regulate the main stem of Colo-

Colorado River above all major points of diversion in the lower basin. Glen Canyon reservoir on the main stem, a short distance from Lees Ferry, is under construction and will have a usable capacity of 21,500,000 acre-feet. In addition, there are three other major reservoirs of the Colorado River storage project under construction which will have an aggregate effective capacity of 4,468,000 acre-feet. Hence, within a very few years the total volume of storage in primary reservoirs available for regulation of the flow of Colorado River will exceed 55 million acre-feet.

All of the experts in the hearings before the master presented studies showing the physical feasibility of translating the variable flow of Colorado River into uniform yearly releases over periods of 30 to 50 years by regulation of these flows in the reservoirs that are now in service or now under construction. I was the only witness who questioned the practicability of full regulation over periods much longer than 30 years, but I pointed out that the variable historical flow of Colorado River at Lees Ferry could have been regulated completely to a uniform yearly flow of 11,800,000 acre-feet per year from 1926 to 1957 by the use of 21 million acre-feet of storage, which is less than the capacity available in Lake Mead alone.

The record also shows that if Hoover Dam had been built in 1921, when actual measurements at Lees Ferry were begun, the variable inflow to Lake Mead could have been regulated completely, resulting in a uniform annual release of substantially 12 million acre-feet per year for almost 40 consecutive years. Similarly, if Glen Canyon Dam, now under construction, had been built 40 years ago, the historical flow of Colorado River at Lees Ferry could have been equated to a uniform annual release of substantially 12 million acre-feet; Lake Mead would then have been available, with many times the capacity necessary, to regulate the supply reaching Lake Mead to conform to any demand that might have arisen.

There is thus no escape from the conclusion that the variable inflow to reservoirs on Colorado River in the future can be regulated to any desired degree by use of the storage capacity that is now available or will become available by 1964 when Glen Canyon and the other reservoirs of the Colorado River storage project will be in service.

UPPER BASIN DEPLETIONS

The supply of water in Colorado River at Lees Ferry under historical conditions, approximately 12 million acre-feet per year, was that remaining after depletions of the natural supply in the upper basin. These amounted to 1,854,000 acre-feet per year on the average during the period of actual measurements of flow at Lees Ferry, less in the early years and more in recent years. It is generally recognized that depletions caused by projects in operation or authorized prior to 1949 for construction in the upper basin will soon amount to 2,548,000 acre-feet per year. Hence, if all of these projects had been in existence in 1922, the average available supply in Colorado River at Lees Ferry would have been about 700,000 acre-feet per year smaller than it was historically. This leaves a net of 11.3 million acre-feet per year as the average supply available in the Colorado River at Lees Ferry under existing conditions.

There must then be deducted the depletions that will be caused by participating projects of the Colorado River storage project which are now under construction. In addition there will be losses by evaporation from the reservoirs of the Colorado River storage project. The magnitude of these new and increased depletions is shown in the following tabulation:

TABLE B.—Depletions by Colorado River storage project
[Quantities in thousands of acre-feet per year]

Location	1970	1980	1990
Colorado.....			35
New Mexico.....	35	35	9
Utah.....	9	9	255
Wyoming.....	173	233	156
Subtotal.....	44	104	
Reservoir losses.....	261	381	455
	300	691	691
Total.....	561	1,072	1,146

Deduction of the permanent depletions of projects now under construction will reduce the average available supply from 11.3 to 10.2 million acre-feet per year in the next 40 years will be 10.2 million acre-feet per year.

At this stage of development of the Colorado River at Lees Ferry, the total sum of 2,548,000 and 1,146,000 acre-feet of losses from reservoirs by evaporation will be 3,694,000 acre-feet.

The States of the upper basin of the Colorado River are now making the assumption that they are entitled to their share of the Colorado River water supply on the basis of the provisions of the Compact with Mexico, III (c) and (d) of that compact. The use of one-half of the water appropriation in a recent pamphlet issued by the U.S. Bureau of Reclamation. See the use of upper basin resources in the compact program which will bring together the minerals * * *"

Other projects under construction are expected to cause depletions of about 25 years. These include the Blue River project of the city of Denver which is now under construction in Colorado which may be authorized by the current Congress. The project and the San Juan-Chama project authorized by the current Congress, that are now or soon will be under construction, will reduce the probable future depletions will reduce the probable future depletions to 10.2 to 9.6 million acre-feet per year.

Further permanent depletions of the Colorado River will be built and new irrigation projects in Colorado have been authorized by the Colorado River storage project. The Colorado River storage project development in other States of the upper basin will cause depletions of about 672,000 acre-feet in 1990, unless the rate of development of the tremendous resources in the upper basin.

In addition, there is a potential depletion of the Colorado River at Lees Ferry on which the future development of the Colorado River at Lees Ferry will probably amount to 500,000 acre-feet per year. The rate of development of the tremendous resources in the upper basin.

The totals of these foreseeable and probable depletions of the Colorado River at Lees Ferry are 10.2 million acre-feet per year being the most probable future depletions equal to the average historical depletion.

TABLE C.—Projected permanent depletions of Colorado River
[Quantities in thousands of acre-feet per year]

Item	1970	1980	1990
Arizona, existing uses.....			
Colorado depletion.....			
New Mexico depletion.....			
Utah depletion.....			
Wyoming depletion.....			
Total projected depletions.....			
Average historical depletions.....			
New and increased depletions.....			
Residual average supply in Colorado River at Lees Ferry.....			

in the lower basin. Glen Canyon from Lees Ferry, is under construction, 0,000 acre-feet. In addition, there Colorado River storage project under effective capacity of 4,468,000 acre-feet volume of storage in primary flow of Colorado River will exceed

the master presented studies show variable flow of Colorado River 30 to 50 years by regulation of service or now under construction. practicability of full regulation over ed on that the variable historical ave regulated completely to per year from 1926 to 1957 by the s less than the capacity available

m had been built in 1921, when run, the variable inflow to Lake resulting in a uniform annual r year for almost 40 consecutive under construction, had been built River at Lees Ferry could have substantially 12 million acre-feet; with many times the capacity Lake Mead to conform to any

that the variable inflow to reser- regulated to any desired degree able or will become available by rs of the Colorado River storage

IONS

Lees Ferry under historical con- year, was that remaining after per basin. These amounted to ng the period of actual measure- years and more in recent years. sed by projects in operation or e upper basin will soon amount of these projects had been in in Colorado River at Lees Ferry year smaller than it was his- re-feet per year as the average Ferry under existing conditions. hat will be caused by participat- oject which are now under con- evaporation from the reservoirs magnitude of these new and in- latic

River storage project

feet per year]

	1970	1980	1990
.....	35	35	35
.....	9	9	9
.....	173	233	255
.....	44	104	156
.....	261	381	455
.....	300	691	691
.....	561	1,072	1,146

Deduction of the permanent depletions that will be brought about by these projects now under construction, approximately 1.1 million acre-feet per year, will reduce the average available supply in Colorado River at Lees Ferry from 11.3 to 10.2 million acre-feet per year, assuming that the natural undepleted supply in the next 40 years will be substantially as great as that over the past 40 years.

At this stage of development of the upper basin, the total depletion of the flow of Colorado River at Lees Ferry will be about 3.7 million acre-feet per year, the sum of 2,548,000 and 1,146,000 acre-feet per year which includes 0.7 million acre-feet of losses from reservoirs by evaporation.

The States of the upper basin of Colorado River, however, have proceeded on the assumption that they are entitled to consume the quantity of water apportioned to them by the Colorado River compact, subject only to physical limitations on the available water supply and compliance with the provisions of article III (c) and (d) of that compact. None of them can be expected to forgo the use of one-half of the water apportioned to them. Furthermore, as set forth in a recent pamphlet issued by the U.S. Bureau of Reclamation: "The future will see the use of upper basin resources on an ever-widening scale under a development program which will bring together the resources of water, power, land, and minerals * * *"

Other projects under construction or for which authorization is pending are expected to cause depletions of about 600,000 acre-feet per year within the next 25 years. These include the Blue River project, a transmountain diversion project of the city of Denver which is nearing completion; the Fryingpan-Arkansas project in Colorado which may be authorized by the current Congress; the Navajo project and the San Juan-Chama project in New Mexico which may also be authorized by the current Congress; and other Federal and non-Federal projects that are now or soon will be under construction. These additional upper basin depletions will reduce the probable future average supply at Lees Ferry from 10.2 to 9.6 million acre-feet per year.

Further permanent depletions of the flow of Colorado River are inevitable; other projects will be built and new uses of water will develop. A total of 22 irrigation projects in Colorado have been proposed as future participating projects of the Colorado River storage project. Others in the same category await development in other States of the upper basin. It is anticipated that the new depletions caused by these projects will amount to 416,000 acre-feet in 1980, and 672,000 acre-feet in 1990, unless the requisite funds for construction be withheld from the U.S. Bureau of Reclamation.

In addition, there is a potential demand for municipal and industrial water on which the future development of the upper basin will depend. Depletions of the flow of Colorado River at Lees Ferry, resulting from such new uses, will probably amount to 500,000 acre-feet per year by 1990, or sooner, depending on the rate of development of the tremendous deposits of oil shale and other mineral resources in the upper basin.

The totals of these foreseeable and probable permanent depletions of the flow of the Colorado River at Lees Ferry are set forth in table C. The residual average supply in future years, the last item in this table, is based on 12 million acre-feet per year being the most probable future supply with upstream depletions equal to the average historical depletion.

TABLE C.—Projected permanent depletions in upper basin and residual flow of Colorado River at Lees Ferry

[Quantities in thousands of acre-feet]

Item	1965	1970	1980	1990
Arizona, existing uses.....	11	11	11	11
Colorado depletion.....	1,702	1,961	2,676	3,112
New Mexico depletion.....	119	305	560	642
Utah depletion.....	676	880	1,073	1,198
Wyoming depletion.....	271	368	535	666
Total projected depletions.....	2,779	3,526	4,855	5,629
Average historical depletions.....	1,854	1,854	1,854	1,854
New and increased depletions.....	925	1,672	3,001	3,775
Residual average supply in Colorado River at Lees Ferry.....	11,075	10,328	8,999	8,225

It will be noted from the foregoing table that the anticipated permanent depletions of the flow of Colorado River at Lees Ferry are much smaller than the 7.5 million acre-feet per year apportioned to the upper basin by the Colorado River compact of 1922; actually, the total in the year 1990, including reservoir losses, amounts to only 75 percent of the amount apportioned to the upper basin for beneficial consumptive use.

It is to be expected, however, that the upper basin States will employ all means within their power to apply to beneficial use the remainder physically available to them, subject only to compliance with the provisions of article III (c) and (d) of the Colorado River compact, which are:

"(c) If, as a matter of international comity, the United States of America shall hereafter recognize in the United States of Mexico any right to the use of any waters of the Colorado River system, such waters shall be supplied first from the waters which are surplus over and above the aggregate of the quantities specified in paragraphs (a) and (b); and if such surplus shall prove insufficient for this purpose, then, the burden of such deficiency shall be equally borne by the upper basin and the lower basin, and whenever necessary the States of the upper division shall deliver at Lees Ferry water to supply one-half of the deficiency so recognized in addition to that provided in paragraph (d).

"(d) The States of the upper division will not cause the flow of the river at Lees Ferry to be depleted below an aggregate of 75 million acre-feet for any period of 10 consecutive years reckoned in continuing progressive series beginning with the first day of October next succeeding the ratification of this compact."

Deliveries of water in Colorado River at Lees Ferry pursuant to the provisions of article III (d) will almost certainly be at substantially uniform annual rates of 7.5 million acre-feet per year because that procedure would result in the maximum conservation of water and the greatest revenue from the sale of power and energy that can be produced at Glen Canyon Dam.

Deliveries of 1.5 million acre-feet of water each year to Mexico, pursuant to the Treaty of 1944, can be made at the present time without curtailment of any existing uses of water from Colorado River, although the surplus referred to in the Colorado River compact does not in fact exist. This situation, however, will come to an end when filling of Glen Canyon reservoir is begun.

If Colorado, New Mexico, Utah, and Wyoming are then held to be responsible for one-half of the 1.5 million acre-feet per year to be delivered to Mexico pursuant to the treaty, the average flow in Colorado River at Lees Ferry will then have to be not less than the sum of 7.5 million acre-feet under article III (d) and 0.75 million acre-feet under article III (c), a total of 8.25 million acre-feet per year. In this event, the limit of upper basin development will be reached by 1990 when permanent depletions will have reduced the available supply in Colorado River at Lees Ferry to about 8.2 million acre-feet per year (table C).

TEMPORARY DEPLETION BY RESERVOIR FILLING

Glen Canyon Reservoir and the other large reservoirs now under construction must be filled, if they are to serve their purpose, while there is a surplus of water available above then existing uses. The gross capacity of Glen Canyon Reservoir is 28,040,000 acre-feet; the gross capacity of the other three is 6,630,000 acre-feet; the total capacity now unfilled is 34,670,000 acre-feet. More than this quantity of water will be required because of losses by percolation into the geological formations bounding the reservoirs which are now devoid of water. Other reservoirs are planned for construction in the upper basin as the need for upstream regulation develops during the next 30 years. The total quantity of water required for filling all reservoirs, including percolation losses from them, may be almost 50 million acre-feet.

Various schedules for filling the reservoirs of Colorado River storage project have been advanced. The latest and most authoritative, which was recommended to the Secretary of the Interior in January 1960, provides in essence that:

1. The total quantity of water to be released from Glen Canyon Reservoir in each year shall be sufficient, without accumulative draft on Lake Mead below 14.5 million acre-feet, to satisfy all diversions for beneficial consumptive use in the lower basin, to offset net reservoir and river channel losses, and to provide for the delivery of water to Mexico pursuant to the treaty of 1944.

2. The total flow in Colorado River in each year plus the actual flow in each year shall be not less than 75 million acre-feet.

If the foregoing schedule, or a flow of Colorado River at Lees Ferry in any year after 1963. Other reservoirs upstream cannot be filled to become great enough to eliminate the deficiency shown graphically on plate I.

NET AVAILABLE

During the period from October 1963 to the special master, exactly equal to page 124 of that report. In the 3 years being filled, there was a net gain from the reservoir have been at Lees Ferry and Hoover Dam. Hence, that the supply available for all practical at Lees Ferry.

In the future, however, when regulated in Glen Canyon Reservoir Lake Mead may be operated at a loss. Various estimates of the net gain it appears that an average net gain be assumed. Hence, under future basin from Lake Mead can be less than the residual flow of Colorado River.

A substantial part of the supply of water at Lees Ferry will not be available for beneficial use in Nevada. There are now and will be large evapo-transpiration losses from reservoirs downstream from Hoover Dam and the International Boundary in the past is given on page 125 of this report about 1.25 million acre-feet per year probably take place, particularly in the lower basin, but the best that can be expected is that the consumptive use of water between Lees Ferry and the International Boundary will be reduced progressively to about 1.7 million acre-feet per year.

The United States is obligated to deliver to Mexico 1.5 million acre-feet per year of water in accordance with a schedule of releases which is unavoidable because of the long distance of the reservoir below Lake Mead, and it is anticipated that the total quantity of water held to less than 1.7 million acre-feet.

Under present conditions, therefore, the water released from Lake Mead for beneficial use in Arizona, California, and the International Boundary, in addition to the total supply may be reduced to a sum of 1.7 million acre-feet per year nonbeneficial consumptive use in the International Boundary.

As pointed out earlier in this report, the most probable future supply of water in the upper basin upstream depletions were equal to the average and there will be progressive depletions in table C. In addition there will be depletions of the Colorado River at Lees Ferry.

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FILLING

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2. The total flow in Colorado River at Lees Ferry caused by such releases in each year plus the actual flow at Lees Ferry in the 9 years preceding shall be not less than 75 million acre-feet.

If the foregoing schedule, or any basically similar schedule, be adopted, the flow of Colorado River at Lees Ferry will be little more than 8 million acre-feet in any year after 1963. Otherwise Glen Canyon Reservoir and the other reservoirs upstream cannot be filled before permanent depletions in the upper basin become great enough to eliminate the temporary surplus that now exists. This is shown graphically on plate I.

NET AVAILABLE TO LOWER BASIN

During the period from October 1937 to September 1949 the estimated historic gain from Lees Ferry to Hoover Dam, as shown on page 123 of the report of the special master, exactly equaled the evaporation from Lake Mead noted on page 124 of that report. In the 3 preceding years, during which Lake Mead was being filled, there was a net gain in supply because the average area of Lake Mead was then relatively small; on the other hand, in recent years the losses from the reservoir have been more than the tributary inflow between Lees Ferry and Hoover Dam. Hence, under historic conditions, it could be assumed that the supply available for diversion or release from Lake Mead is of the same magnitude for all practical purposes as the total flow of Colorado River at Lees Ferry.

In the future, however, when the variable flow of Colorado River will be regulated in Glen Canyon Reservoir and other reservoirs above Lees Ferry, Lake Mead may be operated at a lower average level to minimize evaporation losses. Various estimates of the possible reduction have been made from which it appears that an average net gain of 200,000 acre-feet per year may properly be assumed. Hence, under future conditions, the supply available to the lower basin from Lake Mead can be expected to be 200,000 acre-feet per year more than the residual flow of Colorado River at Lees Ferry.

A substantial part of the supply that can be diverted or released from Lake Mead will not be available for beneficial consumptive use in Arizona, California, and Nevada. There are now and will continue to be evaporation losses from reservoirs downstream from Hoover Dam and there are now and will continue to be large evapo-transpiration losses along the channel of the river between Hoover Dam and the International Boundary. The magnitude of these losses in the past is given on page 125 of the report of the special master, a total of about 1.25 million acre-feet per year. Some reduction in channel losses will probably take place, particularly when the Parker Indian Reservation is developed, but the best that can be anticipated is that the total nonbeneficial consumptive use of water between Hoover Dam and the International Boundary will be reduced progressively to about 800,000 acre-feet per year.

The United States is obligated by the Treaty of 1944 to deliver at least 1.5 million acre-feet per year of water to Mexico in the channel of Colorado River in accordance with a schedule of deliveries. Certain over-deliveries are unavoidable because of the long distance between Lake Mohave, the regulating reservoir below Lake Mead, and the International Boundary, and it is not to be anticipated that the total quantity of water passing into Mexico will be held to less than 1.7 million acre-feet per year.

Under present conditions, therefore, at least 2.9 million acre-feet per year of the water released from Lake Mead is not available for beneficial consumptive use in Arizona, California, and Nevada. In the future, this unusable portion of the total supply may be reduced to 2.5 million acre-feet per year, the sum of 1.7 million acre-feet per year passing into Mexico and 0.8 million acre-feet per year nonbeneficial consumptive use between Hoover Dam and the International Boundary.

As pointed out earlier in this report, 12 million acre-feet per year would be the most probable future supply of water in Colorado River at Lees Ferry if upstream depletions were equal to the average of all historical depletions. This obviously will not be the case because current depletions are more than this average and there will be progressively greater permanent depletions as shown in table C. In addition there will be temporary depletions due to filling of the reservoirs of the Colorado River storage project. Hence, as shown in table D,

the net supply of water available for beneficial consumptive use in the lower basin from the mainstream of Colorado River will be no more than 5,500,000 acre-feet per year.

Should the decree recommended by the special master be entered by the Supreme Court, the supply so apportioned to California would be 44/75 of this amount, a net of 3,227,000 acre-feet per year. It is significant that this ultimate supply from Colorado River is little, if any, greater than the perfected rights of California projects, as defined by the special master.

The degree to which beneficial consumptive uses in the lower basin of water from the mainstream of Colorado River will be limited in the future can be evaluated in a different manner than that set forth above.

The flow of Colorado River has been depleted historically between Lees Ferry and the International Boundary by diversions for beneficial consumptive use, by reservoir evaporation losses, and by nonbeneficial channel losses, offset in part by tributary inflows. The historical net depletion in each year is simply the difference between the total flow at Lees Ferry and the total quantity passing the International Boundary adjusted for changes in the quantity in storage in intervening reservoirs. Such net depletions were less than 3 million acre-feet per year until Hoover Dam was constructed; for the next 13 years they averaged 4 million acre-feet per year; they are now more than 6 million acre-feet per year. For example: the net depletion of the flow of Colorado River between Lees Ferry and the International Boundary was 6,193,000 acre-feet in 1956; in that year the diversions by the metropolitan water district were 481,493 acre-feet (p. 128, report of the special master). Since then the metropolitan water district increased its diversions progressively to 839,000 acre-feet in 1959-60, and it now has facilities for diversion and transportation of much more water.

The quantity of water required from Colorado River at Lees Ferry to satisfy all existing uses is thus at least 6.5 million acre-feet per year plus the quantity that passes into Mexico. The latter will be not less than 1.7 million acre-feet per year, so that not less than 8.2 million acre-feet per year must enter the lower basin. It is significant that this total of 6.5 million acre-feet per year is only 77 percent of 8,462,000 acre-feet, the aggregate delivery obligation of the Secretary of the Interior under existing contracts. It is apparent from table D that the flow of Colorado River at Lees Ferry will soon be less than 8.2 million acre-feet per year unless the Secretary of the Interior adopts a very slow schedule of filling the reservoirs of the Colorado River storage project.

It must be recognized, therefore, that all existing projects in the lower basin are dependent on the unused part of the water apportioned to the upper basin by the Colorado River compact. It must be recognized also that California's existing uses are dependent on the now unused portion of the water allocated to Arizona under the decree recommended by the special master to the Supreme Court.

CONCLUSIONS

In brief, I find from review of the report of the special master and from analysis of published and unpublished reports of Federal and State agencies and from our own studies that:

- (1) Irrespective of the recommended decree, there soon will be insufficient water in Colorado River to fulfill the aggregate delivery obligation of the Secretary of the Interior under existing contracts with the States of Arizona and Nevada and with the political subdivisions of California which have separately entered into contracts with the United States.
- (2) The supply apportioned to California by the recommended decree would only temporarily satisfy existing uses in California.
- (3) The supply of water permanently available to California from Colorado River, if the recommended decree be entered, will not exceed 3,300,000 acre-feet per year, three-quarters of the minimum supply that otherwise would be available.

TABLE D.—Net available supply for lower basin of Colorado River

[Quantities in millions of acre-feet per year]

Item	Description
1	Residual average supply in Colorado River at Lees Ferry after permanent depletions in upper basin
2	Additional temporary depletion due to reservoir storage
3	Probable supply in Colorado River at Lees Ferry
4	Supply available for diversion or release from reservoirs
5	Deliveries to Mexico, including operation of Colorado River Storage Project
6	Other reservoir and channel losses
7	Net available for beneficial consumptive use in lower basin

NOTES.—
 Item 1: Based on 12,000,000 acre-feet per year as estimated by the special master, less depletions equal to average historical depletions in upper basin.
 Item 2: Anticipated rates of filling of Colorado River storage project.
 Item 4: Allowance of 200,000 acre-feet per year for reduction in average evaporation loss from the Colorado River Storage Project.
 Item 6: Assumed progressive reduction in nonbeneficial channel losses from the International Boundary from total of 1,265,700 acre-feet per year as reported by the special master's report.

Mr. ELY. I should like to comment on the measures before you.

First, while the Fryingpan-Arkansas committee today, I desire to say that Colorado and of the sponsors of the bill to Los Angeles for a conference with the River Board and attorney general of the people, as we knew them to be before both sides we struggled to reach some of our differences.

This was accomplished, with the issue upon which they could not yield.

The Fryingpan-Arkansas bill, Mr. Ely, incorporates those amendments. The certain is one which limits in effect to 25 percent of the total which is available.

When this bill is considered in the Arizona members of the committee to amend the bill.

But I may say that with respect to Arizona has withdrawn those which were in the Fryingpan-Arkansas project, which now appear in the bill.

I desire to express my appreciation to Mr. Aspinall and the attorneys for Colorado for the able way in which this matter was handled.

With respect to the San Juan project, we think that the amendments and their counterparts, are fair and should be included in the bill. Mr. Matthew will give the facts when he testifies.

We are particularly concerned that the bill also a limitation upon transportation of water.

TABLE D.—*Net available supply for lower basin from mainstream of Colorado River*

[Quantities in thousands of acre-feet in year]

Item	Description	1970	1980	1990
1	Residual average supply in Colorado River at Lees Ferry resulting from permanent depletions in upper basin.....	10,328	8,999	8,225
2	Additional temporary depletion due to reservoir filling.....	2,428	1,199	425
3	Probable supply in Colorado River at Lees Ferry.....	7,900	7,800	7,800
4	Supply available for diversion or release from Lake Mead.....	8,100	8,000	8,000
5	Deliveries to Mexico, including operational waste.....	1,700	1,700	1,700
6	Other reservoir and channel losses.....	1,000	900	800
7	Net available for beneficial consumptive use in lower basin States.....	5,400	5,400	5,500

NOTES.—

Item 1: Based on 12,000,000 acre-feet per year as most probable future supply at Lees Ferry with upstream depletions equal to average historical depletions. See table C.

Item 2: Anticipated rates of filling of Colorado River storage project reservoirs. See plate I.

Item 4: Allowance of 200,000 acre-feet per year net gain between Lees Ferry and Hoover Dam on account of reduction in average evaporation loss from Lake Mead.

Item 6: Assumed progressive reduction in nonbeneficial consumptive uses between Hoover Dam and International Boundary from total of 1,265,700 acre-feet per year, computed from data on p. 125 of special master's report.

Mr. ELY. I should like to comment briefly on the matter of amendments to the measures before you.

First, while the Fryingpan-Arkansas bill is not formally before the committee today, I desire to say that representatives of the State of Colorado and of the sponsors of the Fryingpan-Arkansas project came to Los Angeles for a conference with representatives of the Colorado River Board and attorney general of California. We found these people, as we knew them to be before, to be reasonable men. And on both sides we struggled to reach some agreement which would dispose of our differences.

This was accomplished, with the exception of one very important issue upon which they could not yield, nor could we.

The Fryingpan-Arkansas bill, Mr. Aspinall's bill H.R. 2206, incorporates those amendments. The one amendment which it does not contain is one which limits in effect transmountain diversions in Colorado to 25 percent of the total which may be available to that State.

When this bill is considered in committee, we shall ask the California members of the committee to again urge that amendment.

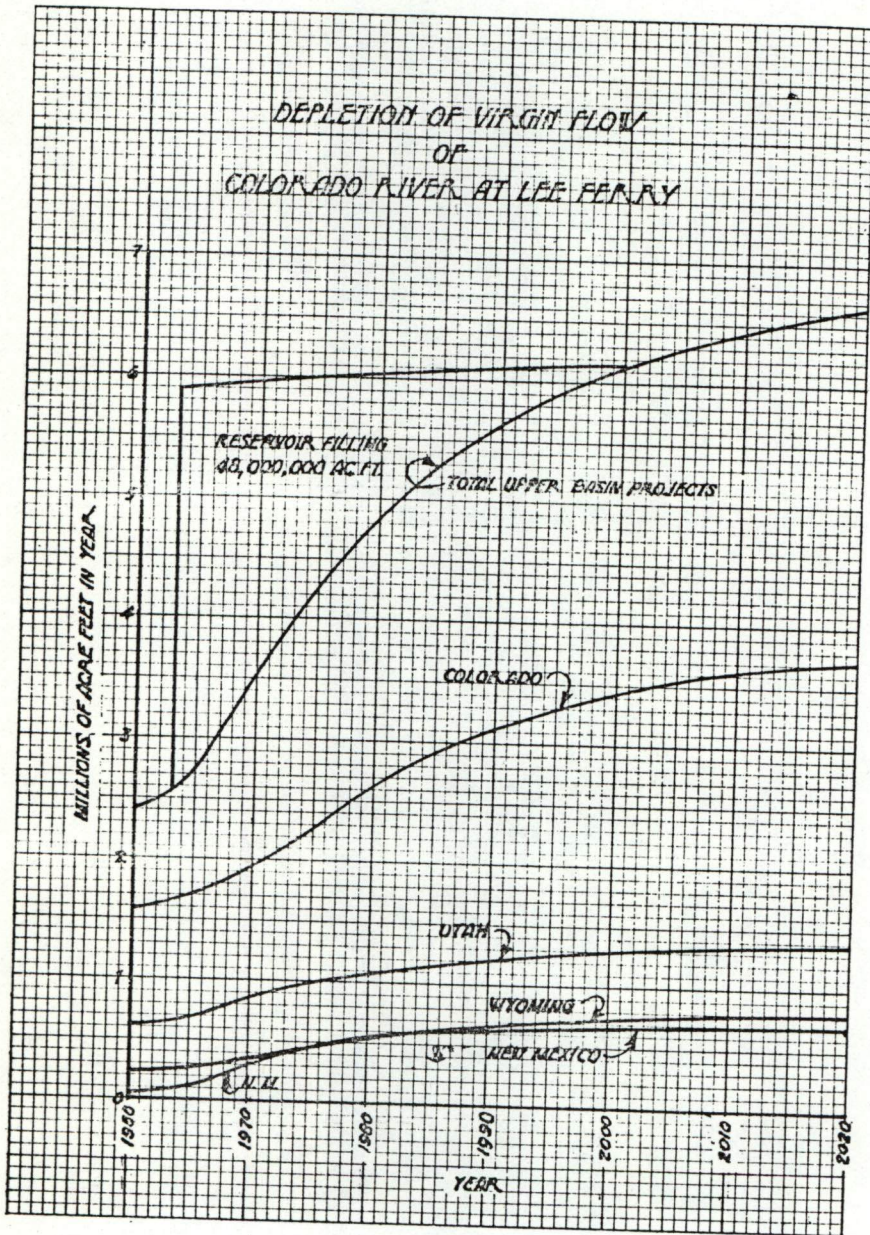
But I may say that with respect to the other amendments, California has withdrawn those which were not acceptable to the sponsors of the Fryingpan-Arkansas project. They, in turn, have accepted those which now appear in the bill.

I desire to express my appreciation to Judge Chenoweth and Mr. Aspinall and the attorneys for Colorado and the project, for the amicable way in which this matter was adjusted.

With respect to the San Juan-Chama-Navajo bill now before you, we think that the amendments which appear in H.R. 2206, or their counterparts, are fair and should be included in the San Juan-Chama bill. Mr. Matthew will give the background of some of those matters when he testifies.

We are particularly concerned that there be in the San Juan-Chama bill also a limitation upon transmountain diversions.

PLATE 1



This is not an academic matter. compact was negotiated, it was representatives that transmountain water would never exceed a half million that estimate was. None of us know what the effect of transmountain water as compared to the use of it. We do know that this matter is of importance.

Quality of water is likely to be affected upon the development of the Colorado River.

The Mexican water treaty involves it exists. We know the troubles we have in California. We know or can estimate that water will be impaired as these upper basins increase. And we do earnestly ask you to consider this.

The other amendments, Mr. Santorum will have in hand and will discuss with them. But their background and the particular problem on the San Juan project is being dealt with by Mr. Matthew.

Thank you very much.

Mr. ROGERS. Thank you, Mr. Matthew. Mr. Matthew?

STATEMENT OF RAYMOND MATTHEW, MEMBER OF THE COLORADO RIVER BOARD

Mr. MATTHEW. Thank you, Mr. Rogers. For the record, my name is Raymond C. Matthew, Chairman of the Colorado River Board, created in 1937 by the State Legislature. My duty is the responsibility of protecting and safeguarding the interests of the agencies and citizens, in and to the Colorado River system.

I have with me Mr. D. E. Collins, Secretary of the Colorado River Board.

I believe you have copies of my statement, and I will proceed with it, Mr. Chairman, if that is all right.

Mr. ROGERS. You may proceed.

Mr. MATTHEW. Water supply and the quality of water are of tremendous significance and are inherent in the development of the Colorado River system. The increase in use of Colorado River water is a matter of New Mexico's best interests. The terms of the Colorado River Compact and in the light of the proposed decree in the *Arizona v. California* case, the adequacy of the water supply plan for the Colorado River and its tributaries.

New Mexico's entitlement to water under the Colorado River Compact and the Upper Colorado River Compact on the average to supply the estimated

This is not an academic matter to us. When the Colorado River compact was negotiated, it was explained by the upper basin representatives that transmountain diversions in the entire upper basin would never exceed a half million acre-feet. We know how wrong that estimate was. None of us know—I do not pretend to tell you—what the effect of transmountain diversions may be upon the quality of water as compared to the use of the same quantity within the basin. We do know that this matter is of urgent importance.

Quality of water is likely to be the dominating and limiting factor upon the development of the Colorado River.

The Mexican water treaty involves that issue. It is latent. We know it exists. We know the troubles we are having with quality of water in California. We know or can suspect the degree to which quality will be impaired as these upper basin transmountain diversions increase. And we do earnestly ask your consideration of that problem.

The other amendments, Mr. Saund, Mr. Hosmer, and Mr. Johnson will have in hand and will discuss with you when you mark up the bill. But their background and the particular relation of the water supply problem on the San Juan project to the impact on California will be dealt with by Mr. Matthew.

Thank you very much.

Mr. ROGERS. Thank you, Mr. Ely.

Mr. Matthew?

STATEMENT OF RAYMOND MATTHEW, CHIEF ENGINEER, COLORADO RIVER BOARD OF CALIFORNIA

Mr. MATTHEW. Thank you, Mr. Chairman.

For the record, my name is Raymond Matthew. I am chief engineer of the Colorado River Board of California, which is an agency created in 1937 by the State legislature with the duty and responsibility of protecting and safeguarding the rights of California, its agencies and citizens, in and to the waters of the Colorado River system.

I have with me Mr. D. E. Cole, principal hydraulic engineer of the Colorado River board.

I believe you have copies of my statement. It is short. I will proceed with it, Mr. Chairman, if that is your pleasure.

Mr. ROGERS. You may proceed.

Mr. MATTHEW. Water supply and use: Two questions of tremendous significance are inherent in the consideration of the proposed increase in use of Colorado River system water in New Mexico. One is the matter of New Mexico's legal entitlement to water under the terms of the Colorado River compact and the Upper Colorado River Basin compact and in the light of the special master's report and proposed decree in the *Arizona v. California* suit; the other involves the adequacy of the water supply physically available in the San Juan River and its tributaries.

New Mexico's entitlement to water: There is serious question whether the New Mexico entitlement to water under the Colorado River compact and the Upper Colorado River compact would amount to enough on the average to supply the estimated requirements of both the pro-

posed Navajo Indian project and the initial stage of the San Juan-Chama project, in addition to the requirements of other New Mexico projects, existing and authorized, for use of Colorado River system water.

Under article III of the Upper Colorado River Basin compact, New Mexico is entitled to 11.25 percent of the total quantity of consumptive use per annum available each year to the upper basin, after deducting 50,000 acre-feet per annum for use in Arizona. Thus the adequacy of New Mexico's legal entitlement would appear to depend directly upon the total supply available for use in the upper basin.

In his report of December 5, 1960, in the U.S. Supreme Court suit, *Arizona v. California, et al.*, Special Master Simon H. Rifkind treats the Colorado River compact, as Mr. Ely has already told you, as a ceiling on appropriations, not a reservation of water in perpetuity. He says in effect that the annual quantity of water available in the future to the lower basin in the main stream, a quantity which will be governed in large degree by the extent of upper basin development, is a matter to be determined by the Congress, not the Court.

Whether this is so or not, the Congress obviously must be fully informed as to the total available water supply and use, in order to weigh carefully the possible effects of any new authorizations upon the water supply that would remain available for existing and authorized projects. The water supply at Lees Ferry, the dividing point between the upper and lower basins, would have averaged in a state of nature only 14 million acre-feet a year for the last 40 years. This is an approximately accurate measure of the total water supply available in the Colorado River Basin, excluding the supply on lower basin tributaries. This supply of 14 million acre-feet a year is all that can be safely depended upon in considering proposed developments and weighing their potential effects upon existing and other proposed uses of water.

Manifestly with that quantity of water the upper basin cannot achieve an annual consumptive use of water as great as the 7.5 million acre-feet a year apportioned it by the Colorado River compact and at the same time fulfill the obligation of the four upper division States under the compact to deliver not less than 75 million acre-feet to the lower basin at Lees Ferry in every period of 10 consecutive years, plus whatever obligation there may be to deliver additional quantities required by the Mexican water treaty. The quantity of water available for use in the upper basin will be substantially less than the compact apportionment, entirely aside from consideration of additional factors raised by the special master's report and proposed decree in the Arizona suit.

As has already been brought out, of course, by simple subtraction, with a water supply of 14 million acre-feet, and deducting the required delivery of water at Lees Ferry under article 3d of the compact, you arrive at 6½ million acre-feet. And, of course, because of the variations in occurrence of runoff, it is probable that you could not fully conserve all of that water. There might be something less.

Existing and presently authorized projects in the upper basin will consume when fully developed, about 3.9 million acre-feet of water a year on the average. Projects now pending approval, including the

Fryingpan, Savery-Pot Hook, Navajo, and San Juan-Chama, would bring the total to about 4.4 million acre-feet a year. The special master's proposed decree in the Arizona suit would result in a full natural supply at Lees Ferry of 14 million acre-feet a year, the consumptive use of 3.9 million acre-feet a year in the upper basin would result in a 20-percent shortage of water for the requirements of existing California projects and other authorized uses for all the main stream water available in the basin. Use of as much as 4.4 million acre-feet a year would, under the same circumstances, reduce the Colorado River aqueduct of the Metropolitan Water District of California to 20 percent or less of capacity. California has appropriative rights dating back to the 1850's, a population already exceeding 7 million, and a highly developed economy. Further substantial increases in population in addition to depriving the Colorado River Basin of its supply, cause very substantial curtailment of water for established California agricultural projects. The Colorado River water, which have appropriative rights dating over a half century ago, with works on 10 million acres of farmland and associated water requirements.

New Mexico's entitlement of 11.25 percent of the total supply available for the Colorado River Basin of 14 million acre-feet a year; 489,000 acre-feet a year would such entitlements go toward meeting the requirements?

New Mexico State Engineer S. E. Reynolds testified at the hearings on the Navajo and San Juan-Chama projects that committed uses from the Colorado River system projects in New Mexico will be 275,000 acre-feet a year (See table 1.) And this table, Mr. Reynolds testified, was mentioned by Judge Sand, but I wanted to ask you about it.

Mr. Reynolds also testified that new projects proposed and contemplated would result in a year net depletion, including 362,000 acre-feet a year for the project and the initial stage of the Navajo project. The total annual requirement for the authorized and contemplated projects in the upper basin in order for the New Mexico entitlement to be met would be 1.1 million acre-feet a year total requirement indicated by Mr. Reynolds. The quantity of water available for upper basin use would have to be 1.1 million acre-feet a year, which would substantially reduce the upper basin can use in view of the average supply available, considering additional factors inherent in the compact and proposed decree.

There follows table 1, which sets forth the details of Mr. Reynolds' testimony, which appears in the report of the committee hearings on H.R. 2352, 86th Congress, 1st Session.

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Fryingpan, Savery-Pot Hook, Navajo and San Juan-Chama, would bring the total to about 4.4 million acre-feet a year. But under the special master's proposed decree in the Arizona suit, and assuming a full natural supply at Lees Ferry of 14 million acre-feet a year average, the consumptive use of 3.9 million acre-feet a year in the upper basin would result in a 20-percent shortage in meeting the full requirements of existing California projects, if Arizona and Nevada developed uses for all the main stream water proposed to be allocated to them. Use of as much as 4.4 million acre-feet a year in the upper basin would, under the same circumstances, reduce the supply for the Colorado River aqueduct of the Metropolitan Water District of Southern California to 20 percent or less of constructed capacity. This district has appropriative rights dating back to the midtwenties. It serves a population already exceeding 7 million and a most important industrial economy. Further substantial increase in upper basin use would, in addition to depriving the Colorado River aqueduct of all its water supply, cause very substantial curtailment of supply for the long-established California agricultural projects depending upon Colorado River water, which have appropriative rights and developments initiated over a half century ago, with works constructed to serve about a million acres of farmland and associated municipal and industrial water requirements.

New Mexico's entitlement of 11.25 percent would be 433,000 acre-feet a year if the total supply available for upper basin use were 3,900,000 acre-feet a year; 489,000 acre-feet if the total were 4,400,000. How far would such entitlements go toward meeting New Mexico's aspirations?

New Mexico State Engineer S. E. Reynolds testified last year in hearings on the Navajo and San Juan-Chama project bills that committed uses from the Colorado River system by present and authorized projects in New Mexico will be 275,000 acre-feet a year, net depletion. (See table 1.) And this table, Mr. Chairman, has already been mentioned by Judge Saund, but I wanted to review it here in my statement.

Mr. Reynolds also testified that new requirements for other developments proposed and contemplated would amount to 508,000 acre-feet a year net depletion, including 362,000 acre-feet for the Navajo irrigation project and the initial stage of the San Juan-Chama diversion project. The total annual requirement for New Mexico's existing, authorized and contemplated projects amounts to 783,000 acre-feet. In order for the New Mexico entitlement to equal the 783,000 acre-feet a year total requirement indicated by Mr. Reynolds' figures, the total available for upper basin use would have to be approximately 7 million acre-feet a year, which would substantially exceed the amount that the upper basin can use in view of the available water supply, without considering additional factors inherent in the special master's report and proposed decree.

There follows table 1, which sets forth those figures from Mr. Reynolds' testimony, which appears on page 78 of the House subcommittee hearings on H.R. 2352, 86th Congress, 2d Session.

(The table referred to is as follows:)

TABLE 1.—New Mexico water requirements from upper Colorado River system¹—
Average annual stream depletion at sites of use

	Thousand acre-feet
Committed uses by present and authorized projects:	
Present uses.....	92.3
Share of evaporation CRSP main stem.....	73.3
Hammond project.....	6.8
Extension of Indian projects.....	24.7
Navajo Reservoir losses.....	39.0
Utah Construction Co.....	39.0
	275.1
Proposed:	
Navajo irrigation project.....	252.3
San Juan-Chama, initial stage.....	110.0
	362.3
Other:	
Municipal and industrial.....	112.5
Animas-La Plata project.....	33.4
	145.9
Subtotal.....	508.2
Total.....	783.3

¹ Per testimony of New Mexico State Engineer S. E. Reynolds.

For committed uses by existing and authorized projects, plus only the requirements for the Navajo irrigation and initial stage San Juan-Chama projects, New Mexico would be depleting the flow of San Juan River by 637,000 acre-feet a year. This amount of use would be 204,000 acre-feet a year in excess of New Mexico's entitlement if the total average annual supply available for upper basin use were 3,900,000 acre-feet, and 148,000 acre-feet in excess if the total were 4,400,000 acre-feet. In order for the New Mexico entitlement to equal 637,000 acre-feet a year, the total available for Upper Basin use would have to be approximately 5.7 million acre-feet a year.

It appears likely that the net use of water on the Navajo Indian project would be 75,000 to 100,000 acre-feet a year more than estimated in the planning report, and consequently the excess of New Mexico uses over her entitlement would be that much greater. Some 50,000 acres of the project service area lie 20 to 40 miles from the San Juan River and it is highly questionable if there would be much if any return flow therefrom to the river.

As previously indicated, a total upper basin use of even as much as 4,400,000 acre-feet a year would reduce the water supply available for use in California under the proposed decree in the Arizona suit to only a fraction of the requirements of projects long constructed and in operation, with water rights established by appropriation under State law and by contracts with the Secretary of the Interior under the Boulder Canyon Project Act.

The Rifkind opinion puts squarely up to the Congress the question of authorization of new projects which upon analysis in the light of the limited water supply available would be found to impair the

supply needed by existing and proposed projects. The Rifkind situation emphasizes the need for a study of the water supply situation involved, including the total water supply available for existing and proposed uses, the water rights compacts, and the significance of the decree by Judge Rifkind in the light of the additional developments.

Adequacy of project water supply is a question that arises whether the longtime average flow of the San Juan River is sufficient, with the water supply provided by the Navajo Reservoir, to meet the requirements of existing and authorized developments and the additional requirements of the contemplated inbasin uses including the initial stage of the San Juan-Chama project. The water supply and reservoir operation at the San Juan-Chama project as reported in the Interior Department report were 1928 to 1951, inclusive. Since 1951, the 4-year period of low flow of reservoir operation 1953-56, inclusive, the water supply was only half the estimated average for the 4-year period 1943-56, inclusive, it was only one-half for the longtime period.

An annual summary of Navajo Reservoir operations by the State of New Mexico, now being prepared, has been submitted for the record. The study assumes upstream depletion of the initial-stage State San Juan-Chama project, the Pass diversion, and a contemplated project. It indicates that the water supply in the Upper Basin, even with the regulation of the Navajo Reservoir would be insufficient to meet the contemplated requirements. The water supply (drawn to dead storage) in the Upper Basin, including the 3 consecutive years 1953, 1954, 1955, and 1956 would be nearly empty at the end of 1953, 1954, 1955, and 1956 would be nearly empty. The assumed normal release requirements for the 5-year period of study the computed water supply is only 710,000 acre-feet. The assumed annual water supply for irrigation and industrial uses is 1,400,000 acre-feet.

Assuming that practically all the water supply borne by the irrigators below the Navajo Reservoir for industrial uses cannot stand the water supply shortages in the 5 critical years, the water supply is only 10 percent of the assumed irrigation requirements, a shortage in the 3 years 1954-56 of 1,400,000 acre-feet or about 2 full years' supply for the Navajo Indian project.

Colorado River system¹—
Uses of use

	Thousand acre-feet
-----	92.3
-----	73.3
-----	6.8
-----	24.7
-----	39.0
-----	39.0
-----	275.1
-----	252.3
-----	110.0
-----	362.3
-----	112.5
-----	33.4
-----	145.9
-----	508.2
-----	783.3

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to address the question
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supply needed by existing and previously authorized projects. This situation emphasizes the need for intensive consideration of all factors involved, including the total water supply available, the total existing and proposed uses, the several States' entitlements under the compacts, and the significance and impact of the report and proposed decree by Judge Rifkind in the Arizona suit, before launching any additional developments.

Adequacy of project water supply:

Aside from the problem of New Mexico's entitlement is the question whether the longtime average flow physically available in the San Juan River is sufficient, with the amount of storage regulation to be provided by the Navajo Reservoir, to supply the water requirements of existing and authorized developments in the San Juan Basin, plus the additional requirements of the Navajo Indian project, other contemplated inbasin uses including municipal and industrial, and the initial stage of the San Juan-Chama diversion project. The water supply and reservoir operation studies for Navajo Reservoir in the Interior Department report were carried only through the period 1928 to 1951, inclusive. Since 1951 there has occurred the most severe 4-year period of low flow of record on the San Juan River. In the period 1953-56, inclusive, the estimated average flow was only about half the estimated average for the period 1928-51; and for the 14 years 1943-56, inclusive, it was only about 75 percent of the average for the longtime period.

An annual summary of Navajo Reservoir Operation Study No. 8 by the State of New Mexico, covering the period 1928-59, inclusive, has been submitted for the record by State Engineer Reynolds. The study assumes upstream depletions reflecting the requirements of the initial-stage State San Juan-Chama project, the proposed Weminuche Pass diversion, and a contemplated increase by the existing Pine River project. It indicates that the water supply in the San Juan River Basin, even with the regulation that could be accomplished at the Navajo Reservoir would be insufficient to furnish the existing and contemplated requirements. The reservoir would have been empty (drawn to dead storage) in 5 of the 11 years between 1945 and 1957, including the 3 consecutive years 1954, 1955, and 1956, and would be nearly empty at the end of 1953 also. Releases in the 5 years 1947, 1951, 1954, 1955, and 1956 would have been substantially less than the assumed normal release requirements of 755,000 acre-feet a year, with shortages of 15, 36, 34, 51, and 49 percent, respectively. For the 32-year period of study the computed average annual regulated release is only 710,000 acre-feet. Computed average annual spill is 80,000 acre-feet. The assumed annual release requirements comprise 531,000 acre-feet for irrigation and 224,000 for municipal and industrial use.

Assuming that practically the entire shortage would have to be borne by the irrigators below Navajo Reservoir, since municipal and industrial uses cannot stand such drastic curtailment of supply, the shortages in the 5 critical years would be 24, 52, 48, 72, and 71 percent of the assumed irrigation demand of 531,000 acre-feet. Total shortage in the 3 years 1954-56 would have been more than a million acre-feet or about 2 full years' requirements of the proposed Navajo Indian project.

Furthermore, the New Mexico study makes no allowance for the release of water for the Utah Construction Co. steam-electric plant near Farmington nor for the satisfaction of prior rights below Farmington. The record indicates the intent to divert at least a part of the 55,000 acre-feet annual requirement of Utah Construction Co. through the Navajo Canal and that this requirement is in addition to the proposed 224,000 acre-feet for other municipal and industrial uses. An operation study by the Bureau of Reclamation submitted recently for the record indicates in addition to the annual demand of 531,000 acre-feet on the reservoir by the Hammond and Navajo irrigation projects, an estimated 20,000 acre-feet for regulatory losses and to meet natural flow uses below Farmington that would not be supplied by return flows or tributary inflow. It omits the 224,000 acre-feet a year municipal and industrial requirement shown in the study submitted by New Mexico. That is the study that Mr. Riter discussed in answer to questions this morning, which shows that there is sufficient water for the Navajo and San Juan-Chama projects, but makes no allowance for municipal and industrial use. The New Mexico study, on the other hand, study No. 8, includes a requirement, an attempted requirement, of 224,000 acre-feet for municipal and industrial use.

That most recent operation study by the Reclamation Bureau, covering the period 1928-60, indicates a sustained annual controlled release, with no shortages, of only 551,000 acre-feet a year, after allowing for the same upstream depletions assumed in the New Mexico study No. 8. Another U.S. Bureau of Reclamation study dated September 1960 is similar except that it does not allow for increased depletion by the Pine River project.

This September 1960 study is part of the financial and power rate analysis of the Colorado River storage project and participating projects, and is in table No. 6, as far as its analysis of the Navajo Reservoir is concerned.

It shows a controlled annual release of 600,000 acre-feet a year with no shortages, without specifying the uses that would be made of the release. Allowance for the Pine River project increased use would reduce this to about 550,000 as in the other Bureau study, which may be considered to be the safe yield of the reservoir. Average annual spill is calculated at 225,000 acre-feet. Although the spill might be reduced by increasing the normal release to serve larger requirements, the inevitable result of such an attempt, as shown by New Mexico's study, would be intolerable shortages in years of low supply.

Using the results of these recent Bureau studies, an analysis (table 2) has been prepared, patterned after calculations on page 322 of House Document 424, 86th Congress. This analysis shows conclusively that the water supply of the San Juan River on the basis of the historical record and with the storage regulation to be provided by Navajo Reservoir, could not furnish an average dependable yield sufficient to meet all the existing and proposed demands that will be placed upon it according to official estimates of the Interior Department and New Mexico. The average annual historical flow of about 980,000 acre-feet during the period 1928-60, reduced by contemplated upstream depletions, reservoir evaporation, and uncontrolled spill, would yield at Navajo Reservoir only about 550,000 acre-feet a year

of dependable supply, to take care of existing, projected downstream demands, estimated at 800,000 acre-feet a year. The indicated deficit is about 280,000 acre-feet a year.

There is no adequate showing in the report or of significant amount of this deficit could be met by return flow or by inflow from tributaries such as Animas. It appears to be mutually conflicting testimony on this point given by different witnesses. For example, Mr. Riter's unsupported statement that the requirements of the Utah Construction Co. powerplant "will be met largely from the flow of the River and in part from return flows from uses at Navajo Reservoir"; whereas Mr. Sparks testified that when the River supply is short the Animas would be dry at its mouth, more data and study are needed.

The conclusion is obvious that either: (1) little if any water would be available for increased municipal and industrial requirements of the Navajo and initial stage San Juan-Chama projects proposed were fully met; or (2) the requirements of the proposed projects would have to be drastically reduced in order to assure any substantial amount of dependable water supply for future municipal and industrial purposes.

The contracting provisions of the pending bills and the uncertainty in water supply which would necessitate arrangements for the prevention of shortages and limiting contract commitments, however, that the occurrence and amount of water shortages indicated by the water supply studies are so severe as to present an unhealthy prospect for successful operation of the project.

(The table attached to Mr. Matthew's statement is as follows.)

TABLE 2.—Navajo Reservoir water budget 1928-60 (average)

[Acre-feet per year, average]

1. Historic flow of San Juan River near Blanco.....	980,000
2. Potential upstream depletions:	
(a) San Juan-Chama project, initial.....	224,000
(b) Ultimate Pine river project and Weminuche Pass diversion.....	224,000
3. Estimated depleted inflow to Navajo Reservoir.....	532,000
4. Assumed withdrawal from storage.....	20,000
5. Estimated supply available at reservoir.....	550,000
6. Estimated reservoir evaporation.....	225,000
7. Estimated spill.....	225,000
8. Estimated supply available for release for downstream demands.....	325,000
9. Estimated downstream requirements:	
(a) Hammond project and 800 acres miscellaneous....	100,000
(b) Utah Construction Co. contract.....	100,000
(c) Navajo Indian project.....	100,000
(d) Municipal and industrial.....	100,000
(e) River regulation and prior rights.....	100,000
10. Deficiency in supply.....	280,000

no allowance for the Co. steam-electric plant prior rights below Farm-vert at least a part of the Construction Co. through is in addition to the pro-and industrial uses. An on submitted recently for demand of 531,000 acre-Navajo irrigation projects, losses and to meet natural e supplied by return flows re-feet a year municipal study submitted by New cussed in answer to ques-s sufficient water for the makes no allowance for exico study, on the other a attempted requirement, ial use.

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of dependable supply, to take care of existing, committed, and projected downstream demands, estimated at 830,000 acre-feet a year. The indicated deficit is about 280,000 acre-feet a year average.

There is no adequate showing in the report or elsewhere that any significant amount of this deficit could be met by the use of return flow or by inflow from tributaries such as Animas River. What appears to be mutually conflicting testimony on this matter has been given by different witnesses. For example, Mr. Reynolds made the unsupported statement that the requirements of the Utah Construction Co. powerplant "will be met largely from the flows of the Animas River and in part from return flows from uses served by Navajo Reservoir"; whereas Mr. Sparks testified that when the San Juan River supply is short the Animas would be dry at its mouth. Manifestly, more data and study are needed.

The conclusion is obvious that either: (1) little if any water would be available for increased municipal and industrial use if the requirements of the Navajo and initial stage San Juan-Chama projects as proposed were fully met; or (2) the requirements and scope of those proposed projects would have to be drastically reduced or curtailed in order to assure any substantial amount of dependable water supply for future municipal and industrial purposes.

The contracting provisions of the pending bills anticipate shortages in water supply which would necessitate arrangements for sharing of shortages and limiting contract commitments. It is submitted, however, that the occurrence and amount of water shortages indicated by the water supply studies are so severe as to present a most unhealthy prospect for successful operation of the proposed projects. (The table attached to Mr. Matthew's statement is as follows:)

TABLE 2.—Navajo Reservoir water budget 1928-60 base period

[Acre-feet per year, average]

1. Historic flow of San Juan River near Blanco-----	979, 000
2. Potential upstream depletions:	
(a) San Juan-Chama project, initial-----	105, 000
(b) Ultimate Pine river project and Weminuche Pass diversion-----	79, 000
	<hr/> 184, 000
3. Estimated depleted inflow to Navajo Reservoir-----	795, 000
4. Assumed withdrawal from storage-----	9, 000
	<hr/> 804, 000
5. Estimated supply available at reservoir-----	804, 000
6. Estimated reservoir evaporation-----	38, 000
7. Estimated spill-----	215, 000
	<hr/> 253, 000
8. Estimated supply available for release for downstream require- ments-----	551, 000
9. Estimated downstream requirements:	
(a) Hammond project and 800 acres miscellaneous-----	23, 000
(b) Utah Construction Co. contract-----	55, 000
(c) Navajo Indian project-----	508, 000
(d) Municipal and industrial-----	224, 000
(e) River regulation and prior rights-----	20, 000
	<hr/> 830, 000
10. Deficiency in supply-----	279, 000

REFERENCES BY LINE ITEMS

1. Data submitted by Reclamation Bureau for record, about May 1, 1961.
- 2-8. incl. Bureau operation study submitted for record about May 1, 1961.
- 2(b)=979,000 minus column (1) of USBR study.
- 8=Sum, columns (3), (4) and (5) Bureau study.
- 9(a), (c), (d) USBR study, and New Mexico study No. 8 supplied for record May 2, 1961.
- 9(b) House subcommittee hearings 86th Congress, 2d session on H.R. 2352, pages 72, 124.
- 9(e) USBR study column (5).

NOTE.—30,000 acre-feet a year present depletion between Navajo Dam site and Blanco (H. Doc. 424, 86th Cong., p. 322) omitted from both supply and requirements.

Mr. ROGERS. Thank you, Mr. Matthew.

The Chair recognizes the gentleman from Colorado, Mr. Aspinall.

Mr. ASPINALL. Mr. Chairman, we now have another study that the committee must consider. I think that as one member of the committee, I spell the word "confused" with a "k".

I do want to make this statement: That we have on our committee staff those who are about as good as anybody when it comes to taking the records that we have and making an evaluation. Mr. McFarland has made a very good study. I think that we can take these excellent statements that have been made to show the opposition, and take Mr. McFarland's study itself, and find some of the answers that this committee should have.

Now, as I understand the position which you gentlemen from California take, you do raise a question as to the availability of water for the San Juan-Chama and Navajo. Especially you call attention to the fact of the claim for 224,000 acre-feet of water for municipal and industrial development. Is that not correct?

Mr. MATTHEW. Yes. Table 2, Mr. Aspinall—

Mr. ASPINALL. I understand that. But what you are saying is that you are taking issue with the New Mexico statement and claims for this much water in the future for these purposes, while the Bureau themselves have not taken that into consideration, or Mr. Riter did not take it into consideration this morning. Is that not correct?

Mr. MATTHEW. Mr. Riter does not attempt to provide any water for M. & I. in his study.

Mr. ASPINALL. So what is really before this committee at this time, does not have anything to do with the 224,000 acre-feet of water claimed for municipal and industrial purposes. Is that not correct?

Mr. MATTHEW. I do not think entirely so. I believe there is a provision in the bill, is there not, Mr. Aspinall, for consideration of putting additional capacity in the conduit from Navajo Reservoir for municipal and industrial use? And is not your record replete with testimony that the city of Gallup expects to get water from this project and perhaps also Window Rock; also that there is a great demand, expected demand, for additional municipal and industrial water supplies to take care of the tremendous industrial potential which exists in the San Juan River Basin?

Now, Mr. Reynolds, in his study No. 8, attempted a demand on the reservoir, including 224,000 acre-feet per annum for M. & I. which he included as one of the presumably desirable demands to be met. Of course, the study shows it cannot be done. Large shortages occur.

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Mr. ASPINALL. The records show that it is not a part of this project as far as the feasibility of the project is concerned. Is that not correct?

Mr. MATTHEW. Well, as I say, my understanding is that there is a desire on the part of New Mexico to provide water from the San Juan River for municipal and industrial purposes. This study here shows, just as Mr. Riter's study shows, that all they can get out of it is 551,000 acre-feet as a safe yield without shortages.

So that would leave no water for municipal and industrial use at all.

Mr. ASPINALL. If the water is not there, then that part to which claim may be made would just be infeasible; is that not true? Is it not true that under the legislation that is now before us, the Navajo irrigation project for the Indians will have priority?

Mr. MATTHEW. I suppose that is true; although, as I say, I understand there is provision in the bill to provide capacity for M. & I.

Mr. ASPINALL. There also has been some testimony as to an enlarged conduit through the divide in order to carry more water to the Rio Grande Valley?

Mr. MATTHEW. That is right.

Mr. ASPINALL. But if the water is not there, it just will not be transported?

Mr. MATTHEW. That is true.

Mr. ASPINALL. And if they have to take it away from irrigation users—not Indians, not Indian irrigation users—in order to get sufficient water to take care of the Rio Grande Valley, that is what they will have to do. That is the only support, as far as I can see, for this enlarged conduit through the divide.

Let me ask you this question. Do you know of any irrigation project in the history of reclamation where the project proposed by the Bureau and approved by Congress and the President has failed because of lack of water?

Mr. MATTHEW. I cannot name them off directly, but I know there have been some. I know there have been projects that had to be cut back. I know there are projects that have had to have their repayment contracts extended many years, partly on account of deficient water supply.

Mr. ASPINALL. But we are not now talking about economics, but about availability of water. Projects have failed because of drainage conditions, because of alkali conditions, because of the economics on the project.

Mr. ELY. I can suggest one, Mr. Aspinall. The San Carlos project is a horrible example, designed for 100,000 acres, and able to supply only 50,000, with a reservoir that was never filled, is empty now, and was never more than two-thirds filled. It is an Indian project.

Mr. ASPINALL. Let me ask you this question. Is that project not paying out as planned?

Mr. ELY. No, sir. No, indeed. The project is a horrible casualty. It is not a Reclamation Bureau project.

Mr. ASPINALL. Is that not an Indian project?

Mr. ELY. It is.

Mr. ASPINALL. Well, all right. We are talking about Bureau of Reclamation projects.

Mr. ELY. I think when we speak of the Government projects under the Secretary of the Interior, it is not useful to inquire which hat he has on at the moment. This Navajo is an Indian project, although it will be built by the Bureau.

Mr. ASPINALL. What Mr. Rifkind said is nothing new, except he may have figured the availability of water, in a manner a little different from what the rest of us have. But what he really says is that the Congress of the United States and the executive department of the United States must be responsible for any future authorizations. Is that not correct?

Mr. ELY. He does say that. But the significance of what he says is that the Congress will be legislating in that respect not for the disposition of water which belongs to the upper basin, reserved to it, but legislating in effect to appropriate water, because this compact is nothing but a ceiling on appropriations.

Mr. ASPINALL. But, Mr. Ely, if the Congress of the United States is unable to depend upon the Bureau engineers in the determination of the availability of water, then the reclamation program should go out the window.

Mr. ELY. No, I do not think so, Mr. Aspinall. I think that the Bureau engineers would be the first to say that their studies of the water supply of the Colorado River, as Mr. Riter has said on another occasion, result in this: that every time they look at that river, they get a lower estimate. It is not within their control that as the hydrographic extends and as we hit extensions of dry periods the estimates must go down.

Mr. ASPINALL. You and I would both be pleased, would we not, if the wet season should happen to return again for a cycle of 10 years, and we could fill all the reservoirs as we could have at one time?

Mr. ELY. Indeed we would, provided we were wise enough to remember that adversity in the past, and not go overboard on the basis of temporary prosperity.

Mr. MATTHEW. I might point out, Mr. Aspinall, that in the case of nearly every project that is being planned in the upper basin, those already authorized and those proposed to be authorized—a large segment of the proposal is to provide supplemental water. For what? For an existing project, where it turned out they did not have enough water. They thought they did. They went ahead, and they went busted, because they did not have enough water. So the Bureau comes along with a new project to bail them out.

And one of the main objectives of all of these projects, I think you will recognize, is supplemental water supply.

Mr. ASPINALL. Mr. Matthew, 22 of these projects are in my district. What your statement would import does not exist in my district. We are not constructing very many new reclamation projects in my district. It does not make any difference whether it is the Boswick part, or whether it is the Animas-La Plata, or whether it is the Yellow-jacket, or the Tomichi Creek, or what it is. Those projects are not especially to put water on lands that are already irrigated. They are to catch water and furnish it for lands that can use it.

Mr. MATTHEW. Well, of course, a lot of the projects have additional lands to be irrigated.

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In other words, you if you endeavor to o right at the start.

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Mr. MATTHEW. I r for these projects; b there is a deficiency of

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Mr. ASPINALL. We is a flag of warning. figures as absolute, a tion, to me just puts tion. We have to de

Mr. MATTHEW. I t to be warned about t projects results in an beyond the water sup relative supplies ava stream, because once to give up the water.

Mr. ASPINALL. Al pathetic—I do not w water—it seems to n you can imagine. A think that is to your

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But I just wanted to further point out here: The requirement excluding M and I is 606,000 acre-feet a year, as compared with a safe yield as shown by Mr. Riter's study of 551,000 acre-feet, without shortage. Thus, there is a shortage of about 50,000 acre-feet a year. There is no other place you can go for supplemental water. No new project can come along to provide more water into the San Juan Basin, unless you bring it from the Mississippi River.

In other words, you are all done. So the whole point here is that if you endeavor to overextend yourself, you are doomed to failure right at the start.

Mr. ASPINALL. Are you making a case against the legislation that is now before us, or are you making a case against something that you think is likely to happen in the future?

Mr. MATTHEW. I realize that Mr. Riter testified there was water for these projects; but these figures on the face of them show that there is a deficiency of 50,000.

Now, one of the great questions that has not been put before your committee is: How much return flow is there going to be below Farmington? How much water is going to come out of the Animas River after your full development of the Animas-La Plata project and the Florida project? Where is this return flow going to come into the river? What use is it going to be available for? And so on.

Now, Mr. Reynolds testified, as I say, that the requirements of this powerplant down there, 55,000 acre-feet, are going to be supplied by return flow or flow from the Animas River. I say that you need to study this. These figures on their face would indicate that there would be a deficiency of 50,000 acre-feet in serving these two projects, in addition to all of the other demands that you have on them excepting M and I.

And I think that the water budget should go on down the river clear to Shiprock, or below, so that you would get a complete picture of your San Juan Basin supply before you come to the conclusion as to whether you have enough water or not.

Mr. ASPINALL. Well, I think that the position that you raise, which is a flag of warning, is perfectly all right. But for you to set up your figures as absolute, and question the figures of experts in this operation, to me just puts this committee up against a more difficult situation. We have to depend upon engineers and qualified experts.

Mr. MATTHEW. I think it would be a good idea for the committee to be warned about the water situation. If the authorization of these projects results in an over-extension of attempted uses by New Mexico beyond the water supply available, it is going to have an effect on the relative supplies available to the other States and the supplies downstream, because once the projects are built they certainly will not want to give up the water.

Mr. ASPINALL. Although I understand your position, and I am sympathetic—I do not want any project authorized for which there is no water—it seems to me that you take the worst possible situation that you can imagine. And I have no criticism against that, because I think that is to your interest to do so.

Now, others take the best possible position for themselves. But along comes Mr. Riter and some other students of this problem, and

one of them was Mr. Hill himself, when he made his first study of the waters of the Colorado River, and they take the middle of the road, which they think is a moderate approach to it.

Mr. ELY. Mr. Aspinall, may I comment on that?

Mr. ASPINALL. Certainly, Mr. Ely.

Mr. ELY. The danger is that there would be planned this project and other upper basin projects on the assumption that there is as much as 6.2 million acre-feet available for use in the upper basin. The figure of 6.2 million that you referred to in connection with Mr. Hill's 1953 report is based upon a period that ended 10 years ago.

Mr. ASPINALL. I understand that. I understand these assumptions and these estimates and so forth.

Mr. ELY. The drought since then has so far reduced the estimate of the safe yield, as Mr. Hill's current reports show, that if you proceeded on the assumption that there will be available for use in the upper basin 6.2 million acre-feet, or even any figure in excess of about 5½ million acre-feet, perhaps as low as 5 million acre-feet, you are making legal assumptions that are of the greatest gravity; because no one knows as yet what the obligation of the upper divisions is at Lees Ferry. There was mentioned this morning an obligation to deliver 75 million acre-feet of water every 10 years under III(d). Mr. Riter mentioned that as a minimum.

Do not forget III(c) and what that requires. And do not forget also that in the present Supreme Court suit contentions by Arizona that are far more extreme than anything I have presented here, as to the rights of Arizona, California, and Nevada out of the main stream.

Mr. ASPINALL. I think that is right. And we will not forget also that there is a lot of water that arises between Lees Ferry and the use down the river. There are a lot of things that must be taken into consideration.

If you would stand on your figure of 5½ million, as you first suggested, I would say: "All right. We will go easy. Even up the 5½ million. And we will stop there for awhile to see whether the necessary water is available." Because we certainly do not want to embarrass the Treasury of the United States on these matters. And that is what it amounts to.

Remember this: that there can be other projects and there can be other diversions of water without the United States coming into the picture whatsoever.

Mr. ELY. That is one thing that troubles us. The depletions may not result from action of this committee, but of some other sponsors.

Mr. ASPINALL. With the situation existing as you say it does, and as critical as it is as far as the supply is concerned, getting back to your limitations, the amendment that you have, do you think that Congress for a minute would authorize and appropriate money for a project which was close to the danger line.

Mr. ELY. I certainly hope not, Mr. Aspinall. But it has happened repeatedly so far. Projects have gone ahead on the happy assumption that the water supply was as great as it was thought to be by the compact negotiators. And it is simply not there.

Mr. ASPINALL. Where is one in the Upper Colorado River Basin that has been guilty of that?

Mr. ELY. Of course, you have so far, of quantities available to you, 4 million acre-feet. If you go beyond 4 million for the lower basin, Arizona, California, 7,400,000. That is how tight the water is.

Now, I am not saying you do not have a compact. I am simply saying that the compact is no longer a reservation of the upper basin. It is simply a reservation of the problem this committee now faces. The Rifkind report was filed, is that right, appropriating water as well as appropriating a new project.

You are not dealing with water reserved for you, your water in the lower basin. Every project built in the lower basin, if the Supreme Court, is in competition with the upper basin.

That is not a happy prospect at the lower. And that is what brings me to you. And that is what brings me to you that your depletion of 4 million acre-feet, which is 50 percent of the total, the unfortunate result of an increase those depletions reduces the water available to California by six-tenths of an acre-foot is built. I emphasize that last part.

Mr. ASPINALL. Of course, I understand the Rifkind decision is necessarily a part of the problem.

Mr. ELY. I hope it is not going to upset it, I assure you. I will give you my opinion.

But this is obviously a very serious situation. If projects being authorized, when we have the "sword of Damocles" in the Rifkind decision.

Mr. ASPINALL. Mr. Ely, the Rifkind decision, at the present time, with the exception of a little effect upon the total supply of water, has had very little effect upon the total supply of water.

Mr. ELY. By "Indian," you mean the Indian water.

Mr. ASPINALL. Yes, the Indian water.

Mr. ELY. Well, it is all incremental. It breaks the camel's back. We know it is a 10 million acre-foot river.

Mr. ASPINALL. I think that is a very good statement.

Mr. ELY. Thank you.

Mr. ROGERS. Judge Chenoweth.

Mr. CHENOWETH. I want to talk about the Fryingpan project.

It is always a pleasure to see any of any witness who has come before me here that commands more respect than not always agree with your comments that they are a result of long and hard work for your comments today concerning

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Mr. ELY. Of course, you have not invaded anybody's conception, so far, of quantities available to you. But you are up to 4 million acre-feet. If you go beyond 4 million acre-feet, the residue available for the lower basin, Arizona, California, and Nevada, shrinks below 7,400,000. That is how tight the water supply is.

Now, I am not saying you do not have a right to do that under the compact. I am simply saying that under the Rifkind formula the compact is no longer a reservation of water for the upper division, the upper basin. It is simply a ceiling on your appropriations. And the problem this committee now has, which it did not have before the Rifkind report was filed, is that the Congress is in effect appropriating water as well as appropriating money every time it authorizes a new project.

You are not dealing with water apportioned to the Upper Basin, water reserved for you, your water, to be distributed without regard to the lower basin. Every project built in the upper basin, every project built in the lower basin, if the Rifkind doctrine is approved by the Supreme Court, is in competition with the projects in the other basin.

That is not a happy prospect at all, either for the upper basin or the lower. And that is what brings us here; because, modest as it may seem to you that your depletions in the upper basin expand beyond 4 million acre-feet, which is 3½ million less than your compact apportionment, the unfortunate result is that every acre-foot by which you increase those depletions reduces existing uses of existing projects in California by six-tenths of an acre-foot, if the central Arizona project is built. I emphasize that last "if."

Mr. ASPINALL. Of course, I am saying to you that I do not think the Rifkind decision is necessarily gospel.

Mr. ELY. I hope it is not gospel. We are going to do our best to upset it, I assure you. I will give you an affidavit on that.

But this is obviously a very difficult period in which to see new projects being authorized, when we have hanging over our heads the "sword of Damocles" in the Rifkind report.

Mr. ASPINALL. Mr. Ely, the new projects that are contemplated at the present time, with the exception of the Indian projects, have very little effect upon the total supply of water for the upper basin.

Mr. ELY. By "Indian," you mean the Navajo?

Mr. ASPINALL. Yes, the Indian Navajo project.

Mr. ELY. Well, it is all incremental. You do not know which straw breaks the camel's back. We know that it is broken if we have a 14 million acre-foot river.

Mr. ASPINALL. I think that is all. Thank you very much for your very good statement.

Mr. ELY. Thank you.

Mr. ROGERS. Judge Chenoweth?

Mr. CHENOWETH. I want to thank Mr. Ely for his reference to the Fryingpan project.

It is always a pleasure to see you here, Mr. Ely. I do not know of any witness who has come before the committee in the years I have been here that commands more respect than you do. Though we do not always agree with your conclusions and observations, we know that they are a result of long and careful study. I want to thank you for your comments today concerning the Fryingpan project.

Mr. ASPINALL. Mr. Ely is one who holds his temper even though the Members up here get a little bit upset once in a while.

Mr. ELY. I am very much honored by these gracious remarks.

Mr. CHENOWETH. Do I understand, Mr. Ely, that it is now the California position on the Fryingpan that except for the 25-percent limitation you have reached agreement on this project?

Mr. ELY. That is correct, sir.

Mr. CHENOWETH. You are supporting the Aspinall bill?

Mr. ELY. I cannot say we are supporting it. I have no authority to say that. I can say that the objections which we had to the Chenoweth and Aspinall bills are removed, with the single exception of the limitation on transmountain diversions.

Mr. CHENOWETH. I want to personally thank you, both Mr. Ely and Mr. Matthew, and all of the California group that helped to make this agreement possible. These negotiations covered a long period of time. We are very grateful for this favorable consideration.

As Mr. Aspinall said, I assure you that we in Colorado do not intend to advocate any project that is going to in any way injure or damage your water users in California. This has always been our attitude.

Mr. ELY. I am sure that is true.

Mr. ROGERS. Mr. Saund?

Mr. SAUND. Now, what is the really usable, controllable supply of water at Lees Ferry, according to your calculations—the dependable and controllable supply of water at Lees Ferry?

Mr. MATTHEW. It is 14 million acre-feet a year on the average.

Mr. SAUND. Mr. Matthew, how much would be the diversion for the Navajo project?

Mr. MATTHEW. 508,000 acre-feet a year.

Mr. SAUND. And how much depletion is allowed in the estimate?

Mr. MATTHEW. A depletion of 252,000 acre-feet.

Mr. SAUND. And where will the balance of 246,000 be made up from? Is that return flow?

Mr. MATTHEW. The return flow is estimated at 256,000 acre-feet.

Mr. SAUND. 256,000 acre-feet return flow from this project, here. Now, how does that get back into the river? Have you seen the Chaco Wash?

Mr. MATTHEW. Yes, I have seen it, Judge, but I have not been clear along it. Of course, this is the great question. About half of the project is lands situated 30 to 50 miles from the San Juan River. My understanding is, from the best information I could obtain, that most of the drainage from irrigation water would find its way into this Chaco Wash, which traverses in a rather north and south direction through the reservation, and finally gets into the river, as I understand it, down near Shiprock, which is below most of the present irrigated area.

But this is a long, dry, tortuous desert channel. Any water getting into it would probably sink into the ground. And how much would be stored in the ground—it would probably be years before any return flow got back to the San Juan River, if it did.

And then the question would be: Is that return flow going to be available for use for any of these projects or these requirements which are set forth in table No. 2?

Mr. SAUND. Mr. Matthew, is included in your statement. Was that information supplied to the State Engineer of New Mexico?

Mr. MATTHEW. That is right.

Mr. SAUND. In that table, the diversion project will use 252,000 acre-feet.

Mr. MATTHEW. Yes.

Mr. SAUND. All right. And with Mr. Riter and arriving at 252,000. But that figure of 256,000 acre-feet of water does flow into the river. And that is 50 miles, over dry washes, really expect of that 256,000 return flow.

Mr. MATTHEW. In my opinion, or the on-site depletion, would be more than is estimated here. It is 250,000 instead of 250,000.

Mr. SAUND. Mr. Ely, you are the State of California. When all this comes in, how long do you expect it to be decided?

Mr. ELY. Within approximately 18 months.

Mr. SAUND. Within approximately 18 months will be the interpretation of the River compact, that we talked about.

Now, opinions differ. My opinion is that the compact differs from those of the States. What is the allocation for the Navajo project?

Mr. ELY. The States of the United States is a party to the compact. It would differ as to whether there is an interpretation of the compact.

Certainly there are before the Supreme Court the interpretation of the compact between Arizona and California under the compact. The Supreme Court has decided it, if anybody is going to litigate this case without any interpretation of these problems still floating around.

But just to give you one example, these litigants are confronted with the Colorado River compact, the controversy between Arizona and California, and whether there has been enough water at Lees Ferry under the Treaty, and all losses below the dam, period of time, ending with the dam.

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Mr. SAUND. Mr. Matthew, just to make it short: This table 1, which is included in your statement—where do you get that information? Was that information supplied to the committee by Mr. Reynolds, the State Engineer of New Mexico?

Mr. MATTHEW. That is right.

Mr. SAUND. In that table, he says that the proposed Navajo irrigation project will use 252,300 acre-feet?

Mr. MATTHEW. Yes.

Mr. SAUND. All right. And when I was this morning calculating with Mr. Riter and arriving at a figure, I accepted his figure of 252,000. But that figure of 252,000 is based on the assumption that 256,000 acre-feet of water diverting for that project will be a return flow into the river. And that has to come over distances as long as 40 and 50 miles, over dry washes. Now what, in your opinion, can we really expect of that 256,000 return flow?

Mr. MATTHEW. In my opinion the consumptive use on this project, or the on-site depletion, would be probably at least 100,000 acre-feet more than is estimated here. In other words, some 350,000 acre-feet, instead of 250,000.

Mr. SAUND. Mr. Ely, you are the Special Attorney General for the State of California. When all these special master's recommendations come in, how long do you expect it will be before the suit will be decided?

Mr. ELY. Within approximately 1 year.

Mr. SAUND. Within approximately 1 year. When it is decided, that will be the interpretation of the law of the river, or the Colorado River compact, that we talked about this morning.

Now, opinions differ. My interpretation of the Colorado River compact differs from those of the Bureau witnesses this morning. What is the allocation for the upper basin and the lower basin?

Mr. ELY. The States of the upper basin are not parties to this suit. The United States is a party. It is a matter on which the lawyers would differ as to whether the court can, or whether it is likely to, give an interpretation of the compact that is binding upon both basins.

Certainly there are before the court some very important issues of interpretation of the compact. It is hard to see how the quarrel between Arizona and California could be decided without interpreting the compact. The Supreme Court of course would be the body to do it, if anybody is going to. It is conceivable that it will dispose of this case without any interpretation of the compact, and leave many of these problems still floating around.

But just to give you one example of the uncertainties with which these litigants are confronted, it is simply this: that if there were no Colorado River compact, there would not be any justiciable controversy between Arizona and California. There is now and always has been enough water at Lees Ferry to satisfy all the demands of Arizona, California, and Nevada, meet the demand of the Mexican Treaty, and all losses below Lees Ferry. There has never been a period of time, ending with the present, when that has not been true.

With the storage capacity available at Hoover Dam and now at Glen Canyon, there would not be any quarrel between Arizona and California but for the fact that the compact must be given some effect with respect to the rights that it accords the upper basin.

But the special master refuses to hold the compact relevant at all. He will not take it into consideration. He says the rates of depletion in the upper basin are for Congress to decide later. The compact does not reserve water for the upper basin. It fixes a ceiling on appropriations.

So we have a very curious paradox. We have no legitimate quarrel between Arizona and California because there is plenty of water for them—unless you give some effect to the compact. But the special master says that compact is irrelevant.

There are a number of courses open, and there is no use speculating, but we think of necessity there are going to be some important compact determinations made in the final decree of the court.

Mr. SAUND. Mr. Chairman, these projects had been up for consideration for many years, and it was testified this morning that it will take 22 years for the construction and development period for one project; and the other about 10 years.

I submit that we could afford to wait one more year; because I know what is happening to the people of southern California, who base their entire lives and future, depending upon the contracts with the Secretary of the Interior, and building huge projects, with the hope and understanding that they will have water available. I hate to see that happen in other parts of the country. And also I hate to see some of the projects in California go dry.

Mr. ROGERS. Let the Chair make this observation. This is supposed to be a factfinding session, and your remarks will be certainly appropriate when we are writing up the bill.

Mr. SAUND. Mr. Matthew, can you give me just roughly the total amount of contracts which California corporations have with the Secretary for the delivery of water, if the water is available? 5,362,000 acre-feet?

Mr. MATTHEW. The contracts of California agencies? Yes, 5,362,000 acre-feet a year.

Mr. SAUND. We have relied on the Secretary of Interior and the Bureau witnesses. Here the Secretary of the Interior has entered into contracts with California agencies to the amount of 5,362,000 acre-feet. Of course, there is the availability clause. But they can do the same thing other places, and mistakes can occur.

That is all, Mr. Chairman.

Mr. MORRIS. Mr. Ely and Mr. Matthew, I read the press release about Mr. Ely not long ago that was issued by some State senators in California concerning your fee, and I thought at that time that that was a rather large fee. But I want to say this to you, sir, after listening to your eloquent presentation before this committee: I do not think that they paid you enough.

Mr. ELY. Thank you, sir.

Mr. MORRIS. Because I must say that you have been one of the most impressive witnesses that I have ever seen appear before any committee of the Congress of which I am a member.

Mr. ELY. I am very much honored, sir. Thank you.

Mr. MORRIS. I am going to ask you some questions. I want you to understand that I am not being facetious. But you and Mr. Matthew brought up the Rifkind report in this hearing. You have said that you are the Mr. Ely who represents California in the suit Arizona

versus California, in an decided on a position? San Juan-Chama and the committee?

Mr. ELY. I wish I could think that your bills, in Supreme Court, and the basin depletions poses a be so if the Supreme Court Arizona project is not also the

The difficulty is that until the Supreme Court concern upon both flanks, and the threat of water to be case were decided in our concerned about your project

Mr. MORRIS. This is in you read Mr. Hosmer's letter

Mr. ELY. Yes. I have not have it with me, but I

Mr. MORRIS. Let me know are pertinent to the question

Two weeks ago California of the State water resource Colorado River Board. The general southern California was entitled in the case of Arizona representatives suggested that the upper Colorado until the California, at which time the come determinable. The State the attorney general's office position.

Now, did you attend in this letter?

Mr. ELY. I attended and not sure what the other attended a number with Mr.

Mr. MORRIS. Is it your recommendation of the Colorado

Mr. ELY. No; I do not

Speaking for myself, I California and the California of taking any position with other until we know what Court.

I wish that this problem well be that we would be in

All I can say is, as I have uncertainty, we have to deal with grave misgivings members of Congress, confront to flatly ask for a moratorium

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versus California, in answer to Judge Saund's question. Have you decided on a position? Are you opposed to these bills concerning the San Juan-Chama and Navajo project, that are now pending before the committee?

Mr. ELY. I wish I could tell you "No." I cannot tell you that. I think that your bills, until the water supply question is before the Supreme Court, and the compact interpreted—every increase in upper basin depletions poses a very real threat to California. That will not be so if the Supreme Court turns down Arizona and the central Arizona project is not also threatening us.

The difficulty is that we are caught between the two of you. And until the Supreme Court tells us the answer, we must look with concern upon both flanks, depletions occasioned by the upper basin and the threat of water to be taken from us by Arizona. If the Arizona case were decided in our favor, I do not think we would be here concerned about your project, Mr. Morris.

Mr. MORRIS. This is just the point that I want to bring out. Have you read Mr. Hosmer's letter to Governor Brown of April 11, 1961?

Mr. ELY. Yes. I have not read it in detail. I have seen it. I do not have it with me, but I have seen the letter.

Mr. MORRIS. Let me read a couple of short paragraphs that I think are pertinent to the questioning.

Two weeks ago California's congressional delegation met with representatives of the State water resources office, your attorney general's office, and the Colorado River Board. The general seriousness of the situation on the Colorado for southern California was outlined in context of the special master's recommendation in the case of *Arizona v. California*. The Colorado River Board representatives suggested that our delegation oppose further development on the upper Colorado until the Supreme Court makes its decision in *Arizona v. California*, at which time the water available to States along the river may become determinable. The State's water resource director and representatives of the attorney general's office declined to approve or disapprove of the Board's position.

Now, did you attend either or both of those meetings referred to in this letter?

Mr. ELY. I attended a meeting with the California delegation. I am not sure what the other meeting is that was referred to. I have attended a number with Mr. Hosmer and others, and that may be.

Mr. MORRIS. Is it your purpose here today to implement the recommendation of the Colorado River Water Board of California?

Mr. ELY. No; I do not go that far, Mr. Morris.

Speaking for myself, I think it is extremely unfortunate that California and the California delegation are confronted with the necessity of taking any position within the next year on your measure or any other until we know whether we or Arizona prevail in the Supreme Court.

I wish that this problem would arise a year from now. It may very well be that we would be in your corner, or at least in a neutral position.

All I can say is, as I have already plainly said: During this year of uncertainty, we have to look on any encroachment upon the water supply with grave misgivings. And I do not say that California Members of Congress, confronted by their multiple responsibilities, ought to flatly ask for a moratorium on all upper basin development. I am

saying, as a lawyer, that any encroachment upon the common water supply is a serious matter until the Supreme Court acts.

This, if I may say, is amplified in Attorney General Mosk's statement which I placed in your record, dated April 4 (exhibit 4).

Mr. MORRIS. Is it not true that you contended in 1960 in the hearings in New York before the special master that the upper basin had an equal right to 7½ acre-feet of water per year from the Colorado River?

Mr. ELY. Mr. Morris, we are in the unhappy position of having, singlehanded, attempted to persuade Judge Rifkind that the compact means what it says, and that the upper basin is apportioned and reserved water by the compact; that there is a resulting shortage in the lower basin that should be taken into account in weighing his decree's effect on existing projects.

The special master has refused to agree with us. He, on the contrary, has taken the position that the compact does not have that effect at all; it is a ceiling on appropriations.

So that had we prevailed in our argument before the master on the effect of the compact, what you say might very well be true. Until these reports came down, it never occurred to us that the compact was not, in effect, a reservation of water.

Mr. MORRIS. What, in effect, you are saying is that you did say that, Mr. Ely?

Mr. ELY. Not in those words, but you are not far wrong in substance. Since what I said then is being quoted, and therefore since what I say now may be quoted, too, I must speak with some care. We, of course, regard the III(d) obligation and the III(c) obligation of the upper division as being prior liens, which would require the diminution of your III(a) apportionment in the upper basin.

Consequently we do not say that the III(a) apportionment to the upper basin is on a parity with that to the lower basin. To the contrary, you might be forced to severely curtail in order to meet your III(c) obligation and your III(d) obligation.

Mr. MORRIS. Can the committee assume that if the decree as recommended by the special master is upheld by the Supreme Court, California will oppose all development in the upper States?

Mr. ELY. I just cannot give you an "iffy" answer to that. I have no authority and no knowledge on that subject.

Mr. MORRIS. You are familiar with the telegram that was sent by Governor Brown of California on April 27, which was in the record of the hearings, are you not, sir?

Mr. ELY. I have seen extracts from it in the papers. I have never seen the text of the actual telegram.

Mr. MORRIS. Let me read just a portion of it. I will not read all of it. He mentioned obstructionist tactics in here; before this paragraph, but I am not going to read that.

It is my understanding that both Senators Kuchel and Engle have already voted on the San Juan-Chama and Navajo projects. They are convinced, as am I, that this does not harm California's position in any way. We are further convinced that an official California stand against all such projects; here, regardless of their merit or their impact on California water supply, would be extremely damaging to efforts to obtain projects—

including many which would be of great benefit to California.

Mr. SAUND. Will the gentleman yield?

Would you want California to want for

Mr. MORRIS. I am in the affairs of the State from a telegram which I assume is the chief executive

Mr. SAUND. I may find even. But you are not everything he is doing which he is

Mr. ASPINALL. Mr. MORRIS. taking a position as the chief executive

Mr. ELY. Mr. MORRIS. candidly as I can see. Mr. MORRIS. full job.

Mr. ELY. The general Stanley have in this matter drawn into an error and com

Mr. ROGERS. Mr. JOHNSON. two questions.

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Mr. ELY. Mr. JOHN. Federal Gov

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benefit to California.

Would you want to grant everything that the Governor of Cali-
fornia wants for the State of California?

Mr. MORRIS. I of course would not want to get involved in the inter-
nal affairs of the California State government. I merely quoted
from a telegram which is a part of the official transcript of this hear-
ing, which I assume sets forth California's official position, since he is
the chief executive of that State.

Mr. SAUND. He says, there, "The official position." I think you
may find even the California delegation divided on this one point.
But you are not going to give the Governor of the State of California
everything he wants. And so why do you want to emphasize some-
thing which he might say on this subject.

Mr. ASPINALL. I suggest that we proceed to mark up the bill.

Mr. MORRIS. Mr. Chairman. It seems to me, Mr. Ely, that you are
taking a position, you and the Colorado River Board, in opposition to
the chief executive of the State.

Mr. ELY. Mr. Congressman, I have appeared here and testified as
candidly as I could today to explain to you—

Mr. MORRIS. I know you have, and I think you have done a wonder-
ful job.

Mr. ELY. Thank you. To explain to you the concern that attorney
general Stanley Mosk and the Colorado River Board of California
have in this matter. Now, I do not think it is appropriate that I be
drawn into any distinctions between communications from the Gov-
ernor and communications from other State officials.

Mr. ROGERS. The gentleman from California?

Mr. JOHNSON. Thank you, Mr. Chairman. There are only one or
two questions I would like to ask of the two witnesses.

I think you have really testified here in rather expert fashion, and
it makes it rather difficult for someone coming from the great State
of California, to have to act contrary to some of the wishes of other
sections of our State.

I am concerned with two or three points on this. If New Mexico
and Colorado are entitled to a certain percentage of the waters of the
upper basin, I think we have to consider their projects on a project-
by-project basis.

I want to make doubly sure that there is a water requirement for
both of these projects.

Mr. ELY. Water supply.

Mr. JOHNSON. Now, in the testimony of all the witnesses for the
Federal Government, they have assured us that these two projects,
namely, the San Juan-Chama-Navajo and the Fryingpan-Arkansas,
have no problem when it comes to an allocation of water.

Today there have been several other matters brought into the lime-
light here, namely, the M and I waters of the State of New Mexico,
and the diversion from the natural watersheds of the State of Color-
ado from the east to the west side, and also the diversion in New
Mexico as it might affect the quality of water in the Lower Colorado
River.

Now, I think that what has been brought out here—and I want to
ask you the question: Do you disagree with the figure of 6,200,000
acre-feet over a long period of time, or a 10-year period?

Mr. ELY. Disagree as to its being available to the upper basin depletions? Yes, emphatically so, on the basis of the two Hill reports we have given you today (exhibits 9 and 10).

Mr. JOHNSON. In the first Hill report, it bore out that figure as being a good figure. Am I not right?

Mr. ELY. No, neither of them, Mr. Johnson. The first report, which dealt with limitations on upper basin development imposed by a shortage of water supply, the red-backed document of March 7, 1961 (exhibit 9), made the point that if upper basin depletions expand beyond 4 million acre-feet, and if the Rifkind decree is upheld by the Supreme Court—California's existing uses must be curtailed.

Mr. ASPINALL. The committee will stand in recess for about 10 minutes.

(Short recess.)

Mr. ROGERS. The subcommittee will come to order for further consideration of pending business.

Mr. Ely and Mr. Matthew, will you resume your places at the witness table?

Were you questioning the witnesses, Mr. Johnson?

Mr. JOHNSON. Yes, Mr. Chairman.

Mr. ROGERS. You may proceed.

Mr. JOHNSON. As I understand it, you people disagree with the figure of 6,200,000.

Mr. ELY. Yes, Mr. Johnson. The Hill report of May 18 (exhibit 10) will give you the details on that.

Mr. JOHNSON. Well, now, as we were told this morning by the Bureau witnesses, there will be water in the amount of 4,500,000 acre-feet in the upper basin. Do you people disagree with that figure, also?

Mr. ELY. What was the figure?

Mr. JOHNSON. 4,500,000. That would be necessary to take care of all the projects now in existence and the two we are speaking of here.

Mr. ELY. From what I have heard here, I think that is probably correct.

Mr. JOHNSON. There is enough water?

Mr. ELY. Well, no. I misunderstood your question. I thought you were asking whether the total of their demand would be 4½ million. It will, as I understand the testimony.

Mr. JOHNSON. Yes.

Mr. ELY. But I have not said they had adequate water to satisfy those demands.

Mr. JOHNSON. And they testified that they were well within the limitations as far as water was concerned.

Mr. ELY. I am glad to come right to grips with that point.

New Mexico has 11¼ percent of the quantity available to the upper basin. That quantity is X. How much is X?

You would have to decide that before you know whether there is water for these projects. We will not know what X is until the Supreme Court has decided as between Arizona and California.

Mr. JOHNSON. Well, not considering the Supreme Court decision, but based upon known facts now, there is an amount of water of 4,500,000 acre-feet in the upper basin?

Mr. ELY. Not with as of 1960 in California is built.

That is why this is a year of great rejects Arizona's claim.

Mr. JOHNSON. I Court and the Co Mexico is entitled

Mr. ELY. Yes.

Mr. JOHNSON. N of water available in

Mr. ELY. Well, Johnson. There is

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Mr. JOHNSON. I report—

Mr. ELY. I wish

Mr. JOHNSON. I represent California

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Mr. ELY. Not without requiring a diminution of the existing uses as of 1960 in California, assuming that the Central Arizona project is built.

That is why this particular year with which we are now confronted is a year of great uncertainty. If the court decides with us, and rejects Arizona's claim, we have no quarrel with the San Juan project.

Mr. JOHNSON. I realize that. But I mean aside from the Supreme Court and the Central Arizona project, as I understand it, New Mexico is entitled to $11\frac{1}{4}$ percent of the water in the upper basin.

Mr. ELY. Yes.

Mr. JOHNSON. Now, do you say that there is not 4,500,000 feet of water available in the upper basin?

Mr. ELY. Well, I do not know how to answer your question, Mr. Johnson. There is physically that much water flowing there. But it well may be that there is not that quantity available for consumptive use in the upper basin, if the Supreme Court recognizes Arizona's claim in the lower basin; and recognizes Judge Rifkind's view of the compact—because the California and Arizona projects are simply appropriations of water in competition with the upper basin projects if Judge Rifkind is right.

Mr. JOHNSON. I realize that. But I mean setting aside the Rifkind report—

Mr. ELY. I wish we could.

Mr. JOHNSON. I do not say that you are not trying to do that. You represent California, and you are doing all you can. But as to New Mexico's right to water out of the upper Colorado River, they have been granted $11\frac{1}{4}$ percent. And the figure that has been kicked around here by a good many people and through a session or two of the last Congress, 6,200,000 acre-feet of water was the figure they most generally used.

Now, we heard this morning from the Bureau witnesses that out of all existing projects—and these two under consideration—the total amount of water would be 4,500,000 acre-feet that would be necessary to take care of all of the existing, plus these two.

Mr. ELY. The difficulty is just with the expression "kicked around here." The figure of 6.2 million has no validity in light of the Rifkind report.

Looking at page 21 of Mr. Hill's report of May 18, you will find that the quantity available for consumptive use in Arizona, California, and Nevada is only $5\frac{1}{2}$ million acre-feet if the upper basin depletions rise by 1990, as Mr. Hill forecasts, to the quantity shown on page 11, which is only 5,600,000 acre-feet. These results are simply shocking, Mr. Johnson. You can check them yourself, readily. If you start with 14 million acre-feet and deduct 2,600,000 for the treaty and for losses, you have only 11,400,000 to divide up.

Now, if you give the upper basin 6,200,000 out of that 11,400,000, the lower basin has on the order of 5 million acre-feet left for Arizona, California, and Nevada. No Californian can tolerate that situation.

Mr. JOHNSON. Well, you and I have a little difference of opinion as to what might happen in the Supreme Court. You are testifying here today that we are probably going to get beat.

Mr. ELY. No, I am not doing anything of the kind. I am telling you that I am going to give my dedicated best to see that we do not get

beat. But I am telling you, also, Mr. Johnson, it is utter folly to dwell in a state of euphoria that we are going to overrule Judge Rifkind in every respect. He is a competent judge, and we are confronted with an adverse decision.

Mr. JOHNSON. I fully realize that. And I think there will be some modification. I do not know how much. I think there will be some.

Mr. ELY. We hope so, and for that very reason I do not like to tell Mr. Morris as of today we are opposed to his project. If we get the modifications we want, we are not opposing it.

I am simply saying that as of today I cannot commit my State to a position which is pure disaster, if the depletions in the upper basin expand and if Arizona licks us in the Supreme Court.

Mr. JOHNSON. I am trying to get this back on an individual project.

Mr. MATTHEW. Mr. Johnson, may I attempt to shed some light on your question?

I have stated in my statement that for committed uses by existing and authorized projects, plus only the requirements of the Navajo and the San Juan-Chama, initial stage, New Mexico would be depleting the San Juan River by 637,000 acre-feet a year.

Now, in order for them to have an entitlement to that much water, the upper basin would have to be using 5.7 million acre-feet. In other words, 5.7 times 11.25 percent with the adjustment for Arizona's use, would give you the 637,000 acre-feet.

Mr. JOHNSON. Well, your figures differ from the figures that were presented this morning by the Bureau of Reclamation.

Mr. MATTHEW. No, sir. They said with these projects the total use in the upper basin, the depletion, would be about 4.5 million acre-feet a year. I do not disagree with that. What I am saying is that with these projects, New Mexico would be ahead of the rest of the upper basin in their pro rata share.

In other words, in order for them to use 637,000 acre-feet, the upper basin will have to have an entitlement to 5.7 million acre-feet. That is the formula.

Mr. JOHNSON. I do not think there is any person representing the upper basin States here arguing that way at the present time. We find no argument from the State of Colorado. And while New Mexico is entitled to their share and Colorado is entitled to their share on a percentage basis, they are accepting a figure of 6.2, as I have been able to learn from the testimony presented both from the people of Colorado and the people from New Mexico, as well as the Bureau of Reclamation.

Mr. ELY. If I might interrupt there, the dilemma in which California finds itself is that the special master has reported to the U.S. Supreme Court that there is nothing in any committee report to show that the upper basin will ever use more than 4,800,000 acre-feet. We are confronted as of this very instant, in your questions from the Bench, with the assumption that the upper basin will use 6,200,000 acre-feet.

You cannot both be right. Now, if it is the conviction of this committee that the upper basin can and will put to use 6,200,000 acre-feet of water, and you are planning projects to do that, I wish you would say so in your report on one of these bills, so that we can then tell the Supreme Court that Judge Rifkind is wrong in finding in

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Mr. ASPINALL. mittee, Mr. Ely. care of these proj in the immediate small projects, w

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Mr. ELY. I am be quite unwilling for the upper basi

Mr. ASPINALL. from what I state that at the preser projects come up, not Congress sho the light of the fa

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committee reports nothing to indicate an expectation that the upper basin will use more than 4,800,000 altogether.

But, if he is right, if 4,800,000 is the anticipated water budget for the upper basin in the eyes of Congress, then manifestly there is a whole lot less water for New Mexico than 11.25 percent of 6,200,000 or some higher figure.

We are caught between the opposite directions in which the special master is taking the Supreme Court, on the basis that we have nothing to fear from upper basin depletions, 4,800,000 at the most, only 2,200,000 now. He says, what are you worrying about? Whereas you gentlemen are asking us to agree with you that it is perfectly appropriate that the upper basin put to use 6,200,000 acre-feet.

Mr. ASPINALL. That is not the position of the members of this committee, Mr. Ely. Our position is that there is water available to take care of these projects now contemplated and before Congress and that in the immediate future there are not over one or two or perhaps three small projects, which do not mean anything, in the whole picture.

And we are willing to wait for the final determination as to whether or not there is 5½ or 6.2 million acre-feet available. It so happens that the figures upon which most people happen to agree, except the California people, is 6,200,000 acre-feet.

I can see your position; but do not place us of the upper basin in the position that we are at the present time founding our support for these programs that are before Congress upon the 6,200,000 acre-feet. We are not.

Mr. ELY. I am glad to hear that. I suppose, however, you would be quite unwilling to concede that your ambitions stop with 4,800,000 for the upper basin as Judge Rifkind seems to think.

Mr. ASPINALL. Our position at the present time, and you knew it from what I stated as to my understanding of the Rifkind report, is that at the present time this is not yet determined, and that as these projects come up, it will be up to the Congress to decide whether or not Congress should spend Uncle Sam's money for these projects, in the light of the fact that water may or may not be available.

But it is there for this project.

Thank you, Mr. Johnson.

Mr. JOHNSON. In the testimony just given by Mr. Matthew, you claim that the depletion that would be allowed here would raise the figure to 5½ million, if I understood you correctly.

Mr. MATTHEW. In order for New Mexico to be entitled to 637,000 acre-feet, which would be required by these two projects in addition to their other authorized and committed uses, the upper basin would have to have a total use of 5.7 million acre-feet a year.

Mr. JOHNSON. That is a little bit contrary to most of the testimony that has been given here by the Bureau of Reclamation.

Mr. MATTHEW. No; I think not, sir. In other words, New Mexico, with these two projects, will be ahead of the other States. They will have their percentage of 5.7, where the other States are nowhere near their percentages.

Do I make myself clear?

Mr. JOHNSON. Yes, as clear as you can make it, possibly. But we are hearing conflicting testimony as to the availability of a certain amount of water in the upper basin.

We today here have heard that it is based upon what the Supreme Court might do or what the Congress might do in authorizing the Arizona project, and quite a few things. We have quite a few things before us here, and tomorrow we will mark up the two bills.

And certainly we do not want to do anything that would jeopardize California's position to any great extent. But I think we both must recognize the demands of the other States on the Colorado River, and specifically these two projects that are before us.

And I think my two United States Senators on the Senate side considered these as individual projects. And certainly they were assured by the testimony they heard that there was enough water to allow them to vote in favor of authorizing these two projects.

Now, we have heard from the Bureau of Reclamation here this morning that there was enough water to satisfy the needs of these two projects. I have heard very little testimony in conflict between Colorado and New Mexico on these projects, as to who was getting the lion's share of the water percentagewise of the total amount that might be available.

I am merely trying to point out the fact that there is enough water; that if it does not jeopardize the uses in the State of California, I see no reason why we should not approve these projects, because certainly we are asking for reclamation development in our State. If we came in here and took a blanket policy against all reclamation projects for the time being, we would be in very poor shape.

That is why I merely want to know if there is enough water, if I can possibly make that determination from the experts who testified. We have heard from the people from the State of New Mexico, the State of Colorado, and the people representing the Department of Interior, and they say that there is.

Mr. ROGERS. Thank you, Mr. Johnson.

Thank you very much, gentlemen, for your testimony.

Mr. MATTHEW. Mr. Ely and I thank you, Mr. Chairman.

Mr. ROGERS. I believe we have two other witnesses, Mr. Simons and Mr. Thompson.

Is Mr. Simons here?

Will you come on up, Mr. Thompson?

Mr. SAUND. Mr. Chairman, inasmuch as they do not have prepared statements, I am going to ask questions on one or two points.

Mr. ROGERS. Just have a seat there, Mr. Thompson. We will start with you; and when he comes in, we will let him join you, and we will do this together.

It is good to see you.

**STATEMENTS OF LOM THOMPSON, IMPERIAL IRRIGATION DISTRICT,
CALIFORNIA, AND JAMES C. SIMONS, BRAWLEY, CALIF.**

Mr. THOMPSON. Thank you, sir.

Mr. ROGERS. Now, will you identify yourself, Mr. Thompson, with your full name and who you represent?

Mr. THOMPSON. My name is Lom Thompson. I reside in Imperial Valley, near El Centro, Calif., and I am with the Imperial Irrigation District. I am the chairman of the board of the Imperial Irrigation District.

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Mr. THOMPSON.
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Senators on the Senate side certainly they were assured there was enough water to allow the projects.

Bureau of Reclamation here this satisfy the needs of these two in conflict between Colorado, as to who was getting the of the total amount that might

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Mr. Thompson. We will start let him join you, and we will

IMPERIAL IRRIGATION DISTRICT,
BRAWLEY, CALIF.

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Mr. Thompson. I reside in Imperial with the Imperial Irrigation of the Imperial Irrigation

Mr. ROGERS. Now, do you have any statement to make prior to questioning?

Mr. THOMPSON. No, Mr. Rogers, I have no prepared statement. I will just answer the questions that are put to me, if I can.

Mr. ROGERS. I recognize the gentleman from Colorado, Mr. Aspinnall, for questions.

Mr. ASPINALL. I have no questions.

Mr. ROGERS. Mr. Chenoweth?

Mr. CHENOWETH. I have no questions. I just want to express my pleasure at seeing Mr. Thompson.

Mr. ROGERS. Mr. Saund?

Mr. SAUND. Mr. Thompson, you are the chairman of the Imperial Irrigation District?

Mr. THOMPSON. Yes, sir.

Mr. SAUND. Were you acquainted with your distinguished predecessor, Mr. Hewes?

Mr. THOMPSON. Yes; for 30 years.

Mr. SAUND. Do you know that Mr. Hewes and other leaders in the area worried about the high salt content of the water?

Mr. THOMPSON. Yes, that is a threat. It is a problem that we have all the time.

Mr. SAUND. It is one of the big problems that the farmers of the Imperial Valley have, the high salt content of the Colorado River water? Is that correct?

Mr. THOMPSON. That is correct, sir.

Mr. SAUND. Now, what have you been doing to overcome that sad situation of the high salt content of the Colorado River water, to help yourselves?

Mr. THOMPSON. We started about 10 years ago with a tiling program. Today the majority of our farmlands are tiled.

Mr. ROGERS. Are you Mr. Simons?

If you will identify yourself with your full name, Mr. Simons, and just sit there with Mr. Thompson, we will examine you both at the same time.

Mr. SIMONS. James C. Simons, Brawley, Calif.

Mr. SAUND. Mr. Thompson, I have some figures here that by the end of 1960 there will be installed 8,000 miles of tile in Imperial County. Is that substantially correct?

Mr. THOMPSON. Yes, I believe it is, sir.

Mr. SAUND. It is also stated that 270,000 acres of the Imperial Valley have been tiled. Is that substantially correct?

Mr. THOMPSON. Yes, just about 300,000 today is under tile.

Mr. SAUND. Now, does it cost about \$100 an acre, generally, to tile land?

Mr. THOMPSON. Yes, sir; from \$70 to \$110.

Mr. SAUND. You recall the time when the chairman of the subcommittee, Mr. Rogers, and our worthy colleague, the gentleman from Colorado, Judge Chenoweth, held hearings in the county on this subject?

Mr. THOMPSON. Yes, sir.

Mr. SAUND. Two hundred and seventy thousand acres tiled at the rate of \$100 an acre means an investment of \$27 million. Mr. Thompson, do you own any land in Imperial County?

Mr. THOMPSON. Yes, sir; I do.

Mr. SAUND. Is any part of that land you own tiled?

Mr. THOMPSON. Yes, sir; it is all tiled.

Mr. SAUND. Let us take it this way. The land that is tiled is in good producing condition?

Mr. THOMPSON. Yes, sir.

Mr. SAUND. If your tile were dislocated and placed out of commission in Imperial County, how long would it be before you could profitably farm that land, without the tile operating?

Mr. THOMPSON. Well, records indicate that the land will go bad in from 2 to 3 years, in normal conditions. If you were in an area where you had a lot of underground water, it would go bad much faster than that.

To give you an illustration, when a tile line gets plugged, when the water cannot get out, and the water will come up, just right away whatever is growing on that will just die. That is how quick it reacts.

Mr. SAUND. And now, Mr. Simons, may I ask you some questions? Have you been farming row crops in Imperial County?

Mr. SIMONS. Yes, I have.

Mr. SAUND. How long have you been doing it?

Mr. SIMONS. Oh, 35 years.

Mr. SAUND. You and I were neighbors at one time. Is that correct?

Mr. SIMONS. We were.

Mr. SAUND. Now, Mr. Simons, let us go back 15 or 20 years. When you planted row crops, planted sugarbeets, or cotton, in what part of the bed did you plant the corn or sugarbeets?

Mr. SIMONS. Well, it is customary that we plant it on the top of the bed. The top conformity of the bed.

Mr. SAUND. Where do you plant your sugarbeets now?

Mr. SIMONS. We have had to develop a way of planting down there. We plant on the side of the bed, now.

Mr. SAUND. Why do you do that?

Mr. SIMONS. We have to do that to allow us to germinate the seed, because the water that we are using has such a high salt content that we must apply enough water to raise the salt saturation area above the seed row, so that we can achieve germination.

Mr. SAUND. Did you ever develop special planters and special cultivators to be able to operate on the side of the slope?

Mr. SIMONS. Yes; we have developed those in the area.

Mr. SAUND. Is it not true that the farmers of the Imperial Valley are up against the situation that when they planted their crop in the regular way, up on top of the bed, the salt was pushed up because of this high salt content, and you do not get any germination? So they started planting on the side of the bed in order to overcome that situation?

Mr. SIMONS. That is precisely right.

Mr. SAUND. Now, Mr. Simons, tell me this: you plant a crop on the side of the bed. Would you get germination if you just put enough water to soak the seed in the normal way?

Mr. SIMONS. No. As I said, we have to have a volume of water to leach or freshen the seed row area. And in hydraulics, the water

has to be pushed, we cause it will leave a water so that we can salt zone above the seed row of cotton?

Mr. SAUND. And Mr. some of those fields in it true that in some case row of cotton?

Mr. SIMONS. That is

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Mr. MORRIS. Will you

Mr. ROGERS. Yes.

Mr. MORRIS. I ask un a resolution passed by regard to the San Juan-

Mr. ROGERS. Is there

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and placed out of com-
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at the land will go bad in
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ome up, just right away
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one time. Is that cor-

k 15 or 20 years. When
cotton, in what part of

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beets now?
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s to germinate the seed,
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you plant a crop on the
f you just put enough

ve a volume of water
hydraulics, the water

has to be pushed, we say, "pushed," pushed beyond the seed row, because it will leave a salt zone. Therefore we have to apply enough water so that we can push the salt beyond the seed row and leave the salt zone above the seed, or away from the seed.

Mr. SAUND. And Mr. Rogers and Mr. Chenoweth and myself visited some of those fields in Imperial County, and we saw cotton fields. Is it true that in some cases, and in your case, too, you irrigate every other row of cotton?

Mr. SIMONS. That is exactly true.

Mr. SAUND. And why do you do that?

Mr. SIMONS. For the reason of this salt that we have in the water.

Mr. SAUND. And now, Mr. Thompson, you are the chairman of the Imperial board. You say there are 270,000 acres of land tiled in Imperial County. How deep are those tiles?

Mr. THOMPSON. The tiles are generally placed about 6 feet deep. The tile drains run anywhere from 8 feet to 12 feet, the drains that take the water out from the tile lines.

Mr. SAUND. So you have to have that how many feet deep?

Mr. THOMPSON. We try to keep them to 12 feet. Some of the drains are deeper than that, but when they are deeper, we place in a sump pump to pump the water back up to the 6-foot drain level.

Mr. SAUND. Now, before you came in, Mr. Simons, I asked Mr. Thompson this question. First, I asked him if he had any land that was tiled. Do you own some land or farm some land which is tiled?

Mr. SIMONS. Yes; I do.

Mr. SAUND. Well, if an earthquake came and your tile was dislocated and went out of condition, for how long would you be able to farm that land?

Mr. SIMONS. Well, basing this upon the last earthquake which we had, a piece within 2 miles of my own ranch was affected that way. And it was immediately apparent that the crops died. I will say immediately, within a few weeks' time, when the tile drains were sealed and blocked and broken off.

Mr. SAUND. Would you agree with the statement that in Imperial County, where you have farmed for a number of years, the high salt content of the Colorado River water is a real problem?

Mr. SIMONS. Oh, very definitely so.

Mr. SAUND. That is all, Mr. Chairman.

Mr. ROGERS. Mr. Morris?

Mr. MORRIS. No questions, Mr. Chairman.

Mr. ROGERS. Mr. Johnson?

Mr. JOHNSON. No questions.

Mr. ROGERS. Thank you very much, gentlemen, for your testimony.

Mr. MORRIS?

Mr. MORRIS. Will you yield for a unanimous-consent request?

Mr. ROGERS. Yes.

Mr. MORRIS. I ask unanimous consent to have inserted in the record a resolution passed by the Upper Colorado River Commission with regard to the San Juan-Chama and Navajo project.

Mr. ROGERS. Is there objection?

The Chair hears none, and the resolution will be included.

(The resolution referred to follows:)

UPPER COLORADO RIVER COMMISSION,
Salt Lake City, Utah, May 15, 1961.

HON. WAYNE N. ASPINALL,
Chairman, Committee on Interior and Insular Affairs,
House of Representatives,
New House Office Building, Washington, D.C.

DEAR WAYNE: The Upper Colorado River Commission at its adjourned regular meeting held in Denver on May 11, 1961, unanimously adopted the following resolution endorsing the San Juan-Chama and Navajo Indian irrigation projects in the States of Colorado and New Mexico:

RESOLUTION

Whereas a major purpose of the Upper Colorado River Basin compact, working through the united action of the Upper Colorado River Commission, is "to secure the expeditious agricultural and industrial development in the upper basin"; and

Whereas the Navajo irrigation and San Juan-Chama diversion projects, two of a group of priority projects approved in principle by the commission in sponsoring Public Law 485 are an integral part of the Agricultural and industrial development of the upper basin in New Mexico; and

Whereas planning of the aforementioned projects has been completed and the plans therefor have been approved by the Secretary of the Interior and the interested States, and legislation to authorize such projects has been introduced in the Congress of the United States and recommended by the Secretary of the Interior; and

Whereas any differences among these States signatory to the Upper Colorado River Basin compact arising in the course of the detailed planning for the Navajo irrigation and the initial stage of the San Juan-Chama diversion projects have been reconciled and resolved: Now, therefore, be it

Resolved by the Upper Colorado River Commission, That this commission hereby endorses the Navajo irrigation and the initial stage of the San Juan-Chama diversion projects and urges their early authorization by the Congress of the United States; and be it further

Resolved, That the secretary of the commission be directed to transmit copies of this resolution to the chairmen of the Senate and House Interior and Insular Affairs Committees, the chairmen of the Senate and House Subcommittees on Irrigation and Reclamation, and to each of the Senators and Congressmen of the Upper Colorado River Basin States.

Sincerely yours,

IVAL V. GOSLIN,
Chief Engineer and Secretary.

Mr. ASPINALL. Mr. Chairman, I have a unanimous consent request. It is that the study made by Mr. McFarland, which we have before us in pamphlet form, be made a part of the record, inasmuch as these other studies have been placed in the record.

Mr. SAUND. Reserving the right to object, Mr. Chairman.

Mr. ROGERS. Mr. Saund?

Mr. SAUND. Mr. Chairman, my assumption may be right, maybe not. My assumption is that Mr. McFarland's statement contains his views on the available supply of water and so forth pertaining to this bill. Would I have the opportunity, for the record, to question Mr. McFarland before his statement is put in the record?

Mr. ROGERS. Well, Judge, as the matter now stands, we have gone overtime at the present time. I think this. I think if you wanted

to rebut those figures, your statement in the motion.

Mr. SAUND. I would my good friend Mr. record; but I do believe disagree to a considerable fair that if we have at we should have an oppo

Mr. ROGERS. As the point, the gentleman desires, to prevent the would be no question.

Mr. SAUND. I will that I be given permis lowing the statement of

Mr. ROGERS. Well, let

Does the gentleman w

Mr. SAUND. I withdr

Mr. ROGERS. Is there

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IVAL V. GOSLIN,
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to rebut those figures, if you would ask unanimous consent to include your statement in the record on it, I would be happy to entertain your motion.

Mr. SAUND. I would be the last person to object to anything from my good friend Mr. McFarland, and would just insert it into the record; but I do believe in fairness. Here is a case where experts can disagree to a considerable degree, and good experts at that. It is only fair that if we have any issue with the statement of Mr. McFarland, we should have an opportunity to develop the full story.

Mr. ROGERS. As the matter now stands from a parliamentary standpoint, the gentleman from California has a right to object, if he desires, to prevent the insertion in the record. Otherwise, there would be no question.

Mr. SAUND. I will not object, but I will ask unanimous consent that I be given permission to insert my remarks into the record following the statement of Mr. McFarland.

Mr. ROGERS. Well, let us take these one at a time.

Does the gentleman withdraw his objection?

Mr. SAUND. I withdraw it.

Mr. ROGERS. Is there objection to the insertion of the item requested by the gentleman from Colorado, Mr. Aspinall?

Hearing none, it will be included.

(The pamphlet referred to follows:)

WATER SUPPLY FOR THE SAN JUAN-CHAMA RECLAMATION PROJECT AND THE NAVAJO INDIAN IRRIGATION PROJECT

COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
HOUSE OF REPRESENTATIVES, UNITED STATES,
Washington, D.C., May 29, 1961.

Memorandum to: Hon. Wayne N. Aspinall, chairman.
From: Sidney L. McFarland, engineering consultant.
Subject: Water supply for the San Juan-Chama Reclamation Project and the Navajo Indian Irrigation Project.

Pursuant to your request, I have examined the matter of the water supply for the San Juan-Chama reclamation project and the Navajo Indian irrigation project. The objective of this study was to determine the availability of water for these two projects and for the proposed Animas-La Plata project, and indicate the approximate amount that may be expected to be available in the San Juan Basin for future use. My investigation involved an analysis of the testimony given the committee and the operation studies referred to in the hearings as well as an analysis of additional studies and data furnished by the Bureau and others at my request. My conclusions are summarized at the end of this report.

My study is divided into two parts: First, I examined the water situation for the entire upper Colorado River Basin to determine the amount of water which New Mexico might expect to be entitled to under the Colorado River compact and the upper Colorado River compact. Second, I studied the flows and the proposed operations of the San Juan River with storage available in the Navajo Reservoir to determine (1) the physical availability of water to supply the requirements of the existing and authorized developments in the basin, the proposed Navajo, San Juan-Chama (initial phase), and the Animas-La Plata projects; and (2) whether the proposed uses in New Mexico were within New Mexico's entitlement.

NEW MEXICO'S ENTITLEMENT TO WATER

New Mexico's position

Mr. S. E. Reynolds, State engineer for New Mexico, testified that, in his opinion, New Mexico's entitlement to water from the Colorado River Basin would amount to at least 838,000 acre-feet per year measured in terms of depletion at points of use (11.25 percent of 7.5 million acre-feet less 50,000 acre-feet). The figure of 838,000 acre-feet is also used by the Department of the Interior for planning purposes. It compares with 804,000 acre-feet depletion at Lee Ferry resulting from the water supply study prepared by Mr. Reynolds and filed with the committee during the hearings in May 1960 by Mr. John Bliss, and which appears on pages 80 and 81 of the printed hearings (Serial No. 22, 86th Cong.). Mr. Reynolds points out that depletion

at points of use can exceed the operation study is discussed. The study covers the period of effective storage in the beginning of the study acre-feet at the end of the of 1953 through 1956. It conditions of the 1909-56 period to deplete the flows of that acre-feet per year and reduce lower basin, plus spills in it is the same as that used by Court litigation, *Arizona v. United States*, during the period averaged how the obligation to deliver allocation of consumptive Reynolds presented the following

Availability of water

	1961
<hr/>	
Virgin flow of Colorado River at Lee Ferry	10,000,000
Upper basin consumptive use	(1,000,000)
Total	9,000,000
Virgin tributary contribution Lee Ferry	(1,000,000)
Virgin tributary contribution Hoover Dam	(1,000,000)
Total	(2,000,000)
Lower basin consumptive use	(1,000,000)
Total	(3,000,000)
Net channel losses Hoover Dam to Lee Ferry	(1,000,000)
Total	(4,000,000)
Required delivery at international boundary	(4,000,000)
Remainder	5,000,000

¹ Values indexed from "Report on the San Juan-Chama Reclamation Project Planning Report" (1960).

² Includes regulatory loss of 750,000 acre-feet.

Colorado studies

The Hill study, which was presented at the hearings, was a study of the Surface Water Supplies of the Colorado River Basin by Leeds, Hill & Jewett, which was authorized by the Colorado Water Conservancy Commission. The study was to determine the supplies in that part of the Colorado River Basin and determine the amount of water that may not actually be available under the water supply compact. Mr. Hill concluded that the amount of water annually apportioned to the States under the compact may not actually be available because of the fact that 75 million acre-feet of water is required for successive 10-year periods of annual depletions in the upper basin under the water supply compact with 38 million acre-feet of water available in the upper basin.

N-CHAMA RECLAMA-
INDIAN IRRIGATION

ULAR AFFAIRS,
UNITED STATES,
n, D.C., May 29, 1961.
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TO WATER

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at points of use can exceed depletion at Lee Ferry (p. 77). The operation study is discussed on pages 76-78 of those printed hearings. The study covers the period 1909-56 and assumes 43 million acre-feet of effective storage in the upper basin. It assumes zero storage at the beginning of the study and shows a storage shortage of 783,000 acre-feet at the end of the period, due to the unprecedented drought of 1953 through 1956. It shows that, under the water supply conditions of the 1909-56 period, the upper basin States would be able to deplete the flows of the Colorado River at Lee Ferry by 7.2 million acre-feet per year and release 7.5 million acre-feet per year to the lower basin, plus spills in high-water years. The period of the study is the same as that used by both California and Arizona in the Supreme Court litigation, *Arizona v. California*. The virgin flow at Lee Ferry during the period averaged 15.2 million acre-feet. In order to show how the obligation to deliver water to Mexico and the lower basin allocation of consumptive use would be met under his study, Mr. Reynolds presented the following additional information:

Availability of waters of the Colorado River system

Item	Acre-feet	Reference
Virgin flow of Colorado River at Lee Ferry.....	Millions 15.2	Arizona Ex. No. 355.
Upper basin consumptive use.....	-7.2	
Total.....	8.0	
Virgin tributary contribution Lee Ferry to Hoover Dam.....	¹ +1.1	
Virgin tributary contribution Hoover Dam to international boundary.....	¹ +1.4	
Total.....	10.5	
Lower basin consumptive use.....	-8.5	
Total.....	2.0	Arizona Ex. No. 366.
Net channel losses Hoover Dam to international boundary.....	-.3	
Total.....	1.7	Do. ²
Required delivery at international boundary.....	-1.6	
Remainder.....	.1	

¹ Values indexed from "Report on Water Supply of the Lower Colorado River Basin, Bureau of Reclamation Project Planning Report, November 1952."
² Includes regulatory loss of 75,000 acre-feet.

Colorado studies

The Hill study, which was referred to during the Committee's hearings, was a study dated October 19, 1953, entitled "Depletion of Surface Water Supplies of Colorado West of the Continental Divide," by Leeds, Hill & Jewett, consulting engineers, and prepared for the Colorado Water Conservation Board. The purpose of the study, which was authorized by the 39th General Assembly of the State of Colorado, was to determine the water resources available from surface supplies in that part of Colorado which lies west of the Continental Divide and determine the present and potential uses thereof. While Mr. Hill concluded that "all of the 7.5 million acre-feet of water per annum apportioned to the upper basin by the Colorado River compact may not actually be available for use because of the requirement that 75 million acre-feet be delivered at Lee Ferry during each consecutive 10-year period" the report states that there could have been annual depletions in the upper basin aggregating 7.5 million acre-feet under the water supply conditions of the entire period 1917-52 and with 38 million acre-feet of reservoir storage capacity available.

On the basis of a 22-year period of study from 1930 to 1952, during which the historical runoff at Lee Ferry averaged only 11.7 million acre-feet per year, and assuming 21 million acre-feet of reservoir capacity available, Mr. Hill concluded that the aggregate depletion of the upper basin could be no more than 6.2 million acre-feet per year.

Mr. Felix Sparks, Director of the Colorado Water Conservation Board, has furnished the committee a copy of the board's "Operation Study C-1," dated May 8, 1961, which is an analysis of the Colorado River flows at Lee Ferry for the period 1922 to 1960. The study is based on historic flow at Lee Ferry rather than virgin flow and upper basin historic depletions are added later to excess flows in determining total water available for upper basin depletion. The historic flow at Lee Ferry over the period of study averaged 12,126,000 acre-feet annually. The average cumulative total in consecutive and successive 10-year periods was determined to be 119,851,000 acre-feet. With compact delivery to the lower basin of 75 million acre-feet in consecutive and successive 10-year periods, the average actual excess delivery to the lower basin for the successive 10-year periods was determined to be 44,851,000 acre-feet. Historic depletions in consecutive and successive 10-year periods averaged 18,796,000 acre-feet. In the study, the actual excess over delivery requirement to the lower basin is then added to the upper basin historic depletions to determine the total amount of water available for upper basin depletion (except in any 10-year period where the total exceeds 75 million acre-feet, in which case 75 million acre-feet is used). This amount for consecutive and successive 10-year periods averaged 62,984,000 acre-feet. On an annual basis the average is 6,298,040 acre-feet.

Erickson studies

These studies were also referred to during the hearings. They are studies by Mr. John R. Erickson prepared by the State of Arizona and presented as testimony in the *Arizona v. California* litigation. Studies were made for a special purpose and no claim is made that they represent a proper operation of the upper basin reservoirs. The first of these studies was submitted to the Senate committee during hearings in July 1958 by Mr. Raymond Matthews. The study appears on pages 174-177 of the printed hearings and is discussed on pages 166-168. The period of this study is 1909-56. The assumption is made that virgin flow at Lee Ferry of over 15 million acre-feet will be available to satisfy the Mexican treaty obligations. The study assumes 25 million acre-feet effective storage in reservoir capacity and 5,700,000 acre-feet annual depletion at Lee Ferry. Releases from Glen Canyon are made without regard to power operation and range from 1,049,000 acre-feet to 13,928,000 acre-feet annually. The study results in releases at Lee Ferry amounting to an average of 9,511,000 acre-feet annually, net inflow to Lake Mead averaging 10,458,000 acre-feet annually, and sustained annual releases from Lake Mead averaging 9,600,000 acre-feet annually.

Mr. Erickson's second study was filed with the committee during hearings in May of last year and appear on pages 84 and 85 of the printed hearings. The period of this study is also 1909-56. Forty-three million acre-feet of effective storage is assumed with 7.5 million acre-feet annual depletion at Lee Ferry and 75 million acre-feet released per 10-year period to the lower basin, plus spills.

Bureau of Reclamation

The most recent Reclamation for reservoir set out in tables 4, 5, Power Rate Analysis, and are closed-cycle the year 1959 assumed 1906. The studies authorized storage in

Estimated

	Unit
Glen Canyon.....	
Flaming Gorge.....	
Navajo.....	
Curecanti.....	
Total.....	

The estimate of for the year 2062 is based on projects which have been identified at this time

Existing and authorized
 Authorized by Public Law
 Evaporation by State
 Participating projects
 Sec. 11 (Blue River)
 Other authorizations:
 Collbran project
 Utah Construction
 Private developments

Subtotal existing
 Proposed in S. 107:
 Navajo Indian Irrigation
 San Juan-Chama

Subtotal with San
 Animas-LaPlata project

Subtotal with
 Other proposals before
 Fryingpan-Animas
 Savery-Pot Hole

Subtotal existing

- 1 From December 1958 Final
- 2 Denver Blue River, Colorado
- 3 From definite plan report
- 4 New Mexico permit
- 5 Utah Power & Light Co.
- 6 From region 4 letter of March 1961
- 7 From coordinated report
- 8 Preliminary data from region 4
- 9 Includes evaporation losses
- 10 water released from Bureau of Reclamation
- 11 From definite plan report

m 1930 to 1952, during aged only 11.7 million re-feet of reservoir ca- aggregate depletion of ion acre-feet per year. o Water Conservation he board's "Operation nalysis of the Colorado o 1960. The study is vrin flow and upper ss flows in determining . The historic flow at l 12,126,000 acre-feet ecutive and successive ,000 acre-feet. With n acre-feet in consecu- actual excess delivery riods was determined s in consecutive and 0 acre-feet. In the nt to the lower basin ons to determine the epletion (except in million acre-feet, in amount for consecutive 000 acre-feet. On an

hearings. They are the State of Arizona California litigation. claim is made that asin reservoirs. The te committee during tthews. The study s and is discussed on 9-56. The assump- 15 million acre-feet y obligations. The e in reservoir capac- ee vary. Releases ow operation and feet annually. The g to an average of ke Mead averaging nual releases from y. e committee during es 84 and 85 of the o 1909-56. Forty- ed with 7.5 million 5 million acre-feet us spills.

Bureau of Reclamation studies

The most recent long-time operation studies of the Bureau of Reclamation for reservoirs of the Colorado River storage projects are set out in tables 4, 5, 6, and 7 in the September 1960 "Financial and Power Rate Analysis." The studies cover the 54-year period 1906-59 and are closed-cyclic studies with the storage content at the end of the year 1959 assumed to be the content at the beginning of the year 1906. The studies are based on the active storage capacity of the authorized storage units which is estimated as follows:

Estimated active storage capacities in fiscal year 2062

[Units 1,000 acre-feet]

Unit	Initial active storage capacity	Sediment deposition to end of year 2062		Remaining active capacity in fiscal year 2062
		In dead storage capacity	In active storage capacity	
Glen Canyon.....	21,505	5,260	4,180	17,325
Flaming Gorge.....	3,600	70	130	3,470
Navajo.....	1,028	250	80	948
Curecanti.....	720	10	20	700
Total.....	26,853	5,590	4,410	22,443

The estimate of future depletion of the Colorado River Basin by the year 2062 is based on a projection into the future. All of the projects which make up the total of 6,200,000 acre-feet cannot be identified at this time. The following table summarizes the situation:

[Average annual depletion 1,000 acre-feet]

Existing and authorized prior to 1949.....	1 2,550
Authorized by Public Law 485:	
Evaporation by storage units.....	1 691
Participating projects.....	1 404
Sec. 11 (Blue River settlement).....	2 190
Other authorizations:	
Collbran project, Colorado.....	3 7
Utah Construction Co., New Mexico.....	4 39
Private developments, Wyoming.....	5 17
Subtotal existing and authorized.....	3,898
Proposed in S. 107:	
Navajo Indian irrigation.....	6 252
San Juan-Chama initial phase.....	6 110
Subtotal with S. 107.....	4,260
Animas-LaPlata project.....	7 130
Subtotal with Animas-LaPlata.....	4,390
Other proposals before the Congress:	
Fryingpan-Arkansas, Colorado.....	8 75
Savery-Pot Hook, Colorado-Wyoming.....	9 38
Subtotal existing authorized and proposed.....	4,503

- 1 From December 1958 Financial and Economic Analysis.
 2 Denver Blue River, Colorado Springs, and Englewood.
 3 From definite plan report.
 4 New Mexico permit. Estimate of depletion by Steve Reynolds, State engineer.
 5 Utah Power & Light Co. steam plant and coking plant of Food Machinery & Chemical Corp. Data from region 4 letter of Mar. 10, 1961.
 6 From coordinated reports.
 7 Preliminary data from region 4 letter of Mar. 7, 1961.
 8 Includes evaporation losses from Ruedi Reservoir but does not include future western Colorado uses of water released from Ruedi Reservoir.
 9 From definite plan report.

The balance of 1,697,000 acre-feet anticipated to be made by year 2062 would be for potential projects not presently identified. Preliminary data for the section 2 projects shown in Public Law 485, exclusive of those identified in the foregoing tabulation, indicate a total depletion of about 800,000 acre-feet. There will probably be some additional use by non-Federal developments for municipal and industrial purposes in various parts of the Upper Colorado River Basin.

The studies show that with an average annual depletion of 6.2 million acre-feet including reservoir losses (2020 conditions), the average annual release from Glen Canyon Reservoir would be about 9.1 million acre-feet. It is the Bureau's position that, to realize upper basin uses which would deplete the flows at Lee Ferry beyond an average of about 6,200,000 acre-feet annually would require additional holdover storage reservoirs in the upper basin, and that, as need therefor can be demonstrated, it is presumed that the additional reservoirs contemplated in the ultimate plan will be authorized, constructed, and operated. In summary, the Bureau estimates that authorized storage units provide sufficient storage for expected depletions in the upper basin during the next 100 years.

Comments and conclusions

Water operation studies show how a project is expected to be operated under future water conditions. They assume a repetition of past flow conditions for a particular period. This is the most accurate and reliable method available for predicting the future water supply situation and planning the project operation. While it can be said that the longest period of record, assuming reliable data, will produce the most accurate estimate of the future average annual flow conditions, it is the extended drought conditions which occur during the overall period which become the critical factor in project design, in determining the storage needed, etc.

The first conclusion that can be drawn from my examination of the operation studies summarized above is that there are no appreciable discrepancies in these studies so far as physical data are concerned. The different end results are produced by using different periods of study, different assumptions, etc. Of course, the studies were made for different purposes and had different objectives.

For example, the State of Colorado had the Hill study made because of its concern as to whether water was available in the quantities proposed for transmountain diversion and at the same time meet the future needs in that part of the State west of the Continental Divide. The Hill study was intended to produce a safe or conservative estimate of water available. Yet the results of the Hill study are more favorable to the upper basin than the results of the Bureau of Reclamation studies which are used for planning purposes. Mr. Hill concluded, on the basis of a 22-year period of study during which the historical runoff at Lee Ferry averaged only 11.7 million acre-feet per year and assuming 21 million acre-feet of reservoir capacity, that upper basin depletions could amount to 6.2 million acre-feet per year. In comparison, the Bureau came up with the same depletion figure for planning purposes on the basis of a 54-year period of study (during which the historical flow at Lee Ferry averaged about 13,620,000 acre-feet) with the storage capacity provided by the authorized units (26,853,000 acre-feet initially, with 22,443,000 acre-feet remaining in the year 2062).

Both Mr. Hill and the upper basin water storage capacity is 21 million acre-feet in the same thing (43 million acre-feet of 7.2 million acre-feet Sparks' 1961 study). The available annually for the results of this study is 9.1 million acre-feet while it covers the period of high flow prior to 1900.

From my analysis I can reasonably conclude that the Colorado River compact provided the Bureau's authorized, constructed that additional storage it is not needed for a concern, and therefore not needed. Without the storage in the upper basin presently operated at Lee Ferry, due to upper basin uses, does not exceed 6.2 million acre-feet.

In my opinion, on the basis of the New Mexico study, the 6.2 million acre-feet depletion at Lee Ferry (based upon 6.2 million acre-feet New Mexico uses in stem reservoirs) result in a total depletion of 7.5 million acre-feet. The studies do not make this a total depletion of the Colorado River compact. Its entitlement to water is compact. If one does not result in depletion of the upper basin, additional storage, it is my opinion that uses should not exceed 6.2 million acre-feet. It is my opinion that without the authorization of the upper basin there will exceed 692,000 acre-feet.

If it can be shown that the authorized development of the Navajo Indian irrigation project, and that part plus an appropriate reservoirs, can be made to result in depletion of 692,000 acre-feet, the question as to whether the entitlement based upon future flow conditions

6 WATER SUPPLY FOR THE SAN JUAN-CHAMA PROJECT

ated to be made by year presently identified. Pre-shown in Public Law 485, going tabulation, indicate a t. There will probably be opments for municipal and pper Colorado River Basin. re annual depletion of 6.2 (2020 conditions), the aver-ervoir would be about 9.1 tion that, to realize upper s at Lee Ferry beyond an ual would require addi- upper basin, and that, as esumed that the additional plan will be authorized, the Bureau estimates that storage for expected de- 100 years.

project is expected to be They assume a repetition period. This is the most predicting the future water operation. While it can assuming reliable data, will future average annual flow itions which occur during l factor in project design,

om my examination of the there are no appreciable sical data are concerned. Using different periods of e, the studies were made ctives.

the Hill study made be- available in the quantities t the same time meet the f the Continental Divide. e or conservative estimate ill study are more favor- e Bureau of Reclamation es. Mr. Hill concluded, ring which the historical n acre-feet per year and pacity, that upper basin feet per year. In com- depletion figure for plan- d of study (during which out 13,620,000 acre-feet) orized units (26,853,000 aining in the year 2062).

Both Mr. Hill and the Bureau indicate there could be depletions in the upper basin aggregating 7.5 million acre-feet annually if sufficient storage capacity is provided (Hill—38 million acre-feet; Bureau—48.5 million acre-feet initially). Mr. Erickson's second study shows the same thing (43 million acre-feet). Mr. Reynold's study shows depletion of 7.2 million with 43 million acre-feet of effective storage. Mr. Sparks' 1961 study C-1 indicates about 6.3 million acre-feet would be available annually for upper basin depletion. I would consider the results of this study C-1 conservative from an upper basin viewpoint; while it covers the period 1922-60, the study does not reflect the years of high flow prior to 1931.

From my analysis of all the above studies and additional material, I can reasonably conclude that the depletions at Lee Ferry under the Colorado River compact could total 7.5 million acre-feet annually provided the Bureau's ultimate plan for 48,455,000 acre-feet of storage is authorized, constructed, and operated. However, it appears unlikely that additional storage capacity will be authorized in the near future. It is not needed for a long time so far as upper basin development is concerned, and there would be extensive water losses from evaporation. Without the authorization and construction of additional storage in the upper basin, I believe it is reasonable to conclude that, under presently expected future flow conditions, depletions at Lee Ferry, due to upper basin uses, should be assumed for planning purposes not to exceed about 6.2 million acre-feet annually.

In my opinion, one flaw in the Bureau's planning in connection with the New Mexico projects is that it is based upon 7.5 million acre-feet depletion at Lee Ferry while overall upper basin planning is based upon 6.2 million acre-feet depletion at Lee Ferry. Should New Mexico uses (including a share of evaporation losses from main stem reservoirs) result in depletion at Lee Ferry amounting to 838,000 acre-feet and the storage capacity necessary to permit a total depletion of 7.5 million acre-feet at Lee Ferry is not provided or future flows do not make this amount available to the upper basin under the Colorado River compact, New Mexico's use of water would exceed its entitlement to water under the upper Colorado River Basin compact. If one took the position that uses in New Mexico should not result in depletion at Lee Ferry exceeding 11.25 percent of permissible upper basin depletion under expected flow conditions without additional storage, then depletion at Lee Ferry from New Mexico uses should not exceed approximately 692,000 acre-feet annually. It is my opinion that under presently existing flow conditions and without the authorization and construction of additional storage in the upper basin there is no assurance that New Mexico's entitlement will exceed 692,000 acre-feet.

If it can be shown that the water requirements of the existing and authorized developments in New Mexico, the requirements for the Navajo Indian irrigation project, the San Juan-Chama reclamation project, and that part of the Animas-La Plata project in New Mexico, plus an appropriate share of evaporation losses from main stem reservoirs, can be met without exceeding depletion at Lee Ferry of 692,000 acre-feet, then there is no need to raise, at this time, the question as to whether it would be appropriate for New Mexico uses to result in depletions which, in aggregate, exceed New Mexico's entitlement based upon the presently authorized storage and expected future flow conditions.

ADEQUACY OF WATER SUPPLY IN THE SAN JUAN BASIN

The second part of my study involves the question of whether the long-time flows physically available in the San Juan Basin are sufficient, with the regulation from storage in the Navajo Reservoir, to supply the water requirements of existing developments in the basin, the requirements of potential developments in Colorado including the Animas-La Plata project, the requirements of the proposed Navajo and San Juan-Chama projects, and the foreseeable water needs downstream from the Navajo Reservoir. Also involved is the determination as to whether the proposed uses in New Mexico are within New Mexico's expected entitlement to water.

The basis for all the hydrologic studies of the San Juan Basin is the records of historic flow. The three points of measurement most important from the standpoint of the projects under consideration and the diversion of San Juan Basin water between Colorado and New Mexico are on the San Juan River at Blanco, on the Animas River at the Tefts diversion site and on the San Juan River at Farmington below the confluence of the Animas River. The long-time historic flow at these three points is shown in the following tabulation:

Flows at Farmington, N. Mex.

The long-time historic flow at the Farmington gage, located below the confluence of the Animas, is about 1,900,000 acre-feet. The following table shows recorded and estimated flows of the San Juan River at Blanco, Animas River at Tefts diversion site and San Juan River at Blanco.

Historic flows
[1,000 acre-feet]

Year ending Sept. 30—	San Juan River at Blanco	Animas River at Tefts diversion site	San Juan River at Farmington	Year ending Sept. 30—	San Juan River at Blanco	Animas River at Tefts diversion site	San Juan River at Farmington
1913			1,600	1940	509	270	885
1914	1,440		2,600	1941	2,351	725	3,659
1915	1,705		2,600	1942	1,652	524	2,707
1916	1,890		2,930	1943	737	393	1,304
1917	1,990		3,290	1944	1,235	553	2,069
1918	785		1,410	1945	368	404	1,416
1919	1,240		2,180	1946	392	334	790
1920	2,275		3,700	1947	667	490	1,299
1921	1,525		2,730	1948	1,267	528	2,133
1922	1,380		2,530	1949	1,389	514	2,239
1923	1,205		2,057	1950	535	290	942
1924	1,200		1,855	1951	331	275	651
1925	1,855		1,572	1952	1,490	576	2,401
1926	1,045		2,019	1953	510		842
1927	1,710		2,962	1954	514		897
1928	860	394	1,534	1955	488		916
1929	1,514	575	2,617	1956	492		874
1930	886	388	1,537	1957	1,432		2,438
1931	550	236	908	1958	1,389		2,363
1932	1,860	525	3,010	1959	308		610
1933	696	337	1,200	1960	1,024		
1934	365	172	630				
1935	1,504	436	2,296				
1936	934	366	1,513	Average for period of record	1,119	420	1,883
1937	1,408	381	2,110				
1938	1,435	520	2,412	Number of years of record	47	25	47
1939	729	298	1,237				

¹ Estimates by Engineering Advisory Committee, Upper Colorado River Commission.
² From 1954 status report. Flows for year ending October 1931.
³ San Juan River near Archuleta minus diversions by Citizens Ditch (diversions estimated after June 1958).

NOTE.—Except where marked, annual totals from USGS water supply papers.

Navajo Reservoir acre-feet, of which 67,000 acre-feet are contemplated diversion for irrigation project. Total streamflows will be 2,438,000 acre-feet. Deposition is expected 21,000 acre-feet.

Bureau of Reclamation

The Bureau's hydrologic study shows that, with the storage in the Navajo Reservoir, water will be available for the San Juan-Chama project with no shortage of water from the reservoir averaging 21,000 acre-feet of the amount of water available.

The operation study furnished the commitment for the project and covers the period from 1928 to 1952 at Blanco near the mouth of the Pine River prior to the Pine River Pass diversion in Colorado. The study shows that uses along the San Juan River at Farmington. The study shows that the San Juan-Chama project will provide Navajo Indian irrigation and for the Hammon Reservoir. The amount for reclamation at Farmington, not supplied by the Navajo Dam, was 2,438,000 acre-feet annually. As indicated by the reservoir, the spills average 21,000 acre-feet per year over the 33-year period of study.

The demand for water is based upon a period of study. The average flow is 111,900 acre-feet to a low of 27,500 acre-feet. The average for the initial period is estimated to be 110,000 acre-feet.

The Bureau's study shows that the flow of water to divert the flow of water from the Navajo Reservoir of 84,500 acres. 20,200 would be in water for industrial use. The Bureau estimates the total flow of water is 2,438,000 acre-feet with an annual average of 95,900 acre-feet of which 95,900 acre-feet would be in New Mexico above, and assuming that the water is used for downstream irrigation up with an annual supply period 1928-52 which

SAN JUAN BASIN

question of whether the San Juan Basin are sufficient for the Navajo Reservoir, to developments in the basin, Colorado including the proposed Navajo Reservoir. The available water needs determined is the determination are within New

the San Juan Basin is of measurement most under consideration between Colorado and Blanco, on the Animas San Juan River at the Animas River. The long-term flow is shown in the following

located below the following table shows the flow at Blanco, Animas River

	San Juan River at Blanco	Animas River at Tefts diversion site	San Juan River at Farmington
.....	509	270	885
.....	2,351	2725	3,659
.....	1,652	2524	2,707
.....	737	2393	1,304
.....	1,235	2553	2,069
.....	868	2404	1,416
.....	392	2334	790
.....	667	2490	1,299
.....	1,267	2528	2,133
.....	1,389	2514	2,239
.....	535	2290	942
.....	331	2275	651
.....	490	2576	2,401
.....	510	.....	842
.....	514	.....	897
.....	2488	.....	916
.....	2492	.....	874
.....	1,432	.....	2,438
.....	1,389	.....	2,363
.....	308	.....	610
.....	1,024	.....	.....
of	1,119	2420	1,883
of	47	25	47

Commission.
diversions estimated after June
papers.

Navajo Reservoir will have a total storage capacity of 1,700,000 acre-feet, of which 672,000 acre-feet will be dead storage below the contemplated diversion level of the main canal of the Navajo Indian irrigation project. The live storage capacity for the regulation of the streamflows will be 1,028,000 acre-feet initially. Future sediment deposition is expected to reduce the live storage capacity to 960,000 acre-feet.

Bureau of Reclamation studies

The Bureau's hydrologic studies of the San Juan Basin indicate that, with the storage for regulation available in the Navajo Reservoir, water will be available to meet the demands for the initial stage of the San Juan-Chama project and the Navajo Indian irrigation project with no shortages. The study indicates spills from the reservoir averaging 215,000 acre-feet annually, which are an indication of the amount of water available for future use.

The operation study supporting the Bureau's conclusions was furnished the committee. The study has been brought up to date and covers the period 1928-60. It shows an average depleted flow at Blanco near the Navajo Reservoir of 899,700 acre-feet annually after allowing for future upstream depletion by the full development of the Pine River project in Colorado, the authorized Weminuche Pass diversion in Colorado, and bypasses at damsite to meet present uses along the San Juan Reservoir between Navajo Dam and Farmington. The study indicates demands for the initial phase of the San Juan-Chama project averaging 104,700 acre-feet annually, for the Navajo Indian irrigation project averaging 508,000 acre-feet annually, and for the Hammond project averaging 23,000 acre-feet annually. The amount for regulatory losses and for natural flow uses below Farmington, not supplied by return flows or by tributary inflow below the Navajo Dam, was estimated to be 20,000 acre-feet annually, and reservoir evaporation losses were estimated to average 38,400 acre-feet annually. As indicated earlier, with the above-listed demands on the reservoir, the spills averaged about 215,000 acre-feet annually for the 33-year period of study.

The demand for the San Juan-Chama project averaging 104,700 acre-feet is based upon the estimates of divertible flow during the period of study. The annual amounts range from a high of 225,000 acre-feet to a low of 40,000 acre-feet. The long-time divertible flow average for the initial stage of the San Juan-Chama project is estimated to be 110,000 acre-feet annually.

The Bureau's study of the Animas-La Plata project indicates a need to divert the flow of the Animas River and its tributaries for the irrigation of 84,500 acres, of which 64,300 acres would be in Colorado and 20,200 would be in New Mexico. The project would also furnish water for industrial and municipal purposes to Durango, Colo. The Bureau estimates the diversion requirements to be about 259,400 acre-feet with an annual depletion estimated to be 130,000 acre-feet, of which 95,900 acre-feet would be in Colorado and 34,100 acre-feet would be in New Mexico. Using the historic flow data tabulated above, and assuming bypass requirements of 28,000 acre-feet annually for downstream irrigation and for fishery purposes, the Bureau comes up with an annual surplus flow of 392,000 acre-feet for the 25-year period 1928-52 which would be available for meeting the Animas-

La Plata project demands. With the storage planned for the Animas-La Plata project, the Bureau's studies indicate shortages over the 25-year period averaging 5.6 percent of the diversion demand. The annual percentages for the entire period were furnished for the record. The shortages go as high as 49.7 percent in 1 year, with the next highest shortage being 25.3 percent, followed by 17.7, 16.1, 11.4, and 11.1 percent. The Bureau testified that these shortages were tolerable.

The Bureau testified that there is no conflict between the Animas-La Plata project and the San Juan-Chama and Navajo projects, and that the Animas-La Plata project would be benefited by the operation of the Navajo Reservoir. In the preliminary studies the Bureau assumed that water rights in New Mexico located below the confluence of the Animas and San Juan Rivers would be supplied entirely from return flows, waste water, and surplus water and there would be no demand on the Animas River. More recent studies indicate an average annual demand of approximately 11,000 acre-feet annually.

The Bureau indicated there was agreement among the Federal Government, New Mexico, and Colorado that the Navajo Reservoir would be operated for the regulation of the San Juan River for the benefit of all the upper basin States.

New Mexico's studies and position

Mr. S. E. Reynolds, State engineer of New Mexico, testified that in his view there will be ample water at sites of use, and within New Mexico's allocation under the Colorado River and upper Colorado River compacts, for the San Juan-Chama project, the Navajo project, and the New Mexico portion of the Animas-La Plata project with a substantial amount of water remaining for future uses. Mr. Reynolds' testimony regarding the physical availability of water in the San Juan Basin is based upon Navajo Reservoir Operation Study No. 8, which he has submitted for the record of the hearings. This study covers the period 1928 to 1959. The study is based upon the recorded and estimated flows of the San Juan River at Blanco which for the period of study averaged 981,400 acre-feet annually. The study assumes future depletions for the proposed Pine River extension project averaging 62,200 acre-feet annually and depletions for the authorized Weminuche diversion project averaging 18,100 acre-feet annually, resulting in residual flow at Blanco averaging 901,100 acre-feet annually. The study assumes diversions for the San Juan-Chama project averaging 103,400 acre-feet annually, releases for the Hammond project averaging 21,600 acre-feet annually, releases for the Navajo project averaging 478,700 acre-feet annually, and releases for future municipal and industrial use averaging 210,000 acre-feet annually. Reservoir evaporation is estimated to average 32,000 acre-feet annually and the study indicated spills averaging 79,800 acre-feet annually. The study also shows expected shortages which would average about 6 percent for all demands. The study assumes that return flow from existing uses, return flow from uses served from Navajo Reservoir, and tributary inflows below Navajo Dam would meet the demands of existing rights below Farmington. The study also assumes that Navajo Reservoir would be full at the start of the study period

and that the active capacity of the reservoir is 960,000 acre-feet at the start of the study period.

Mr. Reynolds pointed out that the Navajo Reservoir is operated annually for future municipal and industrial use. He testified that the Navajo Reservoir constituted an estimated 10 percent of the total water available for other releases and was not available for other purposes as of any year. He testified that the Reclamation had estimated that the shortages under the project demands will reach 70 percent of the total water available that the shortages indicated in the preliminary studies were based upon the needs of the municipal and industrial use.

With respect to the Navajo Reservoir, Mr. Reynolds testified that New Mexico had agreed to provide exchange of water for the requirements from the Navajo Reservoir and the Animas-La Plata project. He testified that the shortages would be met by the Navajo Reservoir. Mr. Reynolds testified that the studies show clearly that the Navajo Reservoir has a storage capacity on the order of 960,000 acre-feet.

Colorado's studies and position

Felix L. Sparks, State engineer of Colorado, testified that studies made by the Colorado River Commission have reached conclusions that there is no conflict between the Navajo project and the San Juan-Chama and Navajo projects in Colorado. Mr. Sparks testified that the Navajo Reservoir would be operated for the benefit of all the upper basin States when Navajo Reservoir is completed. He testified that New Mexico uses water which is not available for the release of natural flows.

One of the studies made by the Colorado River Commission Board in connection with the Navajo Reservoir project in the San Juan Basin was a study of the potential water requirement of the basin independent upon the operation of the Navajo Reservoir with a depletion requirement of 114,000 acre-feet. The study indicated that potential irrigation requirements of the San Juan Basin of 114,000 acre-feet plus a depletion requirement of 114,000 acre-feet would amount to 244,900 acre-feet annually, which is in excess of the 114,000 acre-feet available under future

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t of the study period

and that the active capacity of Navajo Reservoir would be reduced to 960,000 acre-feet at the end of 100 years.

Mr. Reynolds pointed out that the release of 224,000 acre-feet annually for future M. & I. uses (210,000 acre-feet average) actually constituted an estimated amount of water remaining available after other releases and was not an estimate of requirements for M. & I. purposes as of any particular date. He stated that the Bureau of Reclamation had estimated that the municipal and industrial water demands will reach 70,000 acre-feet in the next 60 years. He stated that the shortages indicated were tolerable and pointed out that they were based upon the assumed release of 224,000 acre-feet annually for municipal and industrial purposes.

With respect to the Animas-La Plata project Mr. Reynolds stated that New Mexico had no objection to the operation of Navajo Reservoir to provide exchange storage benefits to that project as long as requirements from the reservoir for the Navajo, the San Juan-Chama, and the Animas-La Plata projects are all on parity and that any shortages would be shared equitably in proportion to diversion requirements. Mr. Reynolds did point out that the water supply studies show clearly that Navajo Dam cannot do a great deal for the Animas-La Plata project and that the problem is finding adequate storage capacity on the Animas River for the Animas-La Plata project.

Colorado's studies and position

Felix L. Sparks, director, Colorado Water Conservation Board, testified that studies by the technical staff of the board lead to the conclusions that there is no conflict between the San Juan-Chama and Navajo projects and the Animas-La Plata project and that the San Juan-Chama and Navajo projects have the approval of the State of Colorado. Mr. Sparks stated that Colorado's position and operation studies were premised upon the assumption that Navajo Reservoir would be operated for the regulation of the San Juan River for the benefit of all the upper basin States and that there would be times when Navajo Reservoir must be operated to release water to satisfy New Mexico uses which, without the existence of Navajo Reservoir, might constitute a legal demand against the State of Colorado for the release of natural streamflows.

One of the studies prepared for the Colorado Water Conservation Board in connection with Colorado's future water needs in the San Juan Basin was a study by Mr. Clifford H. Jex entitled "Stream Depletion of the San Juan River Basin in Colorado." This very detailed report presents a study of present water use development and the potential water requirements. Mr. Jex's study shows that irrigated land of the basin in Colorado at the present time (March 1960) dependent upon the San Juan Basin water totals about 109,000 acres with a depletion requirement of 130,400 acre-feet. Mr. Jex estimates that potential irrigation expansion will increase irrigation by an additional 63,000 acres with an additional depletion requirement from San Juan Basin of 114,500 acre-feet. These figures imply an ultimate depletion requirement from the San Juan Basin for irrigation amounting to 244,900 acre-feet. Mr. Jex estimates reservoir evaporation of San Juan Basin water in Colorado under future conditions at 15,000 acre-feet annually, municipal water uses of San Juan Basin water in Colorado under future conditions at 20,300 acre-feet annually, and

other uses, including exportation, at 28,800 acre-feet. In summary, he shows the stream depletions from the San Juan River runoff resulting from presently developed use in the basin in Colorado to be 146,000 acre-feet and estimates the potential future stream depletion requirement for full basin development in Colorado to be an additional 163,000 acre-feet, resulting in an estimate of total ultimate stream depletion of 309,000 acre-feet for uses in Colorado.

During the hearings, Mr. Reynolds and Mr. Sparks were questioned about an operation study prepared by the Colorado Water Conservation Board entitled "Navajo Reservoir and San Juan-Chama Study 1-A." This study has been placed in the record of the hearings. The study covers the period of 1943 to 1956 during which historic flows at Blanco, less 45,000 acre-feet for possible future use, averaged only 733,200 acre-feet annually compared with 1,095,600 acre-feet annually for the period 1914-58. After diversions for the initial stage of the San Juan-Chama, the demands on the reservoir were indicated to total 785,000 acre-feet, comprising 508,000 acre-feet for Navajo irrigation project, 23,000 for Hammond project, 224,000 for municipal and industrial supply, 96,000 for other Indian uses, 34,000 for reservoir evaporation, and an allowance of 100,000 acre-feet annually for usable return flows. The results of the study showed the reservoir completely empty in 4 years and New Mexico demands exceeding its entitlement (assumed to be 787,000 acre-feet annually) when water was available and suffering heavy shortages in the last years of the study.

Mr. Sparks testified that this study was designed only to reflect the worst sequence of years of record that could be found and that it was deliberately stopped in 1956 because 1957 was a year of very high flow. He stated that this period was designed to get a progressive 10-year series during the most critical history of the river and pointed out that during this period the river flowed only at 65 percent of the normal flow. Mr. Sparks pointed out that in the study he had deliberately created conditions which he believed could not exist and that this was done for the purpose of attempting to create a shortage against Colorado. The assumptions were continually revised and the demands increased until a shortage on the river was forced. He stated that when that shortage was reached the conditions assumed were completely absurd. The study was designed to show that the New Mexico projects could not have any adverse effect on the Animas-La Plata project in Colorado.

Upper Colorado River Commission studies

The staff of the Upper Colorado River Commission has completed a study covering the availability of water in the San Juan Basin. The study covers the water supplies for the San Juan-Chama project, initial phase, the Navajo Indian irrigation project, and the Animas-La Plata project, and the overall effects of these projects on the water supply of the San Juan River basin during the critical period 1942-56. In the Navajo Reservoir operations, potential upstream depletions are assumed for the authorized Pine River extension project (62,800 acre-feet) and the Weminuche Pass diversion project (18,600 acre-feet). When added to the average annual depletion for the initial phase of the San Juan-Chama project (105,100 acre-feet), the total potential upstream depletions would average 186,500 acre-feet annually.

The commission's study resulted in a determination of shortage-free water for a period of record, 1942 through 1956, the Navajo Reservoir, with irrigation approximately 850,000 629,500 acre-feet for the Navajo Indian irrigation project, this would be an additional reservoir. Excluding irrigation furnish about 220,000

The commission's study that the average annual requirement to supply users 320,000 acre-feet after (193,900 acre-feet), the Mutual Ditch (21,200 industrial supply (10,600 that this remaining allocation and municipal at to satisfy present municipal and industrial and that there is an at the Animas-La Plata runoff.

Supporting these conclusions of the Animas River 1956, with varying industrial uses. In the following order: (1) (3) Farmers Mutual industrial uses, (5) K municipal and industrial purpose of the study Navajo Reservoir. The bypass requirement. In the first study, K 23,000 acre-feet and. The results showed the annual shortages of the study, Kirtland irrigation feet, Kirtland municipal Hogback irrigation study indicated no industrial shortages at back irrigation shortage study, an additional municipal and industrial shortages averaged 6 averaged around 2 kept the same but a flows. This caused

acre-feet. In summary, Juan River runoff result- in Colorado to be 146,000 stream depletion require- do to be an additional of total ultimate stream arado.

Sparks were questioned Colorado Water Conserva- San Juan-Chama Study record of the hearings. 6 during which historic ble future use, averaged with 995,600 acre-feet versions for the initial on the reservoir were ng 508,000 acre-feet for nd project, 224,000 for her Indian uses, 34,000 e of 100,000 acre-feet s of the study showed New Mexico demands 000 acre-feet annually) y shortages in the last

igned only to reflect ld be found and that 57 was a year of very ed to get a progressive the river and pointed y at 65 percent of the the study he had de- l could not exist and g to create a shortage ntinually revised and he river was forced. ed the conditions as- as designed to show any adverse effect on

ssion has completed a he San Juan Basin. Ju Chama project, ct, and the Animas- projects on the water tical period 1942-56. upstream depletions sion project (62,800 project (18,600 acre- etion for the initial acre-feet), the total 186,500 acre-feet

The commission's studies of the annual yield of Navajo Reservoir resulted in a determination that during the most critical streamflow period of record, 1942-56, the reservoir would yield 756,000 acre-feet of shortage-free water. Excluding the 4 exceedingly dry years, 1953 through 1956, the annual yield of the river with Navajo Dam and Reservoir, with infrequent and tolerable shortages, would amount to approximately 850,000 acre-feet. With committed diversions of 629,500 acre-feet for the initial phase of the San Juan-Chama project, the Navajo Indian irrigation project and the Hammond irrigation project, this would mean that for the entire critical period, there would be an additional 126,500 acre-feet annually available from the reservoir. Excluding the 4 dry years, the reservoir yield would furnish about 220,000 acre-feet of water for additional uses.

The commission's study of the Animas-La Plata River indicated that the average annual remaining flow of the Animas River at Farmington to supply uses below Farmington would be approximately 320,000 acre-feet after the depletions for the Animas-La Plata project (193,900 acre-feet), the Florida project (13,900 acre-feet), the Farmers Mutual Ditch (21,200 acre-feet) and Farmington municipal and industrial supply (10,600 acre-feet). The commission's study concluded that this remaining flow, when added to the return flows from irrigation and municipal and industrial uses, would be more than enough to satisfy present and authorized irrigation demands and supply municipal and industrial uses of at least 50,000 acre-feet annually and that there is an ample supply of water from the Animas River for the Animas-La Plata project even under conditions of adverse stream runoff.

Supporting these conclusions of the commission are operation studies of the Animas River below Farmington for the critical period 1942 to 1956, with varying demands for irrigation and for municipal and industrial uses. In the studies, the water supply was distributed in the following order: (1) Animas-La Plata project, (2) Florida project, (3) Farmers Mutual Ditch diversion, (4) Farmington municipal and industrial uses, (5) Kirtland irrigation demands, (6) future Kirtland municipal and industrial uses, (7) Hogback irrigation demands. The purpose of the studies was to show the bypass requirements from Navajo Reservoir to meet Animas River rights below Farmington. The bypass requirements are indicated by shortages in the studies. In the first study, Kirtland irrigation demands were assumed to be 23,000 acre-feet and Hogback irrigation demands 71,800 acre-feet. The results showed there were no shortages at Kirtland and average annual shortages of less than 1 percent at Hogback. In the second study, Kirtland irrigation demands were assumed to be 23,000 acre-feet, Kirtland municipal and irrigation demands 40,000 acre-feet, and Hogback irrigation demands 71,800 acre-feet. The results of this study indicated no irrigation shortages at Kirtland, municipal and industrial shortages at Kirtland averaging around 2 percent, and Hogback irrigation shortages averaging about 2 percent. In the third study, an additional 20,000 acre-feet was added to the Kirtland municipal and industrial demands with the result that the Kirtland M. & I. shortages averaged 6 percent while the Hogback irrigation shortages averaged around 2 percent. In the fourth study, the demands were kept the same but a reduction of 35 percent was made in the return flows. This caused shortages in Kirtland irrigation averaging 1 per-

cent annually, shortages in Kirtland M. & I. demands averaging 16 percent, and shortages in Hogback irrigation averaging 8 percent.

The position of the Southwestern Water Conservation District

The position of the Southwestern Water Conservation District of Colorado was presented to the committee by Mr. William S. Eakes, attorney representing the district. The problem which is giving the district concern involves the water requirements to meet existing rights at and below Farmington and the call upon Animas River water to meet these requirements. Mr. Eakes indicated that the district wants to make sure that Navajo Reservoir will be operated to regulate the flow of the river and to supply downstream uses which, unless furnished by releases from Navajo Reservoir, might constitute a legal demand against the State of Colorado for release from natural streamflows. In order to assure the operation of Navajo Reservoir in a manner to meet these downstream rights, Mr. Eakes requested, in behalf of the district board, the following amendment be added at the end of section 8 of the bill:

(c) The Secretary of the Interior is hereby directed to so operate Navajo Reservoir that downstream water requirements on the San Juan River in the State of New Mexico, that may otherwise conflict with uses from the Animas River or its tributaries or from the La Plata River, shall be satisfied by releases from Navajo Reservoir.

Mr. Eakes stated that he was in full accord with the statement made by Mr. Felix Sparks in behalf of the Colorado Water Conservation Board and with the assumptions upon which Mr. Sparks' conclusions were based. He stated that the amendment would assure that assumptions upon which Colorado has given its support to the project are fully followed by the Secretary of the Interior. He stated that the district would not wish to share excessive shortages which are caused by the overburdening of the supply of water in the Navajo Reservoir. He pointed out the importance, from Colorado's standpoint, of the place of use of the water within the basin. He expressed particular concern with respect to future municipal and industrial uses in New Mexico at places where the return flows were so far downstream that they would not be usable.

To illustrate his concern, Mr. Eakes furnished a study prepared by Mr. Reynolds, New Mexico State engineer, setting out the bypass demands of rights below the mouth of the Animas River in New Mexico which are senior to the Navajo, San Juan-Chama, and Animas-La Plata projects. The basic study assumes the water supply of the 1928-54 period. It assumes irrigation senior rights covering 18,950 acres and municipal and industrial senior rights amounting to 60,000 acre-feet a year. It assumes development of the Navajo, San Juan-Chama, and Animas-La Plata projects and a future municipal and industrial demand of 224,000 acre-feet a year. It assumes return flows from existing and authorized works and from the Navajo, San Juan-Chama, and Animas-La Plata projects with return flows from Navajo Reservoir M. & I. demand meeting channel losses only. It also assumes all flows of the Animas River, with the exception of return flows from the Animas-La Plata project, depleted in Colorado. Under these basic assumptions bypass demands are indicated to be 41,800 acre-feet a year.

If the basic assumptions are modified by assuming new development in Colorado limited to the Animas-La Plata and Florida projects

the bypass demand a year with a maximum

If the basic assumption of the 224,000 acre-foot flow for meeting the would amount to an

If the above two combined, the bypass demand acre-feet per year.

Comments and conclusions

In my analysis with respect to the physical Navajo Reservoir of historic periods covering the studies upon which the studies are compatible discussed, I have analyzed of Mr. Utton in behalf of Bureau. Mr. Utton based upon flows during

With respect to the Reclamation used the study by Mr. Reynolds of the Colorado River Commission streamflow period of the Reclamation Board study, 1943-56.

First, I will discuss from the Navajo Reservoir authorized but uncompleted Pass projects in addition indicated an average flow of 901,100 acre-feet which is essential including bypass requirements Reynolds and the Upper same allowance for Reynolds' study showed 901,100 acre-feet, but period used, showed an amount to only 41,500 acre-feet. The latest development, indicated totaling 123,400 acre-feet amount to only 41,500 I interpret it, indicates than the amounts as Upper Colorado River and the West. However, they could be under different conditions as presently planned for this water in the State planning purposes, the by the Bureau, New Mexico

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the bypass demand would amount to an average of 10,000 acre-feet a year with a maximum yearly demand of 33,000 acre-feet.

If the basic assumptions are modified by assuming that 50 percent of the 224,000 acre-feet per year M. & I. demand is available as return flow for meeting channel losses and prior rights the bypass demand would amount to an average of 5,000 acre-feet a year.

If the above two modifications of the basic assumptions are combined, the bypass demand of prior rights would average only 900 acre-feet per year.

Comments and conclusions—Physical operations

In my analysis and study I found no material discrepancies with respect to the physical data for the San Juan Basin. The various Navajo Reservoir operation studies differed with respect to the historic periods covered by the studies and with respect to the assumptions upon which they were based. The conclusions of the various studies are compatible. In addition to the studies that have been discussed, I have analyzed and given consideration to the testimony of Mr. Utton in behalf of the San Juan County Farm and Livestock Bureau. Mr. Utton's conclusions with respect to water supply are based upon flows during the last 10 years.

With respect to the historic period of coverage, the Bureau of Reclamation used the 33-year period, 1928-60; the New Mexico study by Mr. Reynolds covered the period 1928-59; the Upper Colorado River Commission study and the Jex study used the most critical streamflow period of record, 1942-56; and the Colorado Water Conservation Board study, referred to as Study A-1, covered the period 1943-56.

First, I will discuss the depletions of the San Juan River upstream from the Navajo Reservoir. The Bureau made an allowance for the authorized but unconstructed Pine River extension and Weminuche Pass projects in addition to present uses, and the Bureau's study indicated an average annual depleted flow at Blanco of 899,700 acre-feet which is essentially a measure of inflow to Navajo Reservoir not including bypass requirements. The New Mexico study by Mr. Reynolds and the Upper Colorado River Commission study made the same allowance for upstream development as the Bureau. Mr. Reynold's study showed average annual residual flow at Blanco of 901,100 acre-feet, but the commission study, because of the critical period used, showed inflow to Navajo Reservoir averaging only 757,700 acre-feet. The Jex study, which gives estimates of ultimate upstream development, indicates ultimate depletions above Navajo Reservoir totaling 123,400 acre-feet annually of which future stream depletions amount to only 44,500 acre-feet. In other words, the Jex study, as I interpret it, indicates the need for less water above Navajo Reservoir than the amounts assumed by the Bureau, New Mexico, and the Upper Colorado River Commission. The Pine River extension project and the Weminuche Pass diversion are presently considered infeasible. However, they could be determined feasible some time in the future under different economic conditions and even if they are not developed as presently planned there will undoubtedly be opportunity to use this water in the State of Colorado. Therefore, I believe that, for planning purposes, the allowance made for future upstream depletions by the Bureau, New Mexico, and the commission should be adhered to.

I will next discuss briefly the demands on the Navajo Reservoir. There was no appreciable discrepancy in any of the studies with respect to the demands on Navajo Reservoir for the initial phase of the San Juan-Chama project, for the Navajo Indian irrigation project, for the Hammond project, and for evaporation losses which together total about 675,000 acre-feet. The Bureau study indicated an additional demand of 20,000 acre-feet annually for regulatory losses and natural flow uses below Farmington and it is this allowance which would benefit the Animas-La Plata project. The Bureau study showed spills averaging 215,000 acre-feet annually which is an indication of the amount available for future use.

Mr. Reynolds' study assumes that return flows and tributary inflow below Navajo Dam will meet regulatory losses and natural flow uses below Farmington and there is no demand included for these purposes. He includes a demand for 224,000 acre-feet annually for future municipal and industrial uses. Because of this large M. & I. demand assumed, his study indicates shortages which he says are "tolerable" whereas the Bureau's demands are all met shortage free. The Colorado Water Conservation Board Study A-1 assumes not only the 224,000 acre-feet demand for future municipal and industrial supply but also 96,000 acre-feet for other Indian uses and assumes an allowance of only 100,000 acre-feet annually for usable return flows.

The Upper Colorado River Commission study indicates that for the critical period 1942-56, the reservoir would yield 756,000 acre-feet of shortage-free water which would meet the needs of the initial phase of the San Juan-Chama project, the Navajo Indian irrigation project, the Hammond irrigation project and leave an additional 126,500 acre-feet annually available for future use.

The Colorado Water Conservation Board Study A-1 was a special purpose study and in my opinion no consideration should be given to it.

I consider that the Upper Colorado River Commission study, because it is based on the critical period of record, is too conservative. In my opinion, the conclusions of the Bureau's study and New Mexico's study by Mr. Reynolds are entirely supportable and the available water supply which they indicate can reasonably be expected.

In summary, I can reasonably conclude that, on the basis of the most critical period of flow of record, there will be sufficient water available from the Navajo Reservoir, on a shortage-free basis, after making allowance for present uses in the basin and the requirements of potential developments in Colorado, to meet the requirements of the initial phase of the San Juan-Chama project, the Navajo Indian irrigation project, and the Hammond project, and leave at least 126,000 acre-feet available annually for future use, from which could be made releases to satisfy present New Mexico uses that otherwise would constitute a legal demand on the flows of the Animas River. Studies indicate that the amount available for future use could be increased to around 225,000 acre-feet by taking shortages considered to be tolerable during certain critical periods. These conclusions are from the standpoint of physical operation and must be examined in relationship to New Mexico's expected entitlement, and this is done hereinafter.

Comments and con

Colorado's contribution to the San Juan-Chama water supply, of the project, an 85,000 acre-feet water in the Animas downstream natural storage for regulatory purposes. 20,000 acre-feet are available for bypass requirements for the Animas-La Plata project. The Bureau's operation in certain years. The average is 49 percent but upon the 1954 statistics, I have been advised that the shortages are now being met at an average of 49 percent and an average is due principally to the Animas-La Plata provides the

The Upper Colorado River Commission study resulted in a finding for the Animas-La Plata stream runoff, which the committee. The Bureau's studies were for the Upper Colorado River Basin and the

The position of the Navajo Reservoir is that the Navajo Reservoir natural flow rights in the Animas-La Plata Rivers that may be from the La Plata project. It has been agreed to by the committee to permit the downstream Reservoir, provided in any years when benefiting from the and shortages would be met.

The district is concerned with the water supply from the Animas-La Plata basin and by future releases will result in excess water. The district is unwilling to release water from the Animas-La Plata in releases from the Animas-La Plata. The district is fully justified since any overburden on the reservoir would be for additional transmountain

on the Navajo Reservoir. of the studies with respect to the initial phase of the San Juan irrigation project, for losses which together study indicated an additional allowance for regulatory losses and is this allowance which et. The Bureau study annually which is an indi-

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Comments and conclusions—Animas-La Plata project

Colorado's concern with respect to authorization of the Navajo and San Juan-Chama projects has been the relationship, with respect to water supply, of these two projects to the proposed Animas-La Plata project, an 85,000-acre development on the Animas River of which 64,000 acres would be in Colorado. There apparently is sufficient water in the Animas River to meet the needs of this project and supply downstream natural flow rights but the problem is providing sufficient storage for regulation. The Bureau indicates flows averaging 392,000 acre-feet are available for meeting the project demands after meeting bypass requirements for uses downstream. The Bureau indicates a diversion requirement of about 260,000 acre-feet for the Animas-La Plata project. With the limited storage available and planned, the Bureau's operation studies indicated that there would be shortages in certain years. The Bureau testified that shortages would run as high as 49 percent but that they were tolerable. These figures were based upon the 1954 status report on the project. Subsequent to the hearings, I have been advised by the Bureau that their detailed studies have now been completed and that the feasibility report will indicate that the shortages will be less than anticipated, with a high of 31 percent and an average for the 30-year period of only 3.6 percent. This is due principally to the fact that the final plan for the Animas-La Plata provides more storage capacity than originally contemplated.

The Upper Colorado River Commission studies of the Animas River resulted in a finding that there is ample water from the Animas River for the Animas-La Plata project, even under conditions of adverse stream runoff, which is in agreement with the Bureau's testimony to the committee. The Jex study is in substantial agreement with the Bureau's studies with respect to future water needs in the Animas River Basin and the La Plata River Basin.

The position of the Southwestern Water Conservation District is that the Navajo Reservoir should be operated to meet all downstream natural flow rights below the confluence of the Animas and San Juan Rivers that may conflict with water uses from the Animas River and from the La Plata River. The language in the legislation which has been agreed to by the States of Colorado and New Mexico would permit the downstream rights to be satisfied by releases from Navajo Reservoir, provided there is a contract covering such releases, but in any years when there are shortages all projects and contractors benefiting from the Navajo Reservoir operation would be on parity and shortages would be shared equitably in proportion to diversion requirements.

The district is concerned that there may be overburdening of the water supply from Navajo Reservoir by future diversions out of the basin and by future municipal and industrial uses downstream which will result in excessive shortages during critical periods of runoff. The district is unwilling to share such prospective excessive shortages. The district wants the natural flow rights, which may conflict with uses from the Animas River or its tributaries, to have the first priority in releases from Navajo Reservoir. While I don't believe that the district is fully justified in its position, I can understand its concern since any overburdening of the water supply from the Navajo Reservoir would be for future uses in New Mexico, including possible additional transmountain diversions. The district takes the position

that Colorado projects should not have to stand excessive shortages because New Mexico tries to stretch the water supply of Navajo Reservoir too thin. My own view is that, under the legislation, the Secretary is charged with the responsibility of not overburdening the Navajo Reservoir and he is prevented from entering into contracts in the future which might result in excessive shortages. I believe that the district is adequately protected. Also, as hereinafter discussed, in my opinion, the limitation of New Mexico uses by reason of its entitlement under the compacts would prevent the overburdening of Navajo Reservoir.

Comments and conclusions—New Mexico uses versus entitlement

Having determined the physical availability of water in the San Juan Basin, it then becomes necessary to examine the relationship of the water physically available for use in New Mexico and New Mexico's entitlement to water under the upper Colorado River compact. There appears to be agreement between the Bureau of Reclamation and the State of New Mexico with respect to present and authorized uses amounting to 275,100 acre-feet as follows:

Average annual stream depletion

	Thousand acre-feet
Present uses.....	92.3
Share of evaporation losses from main stem reservoirs.....	73.3
Hammond project.....	6.8
Extension of Indian lands.....	24.7
Navajo Reservoir losses.....	39.0
Utah Construction Co.....	39.0
Total by present and authorized projects.....	275.1

With the addition of the depletion requirements for the Navajo Indian irrigation project (252,300 acre-feet) and the initial phase of the San Juan-Chama project (110,000 acre-feet), New Mexico uses would be increased to 637,400 acre-feet.

New Mexico has indicated that part of its water would be used for the New Mexico portion of the Animas-La Plata project. The depletions by the New Mexico portion are estimated to be 34,100 acre-feet and the addition of this amount would raise New Mexico uses to an estimated 671,500 acre-feet.

Hereinbefore I expressed the opinion that under presently existing flow conditions in the upper basin and without the authorization and construction of additional storage there is no assurance that New Mexico's entitlement to water will exceed 692,000 acre-feet annually. This would mean that, based upon the expected uses listed above, only about 20,000 acre-feet would remain for future New Mexico uses after development of the initial phase of the San Juan-Chama project, the Navajo Indian irrigation project, and the Animas-La Plata project.

SUMMARY OF CONCLUSIONS

It is my conclusion that the long time flows physically available in the San Juan Basin are sufficient, with the regulation from storage in the Navajo Reservoir, to supply the requirements of potential developments in Colorado and the water requirements of the initial phase of the San Juan project and the Navajo Indian irrigation project

without appreciable short it will be difficult for New development other than that New Mexico uses will the physical availability of projects are constructed in the San Juan-Chama proe pal and industrial uses in without reduction in irrigat

It is my conclusion that River, with the Bureau's project and that the Anim the release of water from flow rights below the confli In my opinion, the Southe not be concerned that the excessive demands because vented by the legislation of New Mexico's entitlement the reservoir could not be

As I understand it, the placed upon the San Juan will be a substantial contr the Lee Ferry obligation be water, the place of New Mexico's uses by its entitle

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	Thousand acre-feet
-----	92.3
-----	73.3
-----	6.8
-----	24.7
-----	39.0
-----	39.0
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without appreciable shortages. However, my studies indicate that it will be difficult for New Mexico to justify any appreciable additional development other than the Animas-La Plata project. It appears that New Mexico uses will be limited by its entitlement rather than the physical availability of the water. If the above three mentioned projects are constructed and operated additional future diversions for the San Juan-Chama project and water for appreciable future municipal and industrial uses in New Mexico do not appear to be available without reduction in irrigation uses.

It is my conclusion that there is sufficient water from the Animas River, with the Bureau's plan for storage, for the Animas-La Plata project and that the Animas-La Plata project could be benefited by the release of water from Navajo Reservoir to meet existing natural flow rights below the confluence of the Animas and San Juan Rivers. In my opinion, the Southwestern Water Conservation District need not be concerned that the Navajo Reservoir will be overburdened by excessive demands because (1) the Secretary of the Interior is prevented by the legislation from overburdening the reservoir and (2) New Mexico's entitlement limits New Mexico uses to the extent that the reservoir could not be overburdened.

As I understand it, there has been no firm Lee Ferry obligation placed upon the San Juan River. It appears, however, that there will be a substantial contribution from the San Juan River toward the Lee Ferry obligation because of the physical inability to use the water, the place of New Mexico uses, and the limitation of New Mexico's uses by its entitlement.

Vertical stamp on the right margin, partially legible, containing the words "RECEIVED" and "MAY 10 1911".

Mr. ROGERS. Does the gentleman from California have a unanimous consent request?

Mr. SAUND. Yes, I have.

Mr. ROGERS. Is there objection to the request of the gentleman from California that he be given permission to insert in the record any remarks he may have on Mr. McFarland's report?

The Chair hears none, and that request will be allowed.

COMMENTS ON COMMITTEE PRINT NO. 5, 87TH CONGRESS, 1ST SESSION, WATER SUPPLY FOR THE SAN JUAN-CHAMA RECLAMATION PROJECT AND THE NAVAJO INDIAN IRRIGATION PROJECT, BY HON. D. S. SAUND

Committee Print No. 5 is a staff memorandum prepared by Sidney L. McFarland, engineering consultant, Committee on Interior and Insular Affairs, House of Representatives. Stated objectives are the determination of (1) the amount of water which New Mexico might expect to be entitled to under the Colorado River compact and the upper Colorado River compact, (2) the physical availability of water to supply requirements of existing and authorized developments plus the proposed Navajo, San Juan-Chama (initial phase) and the Animas-La Plata projects, and (3) whether the proposed uses in New Mexico would be within New Mexico's entitlement. Mr. McFarland's study was in effect a review and an evaluation of studies made by the States of New Mexico and Colorado, the Upper Colorado River Commission, the Bureau of Reclamation and others.

His primary conclusion is stated on page 18: "It appears that New Mexico uses will be limited by its entitlement rather than the physical availability of the water." There can be no sharp disagreement with that conclusion, but there is room for some question as to the bases from which it is drawn. Manifestly New Mexico will be limited by its entitlement, but it appears that such limitation may well be considerably more restrictive than assumed in the memorandum. Furthermore, the physical limitation on water supply should not be necessarily assigned to a minor position.

The memorandum says (pp. 6, 17). "there is no assurance that New Mexico's entitlement to water will exceed 692,000 acre-feet annually," which would correspond to a total upper basin entitlement of 6,200,000 acre-feet a year. However, statements and implications on the same pages, that the water requirements of the projects proposed in bills now pending, plus existing and previously committed uses, would not exceed New Mexico's entitlement are obviously based on the assumption that the entitlement will be at least equal to 692,000 acre-feet a year. Indeed the memorandum implies that it might even be greater with authorization and construction of additional major storage reservoirs in the upper basin. In the light of present circumstances and knowledge of the hydrology of the Colorado River Basin such assumptions are unwarranted. New Mexico's annual entitlement may well turn out to be considerably less than 692,000 acre-feet. There are too many unknowns as to the legal rights and obligations of the upper basin to rely on such a figure. Moreover, construction of additional storage might increase evaporation losses to the extent that on-site uses in New Mexico would have to be reduced to keep within its entitlement. The memorandum also fails to indicate the dependable supply available to the lower basin, if the upper basin depletion were 6.2 million acre-feet.

In the last paragraph on page 15 of the memorandum it is concluded that there will be sufficient water available from the Navajo Reservoir "on the shortage-free basis," after making allowance for present uses and for potential developments in Colorado, to meet the requirements of the initial phase San Juan-Chama, the Navajo Indian and the Hammond projects, and leave at least 126,000 acre-feet a year for future use. This conclusion apparently is based upon a study by the Upper Colorado River Commission which is mentioned in the memorandum but which has not been made publicly available. The conclusion is definitely not supported by those authoritative studies which have been published. The Bureau of Reclamation studies in the September 1960 report referred to in the committee print (pp. 4, 8), as well as a Bureau study furnished to the subcommittee about May 1, 1961, show that after allowance for the initial phase San Juan-Chama project, potential developments in Colorado, regulatory waste and natural flow

rights below Farmington, on a "shortage-free basis" for the Hammond projects. The New committee print shows that and increase the yield but studies would result in the

The last sentence of the calculated in the Bureau is able for future use, is in spills cannot be accounted is good indication that that there are undeveloped Farmington, N. Mex. It be held over for years at losses, so that the net off

The first paragraph of author might advocate even 1953 through 1956. Such hydrology. The critically to realistic hydrologic and projects. Mr. McFarland " * * * it is the extended period which become the needed, etc."

Mr. ROGERS. Is there committee at this time?

If not, the subcommittee morning.

(Whereupon, at 5:11 convene at 9:45 a.m., Mr

rights below Farmington, the dependable annual yield from Navajo Reservoir on a "shortage-free basis" will be barely enough for the Navajo Indian and Hammond projects. The New Mexico studies discussed on pages 9 and 10 of the committee print show conclusively that attempts to reduce the calculated spills and increase the yield materially above the amounts indicated by the Bureau studies would result in severe and intolerable shortages in critical dry periods.

The last sentence of the second paragraph on page 8 of the print, that the spills calculated in the Bureau studies are an indication of the amount of water available for future use, is likely to mislead the casual reader. Those computed spills cannot be accounted as available for future use in New Mexico unless there is good indication that such spills could be regulated. There is no indication that there are undeveloped major reservoir sites on the San Juan River above Farmington, N. Mex. Regulation of such spills would require that stored water be held over for years and there would be attendant increase in evaporation losses, so that the net effect on the available supply might be small or nil.

The first paragraph on page 12 leaves the unfortunate impression that the author might advocate excluding from consideration the 4 exceedingly dry years 1953 through 1956. Such exclusion would of course violate the basic principles of hydrology. The critically dry years, particularly those in sequence, are the keys to realistic hydrologic analysis and should never be excluded when planning new projects. Mr. McFarland recognizes this principle when he states on page 5, " * * * it is the extended drought conditions which occur during the overall period which become the critical factor in project design, in determining storage needed, etc."

Mr. ROGERS. Is there any further business to come before the subcommittee at this time?

If not, the subcommittee will stand adjourned until 9:45 in the morning.

(Whereupon, at 5:10 p.m., the subcommittee was adjourned, to reconvene at 9:45 a.m., Friday, June 2, 1961.)

