

MINUTES OF THE

16th MEETING

COLORADO RIVER COMMISSION.

The sixteenth meeting of the Colorado River Commission was held at Bishop's Lodge, Santa Fe, New Mexico, on Tuesday afternoon, November 14th, 1922, at 3:00 P.M.

There were present:

Herbert Hoover,	representing the U.S.,	Chairman
R. E. Caldwell,	"	Utah
Delph E. Carpenter,	"	Colorado
Stephen B. Davis, Jr.,	"	New Mexico
Frank C. Emerson,	"	Wyoming
W. F. McClure,	"	California
W. S. Norviel,	"	Arizona
James G. Scrugham,	"	Nevada
Clarence C. Stetson,		Executive Secretary

In addition there were present:

Thomas E. Campbell,	Governor of Arizona.
Merritt C. Mechem,	Governor of New Mexico.
L. Ward Bannister,	Chairman of Committee of Interstate Waters of Denver Civic Association.
Edward W. Clark,	Joint Commissioner and Advisor for Nevada.
Arthur P. Davis,	Director, United States Reclamation Service, Department of the Interior and Advisor to Federal Representative.
Ottamar Hamels,	Chief Counsel, United States Reclamation Service, Department of the Interior and Advisor to Federal Representative.
Charles A. May,	State Engineer and Advisor for New Mexico.
R. T. McKisick,	Deputy Attorney General and Advisor for California.
R. I. Meeker,	Deputy State Engineer and Advisor for Colorado.
P. G. Spilsbury,	President, Arizona Industrial Congress and Advisor for Arizona.
Charles P. Squires,	Joint Commissioner and Advisor for Nevada.
Dr. John A. Widtsoe,	Advisor for Utah
Richard E. Sloan	Legal Advisor for Arizona.

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The meeting was called to order at three o'clock, P.M., by the Chairman, Mr. Hoover.

MR. HOOVER: We left the discussion to await a report from Mr. A. P. Davis on an approximation of the flow at Lee's Ferry. It might save time if we take up some other phase of the discussion until we have Mr. Davis' views.

One question that has been raised several times and we have not dealt with concretely, is the relation of this pact to storage. Mr. Norviel in his proposal makes a specific provision and we might discuss whether the pact should embrace some condition as to storage. In other words, that the pact might not become operative until storage was provided. If such a suggestion were incorporated it would be necessary to set some minimum of storage that would be the criteria of operation. I think it appears to all of us that we are really doing nothing unless there is storage, that the river isn't in a situation today to permit of any further development of any consequence unless storage is provided; that this pact, whether it refers to the matter or not, does in fact revolve upon storage, but it might loosen it up a little if we did incorporate some basis of that sort.

MR. NORVIEL: Perhaps it might clarify my thought a little before the Commission if I just make a suggestion along that line. It is true that we will have storage in any event or else all that we are doing is vain, probably, but it is conceivable to my mind that we might have a tremendous amount of storage along the river and yet not have any provision at all made for reserve storage,

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as I have suggested, and really that is the distinction that I would wish to make in my suggestion for the pact. It isn't merely dependent upon storage but dependent upon a reserve storage capacity for the purpose of equalizing the flow in order that we may maintain past Lee's Ferry, or to the lower basin, some minimum annually.

MR. HOOVER: Well, do you refer to annual reserve or seasonal reserve ?

MR. NORVIEL: A season to season reserve storage capacity.

MR. CARPENTER: Year to year.

MR. NORVIEL: Year to year, wet to dry capacity. Now, to be a little more explicit, it is conceivable to me that storage in the upper basin may be conceived and built merely for power and there would be no reserve storage in it. The same thing could happen on the lower, or it may be built for irrigation with no reserve storage in it.

What I am trying to point out is, probably the simplest thing would be to provide for some reserve storage for the express purpose of equalizing this flow so that the minimum requirements of the lower basin may be met certainly. I may point out that in my judgment it may be many years before that reserve storage would need actually to be provided, but we should provide for it now by agreement. I say we should,--that is just a thought.

MR. HOOVER: You mean by providing by agreement. It is utterly impossible for the seven states to make an agreement to construct storage, that is infeasible, but what the seven states could do would be to agree that this compact wouldn't be enforceable until storage had been provided.

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it in connection with other structures which may be built at this time on the river.

MR. HOOVER: Before we discuss it let's decide on some terminology. When we say reserve storage we mean storage from year to year; when we say control we mean control of the seasonal flow within the year. If we can stick to those two terms we probably will save a lot of explanation and description.

MR. EMERSON: I again take exception to the statement that further large development on the river is now about to cease, or must cease until we get some storage. I can't conceive but what we have the right to continue in Wyoming to develop as fast as we find our projects feasible. We have continual development up there all the time and our position has been made stronger in this regard by reason of the Wyoming-Colorado case. It is certainly a fact that a great amount of water is now passing out through the Colorado River unused and the Supreme Court has held,- when you know the opinion in the Wyoming-Colorado case,- that the lower states must conserve the surplus waters of that stream before they can get action against the upper appropriators and I know of no way that development in Wyoming could be stopped by reason of the fact that there is possibly a shortage in the low water season on the lower reaches. It is my opinion we can go ahead unless the Supreme Court in other actions should reverse its position in that case.

MR. HOOVER: Perhaps my remark would be clearer if I amended it to the effect that Wyoming could develop, yet such development would check development below. We won't get development of any

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great agricultural area unless we have storage.

MR. EMERSON: You could in the upper states at least.

MR. HOOVER: That would be a penalty to the lower States.

MR. CARPENTER: It would tend to enforce the storage of that below.

MR. CALDWELL: We won't solve the Colorado River problem without storage.

MR. EMERSON: No, that is true. I haven't thought of making a compact that would only be operative upon the provision of storage. If the upper states agree to deliver a certain amount of water to the lower states at this point of demarkation at Lee's Ferry it seems to me we have gone far enough and if that compact should become operative and the lower states of necessity would furnish the storage they would require, the upper states could be depended upon to get behind their program of providing the storage works, but I can't say at this time that we would be willing to make it contingent upon the provision of storage before the compact became operative.

MR. HOOVER: What would be the effect on the present situation of a compact that was operative from the beginning?

MR. EMERSON: Well, it would,--

MR. HOOVER: Supposing it one without storage?

MR. EMERSON: Without storage?

MR. HOOVER: There would be some period without storage, what would be the effect during that period?

MR. EMERSON: Why things would go on just the same as they

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would go on anyway.

MR. CALDWELL: I think they would go on, Mr. Chairman, the same as they are going on now under the suggestion that I have made with respect to this matter.

MR. NORVIEL: I can't agree with that statement either, if we enter into this sort of an agreement. There would be no recourse to anyone below against anyone above the point of demarkation and I am of the opinion that the pact should remain inoperative until storage is provided.

MR. CARPENTER: Then immediately will arise, I fear, the desire that the storage provision apply to both basins.

MR. NORVIEL: No.

MR. CARPENTER: No, I say it will naturally arise, the desire upon the part of the upper basin that numerous reservoirs be there constructed by advocates of early construction up there, which I believe will tend to cloud the horizon in deriving the benefits to the lower river. If you recall at the outset of this conference, there was back of a number of us a strong pressure to insist that the storage upon the river should proceed from the top down and that in turn, - I felt for my own part, - would tend to retard the large development in the canyon, hence it has always been my view that by making a division of the water, settling the title to the water, making a pact operative with the title vested, then, that left an absolute freedom without commitment, which in turn would permit a concentration of effort for the works necessary for the protection of the Imperial Valley and this without drawing in a condition precedent. That condition would develop a rivalry which

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I felt might defeat the very object that the southern part of the river wishes to accomplish. When this title is settled, then, the next thought which will be prompted, I believe, in the mind of every fair man would be "save inundation of the Imperial Valley", which in turn will bring with it the very maximum storage development you folks need below. That was my line of thought, roughly.

MR. NORVILL: I had in mind, Mr. Secretary, the statement Mr. Carpenter just gave expression to but hesitated to express it, that in the early discussions of this question there was a strong impression given out that the early development of the river should be above, including the storage, and I will add that there was an objection to the development by construction of large reservoirs below because of the fear of establishing priorities there and those two things were, I might say, the incentive for what we are doing now. I doubt whether that thought has been eradicated from the minds of the upper-staters and, therefore, I don't think this pact that we propose should be made operative with that strong desire still existing that the reservoirs and the development of the upper states should not be made until the storage is provided below. While I feel that they would be fair with us, perhaps they might not lend that moral assistance that they would if it were necessary for us to provide storage in the lower division. They might not try to assist us, perhaps, in obtaining the financial aid which we must have to construct the large works in the lower basin, and the pact should not be operative until that is done.

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MR. HOOVER: That brings us to making a very difficult bargain here,- where the specific site of the storage will be.

MR. CARPENTER: May I illustrate? It has been my thought that here is a given block in a city upon some part of which, in order to protect certain parties, it is necessary to build a structure; that the title to the land on which the structure will be built is in dispute, or may become in dispute. It is my thought that we should now proceed to settle the title to the lot, then that leaves us free not only to permit but encourage the construction of the protective structure which the other party needs. To condition the vesting of the title upon the construction of the structure might meet much opposition, supported with great force by many arguments, while to clear the title now you clear the decks and leave an open field, with no objection.

MR. HOOVER: If the decks were cleared and if when it came a question of appealing for federal support to construct your reservoirs we found a conflict between the states, it would be very regrettable, wouldn't it, and would probably destroy the hopes of the southern states to secure consummation?

MR. CARPENTER: I may say in that respect it has been my view, and I speak only for myself, that the prompting of necessity and of insistence of humanity would justify us in adopting, not as a part of the compact but as a separate recommendation, such a resolution or memorandum as would bring to the attention of all parties the necessity of large construction of a type adequate to give protection, and permanent protection, to the Imperial Valley

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from inundation and I see no objection to adopting such, my thought being that we proceed upon the fundamental idea that the instrumentality by which it is constructed, the source from which the monies are drawn, should be left open so that every available resource be marshalled from whatever quarter to accomplish that great work and, as a mere incident of that stupendous duty confronting us, development of the lower valley will follow. I would be perfectly willing to commit myself to such a policy.

MR. NORVIEL: Perhaps that sort of commitment from each of the states would take care of the situation.

MR. HOOVER. I am wondering whether we couldn't advance a little by the suggestion; that the southern division should, under a general interpretable clause assume the obligation to provide storage, and that therefore they would have the right to designate where they would have the storage built, the other states to agree to support such a designation by the southern states.

MR. CARPENTER: From my own State's standpoint as a State, standing alone, wherever it is built it will be satisfactory to us but how far the other states would care to join in that opinion would be another question.

MR. CALDWELL: As for Utah, Utah would like to see the best structure and the best location to accomplish the purpose, wherever that may be.

MR. CARPENTER: I join in that.

MR. CALDWELL: Personally there are no prejudices on my part or on the part of the people I represent, so far as I know.

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MR. CARPENTER: I realize there can be quite a divergence of opinion and I have heard mutterings of such,- i.e. as to which is the best site.

MR. HOOVER: My thought was that the upper states, having furnished a certain amount of water, are no longer interested in where the structure is erected. If the lower states secure the moral support of the northern states in their application and desire for finance, it might clear the way very materially in this whole matter.

MR. CARPENTER: The exact degree to which that commitment might go would be a matter for mature thought. I wouldn't want to do any violence to the pact or its adoption by the memorandum and to that degree,- proceeding more from ordinary prudence, - I believe we should have time for reflection upon it but for my part I am willing to join in any memorandum that is generally satisfactory to us all. The prime purpose of building works for the lower division should not rest upon increased development,- because they know that we feel we have just as much right to improvements as the lower territory and our population has just as much right to advancements as theirs,- but upon a bigger basis and that is, that of a meeting of emergency, preventing the inundation of the Imperial Valley. As an incident of that great construction the improvement below will naturally follow.

MR. HOOVER: Don't you think, Mr. Norviol, some such an expression as the gentlemen make meets your position very considerably?

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MR. NORVIE: I had hoped to get that kind of expression,
but I was wondering whether this is ^{an} opportune time to ask for it.

MR. HOOVER: I see no reason why we shouldn't go on with the discussion a little.

MR. NORVIEL: I think so, I think it should be given consideration.

MR. CALDWELL: Mr. Chairman, this question came up, it seems to me, somewhat illogically, growing out of the question or a suggestion by Mr. Norviel who couldn't see how a compact could become at once operative unless storage were provided. I have made the statement that I believe a provision for storage and the building of storage is not a prerequisite to the operation of this compact. I think that is true because the river is going down today and it went down yesterday and it will go down tomorrow. The thing that the lower basin wants to know is that a certain portion of that river will continue to go down. The thing that the upper basin wants to do, and the lower basin wants to do I would say, is to help see to it that a certain amount of water goes down to the lower basin. ^{for the purpose} A large storage for that purpose, -/ of irrigation, is not necessary, - absolutely necessary, at this time and may not be for some time to come, at least as long as the minimum which the lower basin will need continues to come down the river, - the minimum in acre feet, in such a way that they can use it. Now that may continue for some time.

The great necessity on the river of course is the control of the river for protection purposes. Now if we sign a compact which

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says that the lower basin is entitled to, say, six million, eight or ten million acre-feet, every season down the river, provided a certain amount of storage is made available on the river, that is a perfectly good agreement to go into effect now and we may go on under that agreement for ten, twenty or thirty-five years and the necessity for the storage may never arise, but the agreement can stand and the pact can be operative.

Now that is just by way of making myself clear on that proposition.

MR. HOOVER: Your thought was to make the compact, so far as the minimum assurance is concerned, operative as against storage?

MR. CALDWELL: Yes. We have been using that "minimum" and "maximum" and I think it makes a little difference as to which basin you live in whether it is minimum or maximum; a maximum from the upper basin, a minimum to the lower basin.

MR. HOOVER: Just to formulate that so I understand it, your thought is that if the upper states agree to a minimum for any one year that that agreement should be contingent on storage having been erected?

MR. CALDWELL: That is it.

MR. HOOVER: That is the compact is not inoperative prior to that, but that only the minimum comes into effect when storage is provided?

MR. CALDWELL: That is it, that is the point exactly. That is what I had in mind, and as to the other question that grew out

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of that, I have always believed that the conclusion of a pact among these states, that was agreeable, would be the greatest possible single factor in bringing about the development which is necessary for the control of the river for the benefit of the lowermost acres. But I have said to myself all the time that the matter of the actual development is the second step and I have been thinking in that order. Personally, after we have arrived at a pact nothing would give me more pleasure than to enter very seriously and earnestly and honestly into a discussion, if indeed it were at all necessary for me to enter into it, as to how the river should be developed to meet all the conditions of the pact and all the requirements of all the people on the river.

MR. NORVIEL: May I ask Mr. Caldwell,- as he expresses it I don't get it,- if he has in his mind that it makes no difference whether the storage is above or below the point of demarkation?

MR. CALDWELL: My thought on that has been that it probably would make no difference in the last analysis. In the draft which I submitted I said "if storage is provided at or above Lee's Ferry." I did that for mental classification largely, to indicate that if it were above there we could easily turn it down but if it had gone down we couldn't put it past Lee's Ferry. But if that same storage were provided below as a reserve and we had the credit in the bank, as Mr. Hoover puts it, I can't see why that could not be made to operate in the same way.

MR. NORVIEL: Then it resolves itself to this; if the storage

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is in the upper basin we are assured only of the minimum flow,- the minimum average,- whereas we possibly might receive more if the storage is in the lower basin.

MR. CARPENTER: If a large reservoir is constructed at or in the vicinity of Lee's Ferry, for illustration, probably the dam in your state and the body of the reservoir in Utah, for example, that should be subservient in its power use. It would be essentially a reservoir for the delivery of water to the lower region. It could be nothing else. The same would be true of any reservoir constructed below the mouth of the Green River or the Grand. No other use could be made of it except the mere generation of power or floating of boats, and we could get no irrigation benefit from such a structure. May I suggest that that was my thought in the compact that I suggested, although I don't believe I expressed it fully enough to bring it out clearly? Whatever the losses might be they could be more than compensated,- take your own statement for example, - from the power benefits to be derived. It would accomplish first of all the saving of humanity below and the saving of property and incidentally rich benefits would run to the lower territory, which would be entirely proper. In return for this, some day, the upper territory might look to you folks for a reciprocity in the matter of the upper development,- not so immediately, however, because there is no imminent calamity threatening us. Do I make myself clear to you?

MR. NORVIEL: I think you do, but I think the reservoir dam

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at Lee's Ferry should be under the control of the lower basin as the water will have gone beyond the control of the upper basin, if it should be considered operative, in the same manner as if it were at Boulder Canyon.

MR. CARPENTER: I agree with you in that thought.

MR. NORVIEL: And that we may use the water as we see fit. We may use it all one year or scatter it over as many yearly periods as we please and that it should not affect the minimum flow.

MR. CARPENTER: Well, of course if you controlled the lake you could thereby control the flow past Lee's Ferry.

MR. NORVIEL: We might turn it all out this year if we saw fit and next year the minimum flow must come into it.

MR. CARPENTER: No, that would hardly be fair because you ought to have a large balance to our credit in that lake.

MR. NORVIEL: But I am speaking of minimum flow.

MR. CALDWELL: In the event Mr. Norviel speaks of I think he means you take one reservoir full out and put the other in which would otherwise have gone by as direct flow. Is that what you mean?

MR. NORVIEL: I mean this; that the water will have gone beyond your control. Whether we store it at Lee's Ferry or at Boulder Canyon makes no difference to you. The minimum flow must come into that lake, - into the lake, - whether it be at Boulder Canyon or at Lee's Ferry. It must come; the minimum irreducible flow.

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MR. CALDWELL: It will run into the reservoir naturally.

MR. NORVIEL: It must be permitted to come into the reservoir.

MR. CARPENTER: There would be no trouble on that score, I am sure.

MR. HOOVER: We have advanced that idea a little for further consideration. We might go to the point we were on when we were awaiting Mr. A. P. Davis' return, and that was some approximation of the intrinsic flow at Lee's Ferry.

MR. A. P. DAVIS: Mr. Chairman, Mr. Hooker and I spent the greater portion of the time at our disposal on mooted questions concerning losses and inflow, which occur between Lee's Ferry and Laguna Dam and he explained his method of reasoning and I explained mine and we devised a new one, worked it out together, ^{not} and knowing what the result was going to be until we got through, agreeing on the steps as we went along. We came to the conclusion that the mean annual losses, as nearly as we can get at them, between Lee's Ferry and Laguna Dam are about a million acre feet. These check within a very small percentage of the estimates of inflow which we together checked from Mr. Grover's figures and upon which we are agreed, so that we are now in accord that the nearest estimate we can make from existing data indicates that, on the average, the losses between Lee's Ferry and Laguna Dam just about balance the average contributions. We don't know which is larger. Some years one is larger and in other years the other is larger. We know that there is loss as well as inflow between Lee's Ferry and Laguna Dam and that they are each approximately

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on an average about a million acre feet.

The other important point we considered was how the translation of those figures from Laguna Dam to Lee's Ferry would affect the minimum and we are agreed that the loss in extremely dry years would be perhaps about normal, - increased because of the greater aridity and diminished because of the less submergence of the bottom lands in those years, - somewhere about normal, and that the inflow would be greatly subnormal, almost negligible. We believe, therefore, that a low year's measurement at Laguna Dam transferred to Lee's Ferry should be increased by at least five hundred thousand acre feet.

So far we agreed upon those things and taking those figures and those conclusions it follows that, in the long run and on the average, measurements at Laguna Dam are good for Lee's Ferry, corrected by individual years, but the mean would be about the same.

To correct for this minimum, we agreed upon adding five hundred thousand acre feet to the low years and deducting the same amount from the highest years. That keeps it from affecting the mean. The same logic applies for high years, as the tributaries would contribute more in a high year than in a low year, when the loss would be somewhere near normal.

On page five, Senate Document 142, 67th Congress, 2nd Session, "Problems of Imperial Valley and Vicinity," is the table that you are familiar with. This shows the discharge at Laguna

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Dam. That doesn't include the Gila but does include the water that runs down to the Imperial Valley.

MR. CARPENTER: Then the table you have just mentioned is not the table or amount of water that ran by Lee's Ferry?

MR. A. P. DAVIS: No.

MR. CARPENTER: But there should be added to that amount the five hundred thousand extra for the very extreme low years?

MR. A. P. DAVIS: Five hundred thousand additional in extreme low years.

MR. HOOVER: My mind is a little mixed. In the first place, on page 5 are given the gaugings at Laguna Dam which do not include the Gila flow. Mr. Carpenter's calculation is based on the gaugings at Yuma, which I understand include the Gila and that is the difference between Mr. Carpenter's basis and the basis of the Laguna gaugings. Is that not true?

MR. CARPENTER: No, partly correct. I didn't deduct the loss in the river from Lee's Ferry to Laguna.

MR. HOOVER: I was saying the difference between your calculations and the Laguna gaugings is simply the flow of the Gila. The Laguna gaugings do include water which goes into the Imperial Valley.

MR. CARPENTER: Yes, sir.

MR. HOOVER: So that if we take the Laguna gaugings instead of the Yuma gaugings we would exclude the Gila flow.

MR. A. P. DAVIS: We would exclude the Gila flow, but we include the diversion for the Yuma project. The measurements at Yuma on

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the other hand do not include water diverted for the Yuma project, but include the Gila. When you measure at Yuma you are measuring above the Imperial diversion and below the Laguna Dam diversion.

MR. HOOVER: The Laguna Dam gaugings include water which goes to the Yuma project?

MR. A. P. DAVIS: They do.

MR. HOOVER: So they include the whole flow of the Colorado River at that point?

MR. A. P. DAVIS: At that point, yes, sir. That is what they are intended to include, the whole flow there, which is above the Gila and of course excludes that.

MR. HOOVER: Then the problem also goes into the consumptive use in the upper basin. In order to reconstruct the river the consumptive use in the upper basin must be taken into account. Is it true that the Laguna gaugings include the Imperial Valley?

MR. A. P. DAVIS: Yes.

MR. HOOVER: The Imperial Valley diverts below?

MR. A. P. DAVIS: Yes.

MR. HOOVER: Consequently at Laguna you have the whole flow of the Colorado River at that point?

MR. A. P. DAVIS: Yes.

MR. HOOVER: Without deductions, except the Gila.

MR. A. P. DAVIS: Yes.

MR. HOOVER: And if you were to reconstruct the river you

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must also take account of the consumptive use of the upper basin and add that to the Laguna gaugings, and ought to add also the Gila flow. Have you a rough idea as to what the flow of the Gila would be if it had not been used for irrigation, or what the consumptive use, plus the present flow is?

MR. A. P. DAVIS: I can estimate that fairly closely. The mean annual flow as measured during the last twenty years is 1,070,000 acre-feet. The areas that are irrigated there are given in this document, 142,- and we can apply a duty of consumptive use of water on that area and approximate fairly well, I believe, the consumptive use in the Gila Basin, if that is what is wanted.

MR. HOOVER: My only point on that is, does it approximate, possibly, the amount of consumptive use in the upper basin?

MR. A. P. DAVIS: Oh, no, it is smaller. The consumptive use in the upper basin is on that table I gave you.

MR. HOOVER: About two million four hundred thousand?

MR. A. P. DAVIS: In 1902 the consumptive use was about 2,400,000 acre feet.

MR. CARPENTER: That is a progressive increase from 0 up?

MR. A. P. DAVIS: Yes.

MR. CARPENTER: You would think the Gila consumptive use would be something over a million and a half feet?

MR. A. P. DAVIS: Very likely less than a million and a half. But I am not sure about that till I figure on it a little.

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MR. CARPENTER: In other words, there might be - - -

MR. A. P. DAVIS: (Interrupting) There would be a good deal less.

MR. CARPENTER: There might be, then, a million feet to go into this calculation for translating back from Laguna gaugings?

MR. A. P. DAVIS: To include the Gila, yes. It doesn't seem like it would apply to the Little Colorado, as its contribution is offset by evaporation. There is very little outside the Gila Basin that is not thus offset.

MR. CALDWELL: Mr. Davis, just where is the Gila measured?

MR. A. P. DAVIS: There have been different points; one was at Dome.

MR. CALDWELL: Tell me where it is with respect to the mouth?

MR. A. P. DAVIS: Dome is about twelve miles above the mouth, and that was changed on account of difficulties of measurement, but not very materially.

MR. CALDWELL: This million seventy thousand you speak of is an average flow, is it?

MR. A. P. DAVIS: Yes.

MR. CALDWELL: Average annual flow over how many years?

MR. A. P. DAVIS: Eighteen years, I believe. It is all published in Senate Document 142.

MR. CALDWELL: That is near enough.

MR. HOOVER: On the table on page five, Senate Document 142, take 1920 for instance, you have 21,100,000. That is the Laguna flow.

MR. A. P. DAVIS: Yes.

MR. HOOVER: What would be added here, as a rough guess would be, the flow and consumptive use of the Gila and Little Colorado and the consumptive use of the Colorado below Lee's Ferry and above Laguna. This all comes to about a million and a half, and the consumptive use in the upper basin ^{is} 2,400,000 so it would be a credit of water to the Laguna readings of approximately a million feet, something like that.

MR. CARPENTER: Yes. If there are others, like the Virgin and other rivers, that would be still more of a reduction.

MR. SCRUGHAM: I thought the Imperial Valley had a heading somewhere at Laguna. What was all the disturbance by the Yuma people?

MR. A. P. DAVIS: They have contracted for building their canal and heading it at Laguna and have agreed to do that, but never have done it. They have never taken any water out above the Yuma project. The best use of the Gila, as I said yesterday, is in its own valley and that probably will be accomplished some day.

MR. HOOVER: Would it be possible for you to recast some figures in the light of the counteraction of deducting the Gila flow and consumption from the upper basin flow and consumption?

MR. A. P. DAVIS: The lower basin consumptive use you mean, don't you? Make some approximation of a difference in consumptive use between the lower basin and the upper basin, exclusive of the Imperial Valley, and add that to these figures.

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MR. HOOVER: You would have to add to the consumptive use the flow of the Gila over and above its consumptive use.

MR. A. P. DAVIS: Did you want the flow of the Gila included also?

MR. HOOVER: It is a part of the drainage basin.

MR. CARPENTER: You are now revolving as I revolved at one time and I decided consumptive uses had better offset one another and took the figures as printed.

MR. A. P. DAVIS: I don't know how near they would do that. You don't mean to undertake to run that back over twenty years,- take it as it is now; is that what you mean?

MR. CALDWELL: Run it back/^{over}twenty years.

MR. A. P. DAVIS: If given time I could make an estimate that would be worth something. The present consumptive use we practically know. How that has grown is a matter of history.

MR. HOOVER: I might phrase it in another way perhaps. On page 5 of Senate Document 142 your mean flow at Laguna is 16,400,000. Now if you went into this elaborate calculation to account for the Gila consumptive use below and consumptive use above it might add a certain amount to that mean flow,- it might add between 500,000 and a million feet. That is just a guess that might be the result of such an elaborate calculation.

MR. A. P. DAVIS: That is true.

MR. HOOVER: And if you took the low years as being 500,000 more than that and the high years as being 500,000 less

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than that, it probably wouldn't vary materially or affect the mean?

MR. A. P. DAVIS: No.

MR. HOOVER: So that you would get somewhere around 17,000,000 feet as the Lee's Ferry flow?

MR. A. P. DAVIS: Yes, 17,000,000 would be a correction in the right direction, probably not very far wrong.

MR. HOOVER: I should think for matters of discussion we could take it that the reconstructed mean at Lee's Ferry is a minimum of 16,400,000 and perhaps, with this elaborate calculation, half a million above, i. e. 17 million. Therefore we would come to a discussion of a 50-50 basis on some figure lying between 16,400,000 and 17 million.

MR. S. B. DAVIS: With all due respect to these eminent gentlemen, I am still from Missouri, I have to be shown, but I am willing to enter into a discussion on that line.

MR. HOOVER: I should think the result of the deliberations and of our advices on that matter have been to establish the 16 million as a sort of least mean.

MR. S. B. DAVIS: As the average mean at Lee's Ferry.

MR. HOOVER: Yes, and that an apportionment of a minimum would be half that sum, 8,200,000 acre feet instead of the 6,260,000 feet as suggested by Mr. Carpenter - so that this would be the question on your proposal, delivering approximately 82

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million acre feet in 10 year blocks.

MR. NORVIEL: Is the minimum average.

MR. HOOVER: That's the total they agree to deliver in ten year blocks. Then, just to further the discussion, if the Mexican deduction is to be borne by both sides and we take the maximum Mexican position, it would mean so far as the southern basin is concerned, their needs, as worked out by the Reclamation Service including the projects in view, are 7,450,000 feet, so that 8,200,000 covers that with a comfortable margin.

MR. A. P. DAVIS: It includes half the water to be delivered to Mexico on the basis of 800,000 acres.

MR. HOOVER: So the southern basin would be protected as to their end and still have a margin of about 800,000 acre feet.

MR. NORVIEL: That would be for possible future development.

MR. HOOVER: Or anything that may happen to you.

MR. NORVIEL: Delivered at the point of delivery.

MR. CARPENTER: Delivered at Lee's Ferry; you already have figured your evaporation on the river.

MR. NORVIEL: Not this one. We figured that for the purpose of calculation.

MR. CARPENTER: You told us that power was many times more valuable than any other use. We are letting you tear all the fire out of that water clear down to Laguna.

MR. NORVIEL: You have more miles above and the fire will already have been torn out.

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MR. CARPENTER: It recovers itself, it's just as good; our evaporation is already taken out.

MR. NORVIEL: The evaporation is not taken out of the two million if it is to be delivered to us.

MR. CARPENTER: If we use it for power above, our evaporation is already out.

MR. NORVIEL: The evaporation has not been deducted from the million and a half acre feet that you are going to deliver to Mexico. You have to make delivery at the point of delivery, not 600 miles above.

MR. HOOVER: Mr. Norviel, you have a margin of 750,000 feet to take care of all needs all along. That's pretty liberal.

MR. NORVIEL: That makes 8,200,000 acre feet a year minimum.

MR. HOOVER: That's the total to be delivered at Lee's Ferry.

(Mr. Norviel requests time for consultation)

MR. NORVIEL (After recess) As I understand the proposition Mr. Chairman, it is to divide the water so that the lower basin will receive (including the one-half to be furnished the Mexican lands) 82 million acre feet per annum over a period of ten years average, with 4 1/2 million acre feet minimum annual flow.

MR. HOOVER: It might be worth discussion. I wouldn't want to put it in the mouth of the gentlemen from the North, that it is their proposition.

MR. CALDWELL: There is no proposition; there is recorded a "no" vote against that minimum yet.

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MR. CARPENTER: That's a subject of discussion.

MR. NORVIEL: I thought when we retired we were to consider that on the basis of 4-1/2 million acre feet minimum annual flow.

MR. CARPENTER: From the last poll of the vote on the minimum there were 5 for and 2 against but the period was left undecided.

MR. NORVIEL: Now we are fixing the period at the greatest number of years suggested, which is ten.

MR. CARPENTER: We thought the period was left open. The minimum is for one year, an irreducible minimum predicated on no period. The low year goes regardless of period.

MR. HOOVER: Supposing I take the onus of a suggestion for the consideration of the upper states,- the 82 million ten year block and a minimum flow for one year of 4-1/2 million.

MR. CARPENTER: If you crowd us on the minimum we will have to have a protecting clause on precipitation, because we can't control that. Nature will force us into a violation, any possibility of which we should strenuously avoid in our compact, because that would provoke turmoil and strife. The mere matter of 500,000 acre feet as the minimum is small, but it might be decisive at such a time. It is not with the idea of trying to avoid delivering the water that I am suggesting the low figure, it is to avoid that which would result from nature's forcing a minimum that we could not control; therefore we want to avoid that as nearly as we can.

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MR. HOOVER: You are seeking protection from a shortage on precipitation beyond that heretofore known.

MR. CARPENTER: I think I am correct in saying that, when we come to consider the extreme minimum, a 20 year period is not indicative of that one year extreme minimum. We have heard engineers say it takes a 50 year record to reveal a safe extreme minimum, or likewise a safe extreme maximum, but that for general calculation of averages a 20 year record was safe. But the proposition is this, we shall make in any specific year, no matter what calamity above reduces the flow below, a delivery of so much net at Lee's Ferry. That condition will be one forced upon us by causes beyond our control. Therefore, it is not the idea of avoiding delivery so much as it is avoiding cause for conflict, the very object of the Commission. It is not to escape responsibility but to avoid an opportunity of opening the door to conflict.

MR. HOOVER: Don't you think the margins here pretty clearly cover the situation?

MR. CARPENTER: Generally speaking I think you are correct.

MR. HOOVER: Your worst contemplation on any historic basis is that it works out something over 10 million feet over the worst three years known in history and the worse one year works out at 9,500,000 feet.

MR. CARPENTER: That's the record.

MR. HOOVER: That your estimated maximum use which I don't think is final, at any time is about 4 million additional acre feet.

MR. JERSON: Is that the consumptive use in addition to the total?

MR. HOOVER: I assume that the question as to how much of this minimum flow recorded here was effected by consumptive use above at that time is very difficult to get at.

MR. CARPENTER: I feel this way: I am speaking for myself. That the quantity of water is a hydrographic question. The engineering members of the Commission from the upper states should take the matter under advisement and arrive at their conclusions after sufficient study of the question. I do not assume any particular knowledge in that respect. I only have certain general outlines and general principles that I have gathered from those who are familiar with the signs.

MR. CALDWELL: If the gentlemen who retired would care to offer a proposition based on the representations that have been made here, that might be desirable. May be they would not wish to do that. It would be entirely within their discretion, of course, but if they do, it might bring us one step nearer to something definite. If they don't, I should like to propose an adjournment until tomorrow sometime, but I won't propose that until after they have had an opportunity to say whether they have arrived at something definite.

MR. HOOVER: As a matter of progress, I have this personal suggestion to make. It is very difficult to ask one group or the other to make a proposal on this line and start a line of argument, because immediately a proposal is made it becomes a

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basis of bargaining. We don't want to approach the problem on that line and perhaps, if the two groups would meet separately and communicate to me their views, each one separately, I might be of some assistance.

MR. CARPENTER: That is a fine suggestion.

MR. CALDWELL: That is one thing I had in mind when I made that suggestion. I didn't suggest that they make their proposition but if they desired to do so, there was no particular harm.

MR. HOOVER: If that is agreeable to you, I suggest we might adjourn in two groups and consider the problem from this aspect.

Thereupon the meeting adjourned to meet again at 11:00 A.M., November 15th.

Clarence C. Stetson,
Executive Secretary.

The above minutes were approved at the 27th meeting of the Commission held at Santa Fe, New Mexico, Friday afternoon, November 24, 1922.