FILE

MINUTES OF THE

BEAR RIVER COMMISSION

ANNUAL MEETING

November 25, 1985
11:30 a.m.

First Floor Auditorium
Department of Natural Resources Building
1636 West North Temple
Salt Lake City, Utah

THOSE PRESENT

UNITED STATES

Kenneth T. Wright, Chairman
and Federal Representative

WYOMING COMMISSIONERS

George L. Christopulos
J. W. Myers
S. Reed Dayton
John Teichert (Alternate)

IDAHO COMMISSIONERS

Daniel Roberts
Don W. Gilbert
Rodney Wallentine
Kenneth Dunn, Ex-officio Director
Idaho Dept. of Water Resources

UTAH COMMISSIONERS

D. Larry Anderson
Blair R. Francis
Paul Holmgren
Calvin Funk (Alternate)

LEGAL COUNSEL

E. J. Skeen

ENGINEER-MANAGER

Wallace N. Jibson

SECRETARY

Geralee Murdock

OTHERS IN ATTENDANCE

UTAH

Robert L. Morgan, State Engineer
Dr. Norman E. Stauffer, Division of Water Resources
Barry Saunders, Division of Water Resources
Robert M. Fotheringham, Division of Water Rights
Jim Christensen, Utah Department of Agriculture
Carly Burton, Utah Power & Light Company
Robert W. Allen, Utah State University
L. Niel Allen, Utah State University
Ted Arnow, U.S. Geological Survey
Daniel F. Lawrence
Connie Borrowman

IDAHO

Hal N. Anderson, Idaho Department of Water Resources

WYOMING

John Shields, State Engineer's Office
Jeff Fassett, Deputy State Engineer
Mike Ebsen, Hydrographer
Marvin Bollschweiler

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KEN WRIGHT: Let's call this session to order. Everyone's here. Nancy is not here but taking her place is Geralee Murdock. Wally Jibson will read the minutes of the last meeting.

WALLY JIBSON: We have two meetings to summarize, first will be the annual meeting held April 15, 1985, the second will be a special meeting held July 11, 1985. These minutes were then read. Chairman Wright asked for a second on the Minutes. Paul Holmgren seconded the Minutes.

REPORT OF CHAIRMAN

KEN WRIGHT: This brings us to a special occasion to honor two of our very important people who served this Commission for so very very long and for so very very well - Dan Lawrence and Connie Borrowman. We're sorry to drag you out of your retired status on a wet snowy morning but Connie if you would like to come up here and stand in front of the table and Larry if you would be so kind as to do the honors.

LARRY ANDERSON: Connie it's a pleasure that I've been given the opportunity to give you this little token of our appreciation for the many many years you have spent with the Bear River Commission. I'll read this. "To Connie Borrowman, your endless hours of service in performing the always important but seldom appreciated secretarial duties, including the concentrated effort associated with amending the Bear River Compact, contributed significantly to the smooth functioning of the Bear River Commission from 1971 until your retirement in 1985." Congratulations, Connie.

CONNIE BORROWMAN: Thank you all. It's beautiful. I really did enjoy my years with the Commission. I know while they were negotiating the amended Compact of the Bear River there were times when I thought we will never reach a solution to this. We'll never amend this Compact. But it did come about and I'd like to feel like maybe I was some small part of that. At least vicariously, even though I didn't actually do the negotiating I kind of felt like I was in on it. Thank you all, I really have enjoyed it. I'm enjoying my retirement, in case you are wondering.

KEN WRIGHT: Dan if you'd be so kind as to step forward. All of this work proceeded my arrival, but I imagine there was quite a bit of it and it was no small matter. I'd like to make this plaque presentation. If you don't mind I'd like to read it. "To Daniel F. Lawrence, in appreciation for your guidance, counsel and wisdom so diligently given during the 18 years of dedicated service as Secretary-Treasurer. Without your quiet leadership and direction your fair-minded and sensible approach to complex problems the objectives of the Bear River Commission could not have been successfully completed." Dan, thank you so much.

DAN LAWRENCE: I guess getting something like this entitles me to make a speech too, doesn't it. Connie said that she is enjoying her retirement and I want to report to you I am in fact, happy with what's going on, what I'm doing and so far I have had the pleasure of everything I've done is without the benefit of monetary compensation. It's been quite enjoyable to be able to go about and serve in whatever I'm doing without worrying about getting a pay check for the hours worked, and so forth. That's been pleasurable. I really enjoy surveying and over the years have had a little family moonlighting company with my sons. I thought well, I'll retire when I'm 60 or 65 and take up a surveying company, but those of you who are aware of the surveying business know the state of the art is such you'd have to be rich to get into the surveying business now days, with all the modern equipment. I decided to stay a few years longer and just hoped when I retired I could get into something that wasn't involved in money-making and it has been fun.

I, like Connie, look around the table and see several of you still here that were with us in those long negotiating years. I think one of the highlights of my career was the negotiating process. I felt it was a good Compact in many respects, and was accomplished only because each of the three states gave up something. Not any of the states attained their early goals and I guess that is because everyone compromised. I appreciate being with you and glad to know that things are going well with the states. I certainly appreciate the invitation and thanks for the plaque.

KEN WRIGHT: Incidently on both Connie's and Dan's plaques we've recreated the Bear River logo. I'm sending that artwork out to Larry and

if any of you ever need it for anything the artwork and material will be here.

KEN WRIGHT: May we have the report of the Engineer-Manager.

REPORT OF ENGINEER-MANAGER

WALLACE JIBSON: This is the usual type of report for this particular regular meeting. A copy is attached.

I recall one morning being awakened quite early by a water user up there and he'd also talked to Don Gilbert and he said you'd better get up here and check this thing out I have no water at my head gate. I said that can't be, our Water Commissioner was up there just Saturday and you are in good shape. He said, we have no water, and so we've got to find out what it is, and so I first called Bear Lake at Lifton Pumping Plant and found out that the flow in the Rainbow inlet canal hadn't changed. If anything, it was a little more than it was before, and then I really was puzzled about it and I called the Water Commissioner to have him go up and check on it and he'd left town about 15 minutes before I'd called heading for the upper country and so in due time, we got another call from the water user up there and he said we found the culprit and told me about the break. It was a rather difficult break to fix and as I recall the Power Company loaned them some equipment, and I don't know how much damage to their crop was done. Rod can you - - -

ROD WALLENTINE: I can't tell you the damage.

WALLY JIBSON: I don't think it was excessive. They did get back in business. It's something they can see how those things can happen. It goes down the railroad for a mile or so and back into the river.

PAUL HOLMGREN: Where exactly was this?

WALLY JIBSON: It was a break in the river bank. It was following the peak. Maybe I shouldn't say what caused it, but when Pixley Dam was opened it gave a little flush down the river far below the peak and that flush was just enough to go through the saturated bank. It did cut it right out and followed the railroad grade and all of it stayed in the railroad right-of-way until it hit the next bridge crossing.

We also have copies of the printing of the Compact and the By-Laws. That concludes my report.

KEN WRIGHT: Are there any comments or questions on Wally's report. Do I have a second for approval of that report.

LARRY ANDERSON: I second it.

KEN WRIGHT: All those in favor, any opposed.

MOTION CARRIED.

REPORT OF THE TREASURER

LARRY ANDERSON: While Bert is passing a copy of the Treasurer's Report around, I should indicate to Bert why he didn't receive a plaque. He hasn't retired yet and we thought we could wait for a little while. We do appreciate all he does do, and we hope he knows that. We thought while he's still working here we didn't want him to think he had to leave.

BERT PAGE: (A copy of the report is attached). I hate to make this confusing but we crossed over the fiscal year. The last report you had was March or April and so the first report, which ends June 30, 1985 would complete the year you were in at the last meeting. It shows that you received interest last year on the money invested of $10,687.06. All three states paid their assessment. The total revenue available for the year or cash available was $213,278.71. You paid your assessment to the USGS of $59,840.00. You had internal expenses of $54,000. The bulk of which was $45,000 to Utah State University. That left us a balance at the end of the year of $98,000. On Utah State University I think I may have got billed early on the new contract. There were actually 5 payments last year. I don't have any problems, I just point that out to you. On the back of the sheet there's a list of checks - to whom they were issued and the amounts. The Bank Reconciliation at the bottom - this is the first time that I've been doing this but I have not had a bank statement come ending the month I'm dealing with. For some reason they gave me a two month bank statement, and we ended in the middle of the period so we had some deposits in transit and some outstanding checks

to make it come to the balance we should have had there. You'll notice it reconciled with the balance available. For the fiscal year we're in now the assessments we're in now the assessments are larger. Each state has paid theirs. We've had interest income $2926.25. We have a balance available for spending of $227,701.87. We've spent $62,240 for the stream gaging costs. We've paid $1853.76 for Wally's contract. We have the printing of the annual report of $2195. The legal consultant sent us a bill for $500. This leaves a balance at this point of $160,913.11. On the back are the checks that have been issued. There were no outstanding checks and you'll notice we have an account with the State Treasurer of $100,359.96. This also shows you have $60,000 in the bank. A check was signed this morning transferring $50,000 to Utah State Treasurer, like we do every year for our savings. That will not change, our balance available, but it will put money in savings. Any questions?

KEN WRIGHT: Bert, I'd like to see if everyone agrees - a projection for the year. We get this on a quarterly basis. It would be sort of nice to see what we project our costs would be for the balance for the remaining 9 months of the year.

BERT PAGE: Generally, the remaining budget should be your projection.

WALLY JIBSON: I projected last year. We had $119,000 left over. I deducted the $62,000 something to the USGS, $3391 to me, another payment to USU of $9000, plus a second payment to USU making it 5. That's where I came up with the $32,000 we had available. I did notice on that other report that you had a check for $30,000 to Utah State University. I think you meant the state of Utah.

BERT PAGE: It should be the State Treasurer.

KEN WRIGHT: I'd sort of like to see here's the quarterly report that takes us to October 31, 1985. Here are our projected expenditures for the balance of that fiscal year. What kind of a surplus will we end up with at the end of this year. Why are we generating such surpluses?

WALLY JIBSON: We don't have it at the end of the year, but at this time of year we've generated it because the state's have paid their assessments.

BERT PAGE: The three states have just come through with $42,000 a piece. That's all the income except income we're going to have until next June 30. At that point in time it will be down.

KEN WRIGHT: We had an unexpended cash balance after one year of $98,000.

WALLY JIBSON: You're looking at $30,000 or $35,000 at the end of June. That's all we had this last June 30. It may be a little more than that depending on what we do with our budget.

KEN WRIGHT: I'm sorry to ask these dumb questions but how can I read that on this sheet.

WALLY JIBSON: If you consider the budget is used up entirely and deduct the amount that's been spent or the expenditure, you come up with an unexpended balance of $44,000 so if you take your $44,000 off that, that is your first deduction and then you have a new deduction for USGS.

BERT PAGE: The funds are going to come out of what's left out of this $160,000. We've paid the USGS, that's the big payment. You're asking what's left in this budget. That has come out. Other than the miscellaneous stuff and the rest of Utah State's contract there shouldn't be anything big come out.

Our budget starts next July 1, a year from now. We'll have Ted's payment in a year from now which will be in September.

WES MYERS: That all comes about from changing the end of the fiscal year and then changing it back again. That's where all the confusion come. In the long run we're back to where we started.

BERT PAGE: This may be why we have some surplus too. We were able to move that payment until the end of the fiscal year, which is June 30, by moving our fiscal year back to the end of June we're moving back 3 months. We probably went through one month without any payments. I think that's what happened a year ago. We have this surplus. It's a surplus at the end of the year. We pull $60,000 out from under it and start over again.

WALLY JIBSON: Bert I'm confused on this. When we budget for 1986 we're budgeting for the 1986 water year with Ted. It won't be due on June 30. It'll be due on September 30.

BERT PAGE: Ted doesn't care where the money comes from.

WALLY JIBSON: Your books have got to agree with our budget.

BERT PAGE: This year showed $62,000 and we spent $62,000.

WALLY JIBSON: That was for 1985.

BERT PAGE: It might have been, but that's what we're in now and that's how it's there. We're talking dollar years and water years.

KEN DUNN: One of the reasons for the surplus was that we had used a substantial amount of the surplus in order to fund the study with the universities in the three states on consumptive use. We made the decision to increase the dues to build the surplus back up and in anticipation of the 1976 base year studies that will be coming along. That's why you'll see a surplus and you'll see it growing because once we enter into that agreement to get that base study it's going to take a substantial amount of money to do that.

GEORGE CHRISTOPULOS: That $62,240 we paid October 1, that covered the previous water year.

LARRY ANDERSON: Ted's going to send us a bill. We are incurring a cost right now that hasn't been billed to us.

TED ARNOW: I can tell you what it's going to be. The program does not change. If we continue the same 32 gaging stations the total cost will be $64,800.

WALLY JIBSON: That $64,800, I maintain has to come off the budget we have set.

BERT PAGE: We're not going to pay it until after July 1. It is a cost we're incurring, we're setting up, we're accruing, but it will not come out of this budget.

REED DAYTON: I'll make the Motion to approve the Treasurer's Report.

GEORGE CHRISTOPULOS: I'll second it.

KEN WRIGHT: All in favor, any opposed.

MOTION CARRIED.

CONSUMPTIVE USE STUDY

Progress Report

BOB HILL: (Copy of Bob Hill's report is attached) A slide presentation was made showing the type of equipment used and location of study areas. At Montpelier we attempted to maintain the water table inside the study area the same depth as outside. Partway into the irrigation season this year it became apparent that was incorrect because our vegetation had not reestablished the root depth, but vegetation just adjacent to the lysimeter had. This is two years now since transplant. We were running the lysimeter drier than what was outside. The roots were not established. About mid-July we made a correction and brought it up. We would have been a lot better if these lysimeters at the Montpelier site had been across the fence out in the field where Jim has his meadow hay. The lysimeters at Hillyard look real good inside and outside.

KEN DUNN: What kind of conclusions have you drawn?

BOB HILL: We were hoping that we could come up with a simple coefficient that would fit all three sites. That doesn't appear to be possible. We had hoped we could come up with one that would fit with the Blaney-Criddle method because that's simple. We've got data to do that for a historical period of time. That doesn't seem to be possible. The difference is from one year to the next on a seasonal basis. I think we could probably come up with something for Hillyard and something for Randolph and I'm not sure about Montpelier right now. The more complex equation - the Penman equation utilizes all the data we're getting. It seems to fit well at all three sites. We don't have enough data to do that historically through the long term water budget study.

KEN DUNN: What kind of data is that?

BOB HILL: It takes temperature and precipitation data which we have for Montpelier, Clifton, or Woodruff for the long term. It also takes a daily wind travel which we don't have. It takes a dew point measurement or relative humidity which we don't have on a long term. It also takes solar radiation which we don't have on a long term.

KEN DUNN: I guess I still have some questions as to what we're going to do with this now.

KEN WRIGHT: We've got another year on this haven't we?

WALLY JIBSON: We're contracted up to June 30, 1986, but that isn't another year.

KEN DUNN: It appears to me we don't have enough data to make much of a decision in terms of consumptive use for the basin. We need to decide whether we're going to continue this or drop it.

PAUL HOLMGREN: Are we trying to pick up trends that are developing. If so, I don't think we've had it long enough.

BOB HILL: Our original discussion with the Commission was we would have a 5 year study of which we hoped we would get four reasonably good years of data. As you can appreciate we've had wet years. This last year, 1985, may have been closest to a typical year than we have had. Our hope was that we could compensate for the wet years by the way we did our calculations. When you look at the depletion on the river we would subtract out our water used by the crop. We would take that into account and calculate the difference. I'm not convinced that I can say that I feel comfortable with drawing firm conclusions from the data we now have. If it's the wish of the Commission we will do that. We intend to do that after a complete analysis of this year's data. How comfortable we are about doing long term projections or interpretations on that, I don't know.

KEN WRIGHT: Would you feel comfortable after 4 years?

BOB HILL: That's what we originally proposed at least 4 years worth of summer days which would take us through each set. We will do the best we can.

WALLY JIBSON: Bob, is there a possibility of a reduced type program for next summer in which you would still have the field data collected?

BOB HILL: This is a possibility and one reason it's come about is that we may end up with a little bit of funds in excess of what we'd anticipated. Wally and I talked about this previously.

The actual field trip itself takes 2 days by a student. We've had a sharing of a student at Utah State, so Utah, Wyoming and Idaho shared the same field trip effort. That helps us out a little if funds are left over. We think about $5,000. That may be enough to carry us through the summer on the field work without any additional expenditure from the Commission. If we decide to do that we would write the final report as of December 31, as per the contract and then add any information from the field work in the summer of 1986 as an appendix to that report. We would have the opportunity under full contract to write the report and any additional report would be as an appendix to the report.

ROD WALLENTINE: But as you feel right now that report is going to say "I don't think we have one formula that works for all."

BOB HILL: I think we can get a calibrated approach on the Blaney-Criddle question but it's not going to work the same at Hillyard as it does Randolph or Montpelier.

KEN DUNN: The data at Montpelier is not equivalent to the other?

BOB HILL: Yes, and I think basically that's because of the siting of those lysimeters in that stack yard.

WES MYERS: If we have another two years and you were satisfied with the results, what practical application would the Commission make with the study?

BOB HILL: There's two things the report will be used for, one is a historical study going back to 1976. I think Wally read a statement at the beginning of the meeting that referred back to that water budget study for a historical period. The other one is for a year to year basis and maybe this will come up in the implementation discussions, if we could somehow estimate the state of depletion on a weekly or a monthly basis. I think it would help you on regulation. I'm not in a position to say that. Wally's in a better position to say it.

WALLY JIBSON: Well as I envision this once we get the results and the three states are satisfied with them, then as additional acreage is irrigated or additional uses develop we will apply the results of Bob's study to get a new figure in depletion. What it is, is a tool to be

used in determining the increased depletion and to tie this use to the Compact. That's the bottom line. We've got to have some way of arriving at an answer for increased depletion in each of the states.

WES MYERS: I imagine there are other groups and other people doing work on this same problem. I know our water development commission in Wyoming is doing a minimum amount of work on runoff water in the high area meadow at the head of the Green River. We're coming up with some results there and there must be other groups. We should be able to pull all that together and get some pretty good figures. I don't know who's responsible for doing it.

WALLY JIBSON: If we didn't have Bob study it, I suppose what we would do is go to one of the accepted methods like Blaney-Criddle. That's been a long time method of estimating depletion or consumptive use. If we didn't have Bob's study we'd say okay let's use Blaney-Criddle with different coefficients for different areas.

GEORGE CHRISTOPULOS: Mr. Chairman, I would like to remind everyone that we agreed to conduct this study to try and get some sort of refinement because our Compact calls for a depletion amount for each state and we wanted to try to get information in a particular area that would be applicable in order to determine the depletion in the basin, but if I hear correctly you're telling us that the information you've now gathered has not given you the conclusions that you feel comfortable with.

BOB HILL: Yes, I think I would say that. I would say we're comfortable with using the Hillyard and Randolph data. I think we've got two years of reasonably good data of those two places. Montpelier I don't feel comfortable with.

GEORGE CHRISTOPULOS: I would say too, from what knowledge I have of Blaney-Criddle or any of the methods, this was just additional research to try to refine what we have and to see if we can't gain more information. I think the question we should be asking ourselves now is do we have enough data to feel comfortable with the efforts that we've made to now proceed with the actual determination of depletions in each of the states. Bob's saying he feels comfortable with what's been done

at Hillyard and Randolph but not at Montpelier. So we need to ask ourselves what do we want to do with the Montpelier data. Do we want to extend the study another year. That's a question we've got to face up to.

DAN ROBERTS: I'd like to put a little fact in here. I think our farmers are way ahead of us. For example in our county we have one irrigation district where the water is assigned to the land and then we have stock companies where water is made available by the shares of stock an individual owns. Those stock companies can sell water like you sell cows. I wish you could be in Franklin County and you'd see where that water from those stock company areas is being sold. When I went into Franklin County forty years ago and they closed out the Franklin County Sugar Company that water sold at $20 a miner's inch. I wouldn't dare tell you what the price has been this last year. We have guys buying that water off the irrigated land taking it and I don't know where the economics are. I haven't seen with the price of electric power going up. Here these guys are taking that water and sprinkling heretofore dry land wheat in our county. What's happening to that consumptive use. There is no return to the river from irrigation runoff from those irrigated fields. So I think this thing is really important. I've been watching this thing for nigh onto 50 years in Franklin County and this thing is just growing. Our consumptive use is going up. There will be less return to the river, and I think this thing is really important for this reason. They're selling this water stock off those stock companies just like you'd sell cows. The water is being moved onto that dry land country in Franklin County. I suppose it's happening all the way up the river and you'll get where you have a 70% return flow you'll have maybe nothing. That's the reason this return flow or consumptive use is extremely important in my opinion.

WALLY JIBSON: Dan, don't you think rather than the consumptive use going up that the consumptive use with respect to the water applied is going up. The consumptive use might remain fairly constant but your applying less water than you did before so you are getting less return flow.

DAN ROBERTS: They're taking that whole ride that was taken out onto the land and that water from that irrigation. A lot of it was returning through subterranean seepage and runoff from the end of the field.

DAN LAWRENCE: It isn't clear when Bob says it was long range data from other sources. Is that the problem or is it the lack of one more year?

BOB HILL: I may have confused the issue. One of the things that Wally was talking about was going back to historical data and seeing what has been depleted historically for a 10 or 20 year period from January 1976 and saying what if we had that acreage. That's the long term question. To do the long term we don't have adequate data since we did not put the detailed weather stations in until 1982. For the past 4 years we had enough data to use any transpiration equation we want, but prior to that we do not.

DAN LAWRENCE: The Compact requires that 1975 was the year that you know what happened. Is that related to the question as to whether you do one more year or not?

BOB HILL: That's not related whether we do one more year or not.

KEN WRIGHT: Could you say Bob, that you could feel comfortable with the Randolph and Hillyard and you could stop that study.

BOB HILL: If you're going to do something with the Montpelier, let's do it at all 3 sites; because as long as I've got a man out there the cost is insignificant.

BLAIR FRANCIS: Bob, what do you propose to do at the Montpelier station as far as the site goes. Move it and start it different or what are you saying. As long as we're discussing this I think you are getting better at what you're doing. We've definitely had some hesitation on some of the data on the Randolph because of not having background and now we feel pretty comfortable. What do you have to do at Montpelier?

BOB HILL: If we were to have done Montpelier right first off, we should have put the lysimeters out in the field. At this point in time if we move those lysimeters it's another year before it's established and we're

back in 1983. It's another two years getting reasonable data. On Montpelier I'm really puzzled as to what to do with that. I would like to transplant the rushes in the same density and we would operate the water table almost at the surface of the ground all through the season.

BLAIR FRANCIS: In relation to the goal of this project we're doing on consumptive use, how do we correct the data at Montpelier in order to bring this study to a head to get what we want.

BOB HILL: If we went another year with Hillyard and Randolph, it would give us that much more assurance in the coefficient we are developing. We wanted to see the same thing in all 3 years but we didn't see the same thing. That's something we've got to wrestle with a little bit. As far as Montpelier I don't know. Our alternative is to continue where we're at and maintain the water high enough to keep those rushes in place.

LARRY ANDERSON: Mr. Chairman, I'd like to suggest that we ask Bob to complete a draft of his report summarizing what has been done so we can have something to react to before the next Commission meeting. We could then make a decision in April as to whether or not to extend the contract. I really need a report to look at showing what you've done, what your conclusions are and your recommendations of what we ought to be doing. I would think the Engineering Committee could look at that report and come back with a recommendation as to whether to extend it or not, and we could do that in April.

GEORGE CHRISTOPULOS: Mr. Chairman, I like Larry's idea except I wonder if at the same time we get the report, if Bob could provide us with a proposal giving us an idea of the cost we're talking about to extend this contract for all three sites for a year and possibly 2 years for Montpelier. I think that would help make my mind up as to what we're buying with it and also comparing what that report tells us. I would think the Engineering Committee ought to get that report and the cost figures and then have a meeting and spend the day looking at the whole thing and then come back to the Commission with a recommendation in April.

WALLY JIBSON: Bob, will you have much more feel for this by the first of January than you have in your update today?

BOB HILL: What you've got right there represents our best analysis on the lysimeters. It probably won't change by the middle or end of January just due to the logistics of our schedules.

KEN WRIGHT: If you could include in there Bob not only, as George suggests, the costs of various objects. There's a full scale - let's have another year, there's a fall back position of a partial kind of thing.

BOB HILL: If we opt to the fall back position, we operate with what residual we have. If you want another full year which goes through June 30, 1987, then we haven't put any cost of living or increased cost in what our budget analysis is and we're operating rather close to that each year. We've accumulated over 4 years now a little residual that could carry us through the summer's worth of data. If you want another full year and then the residual, I'd say we're looking at about a full fledged amount of $36,000.

KEN WRIGHT: Those are the things the Engineering Committee and this Committee has to look at. Here are the various ways we can go and this is what it's going to cost. Here's what we expect to get out of this thing. If we're not going to get anything, here are the ways to correct that in hopes that we do get something out of it. If we can see it in black and white, then we can respond to it.

BOB HILL: I would be very cautious about suggesting we have any report to interpret much before the third week in March. December 31 would be impossible.

LARRY ANDERSON: As a draft report, could you have something for us to look at so the Engineering Committee could meet as early as February or the first part of March. The Commission meets around the middle of April, as I remember, and that would give the committee an opportunity to review the proposal and make a recommendation to the Commission.

BOB HILL: We'll try.

KEN WRIGHT: One last comment. You start something and you have a goal in mind and you hate like heck to come back off that goal. You've just wiped out all 3 years of effort just to save a buck in the future. That's something we don't want to do. This thing was started for a specific purpose and we want to see it work.

BOB HILL: Our goal was 5 years which would carry us through June of 1987 which we were hoping for. If the Commission authorizes a fall back I'm all for that.

WES MYERS: Do you feel that one location in each community is quite accurate?

BOB HILL: As I indicated, in adjacent alfalfa fields where we didn't have a water table we've been taking neutron probes. This hasn't happened in Hillyard Flat. In the Randolph area we have several alfalfa fields in that valley, Cokeville, up Smiths Fork, where we're taking neutron probes to supplement what we're getting on the lysimeters.

WES MYERS: It seems to me like there would be a tremendous variation of runoff depending on the type of soils involved.

BOB HILL: This question was brought up a little earlier. Our hope is that the consumptive use is the same even though the drainage may be different.

WES MYERS: I agree on that - consumptive use would probably be the same but the depletion from ranch to ranch might be 100% different.

BOB HILL: That I don't know.

WES MYERS: That's what you've got to get at is the amount each unit depletes.

GEORGE CHRISTOPULOS: Actually again, I think what you're trying to do is to refine data so we can determine the consumptive use of a particular crop in the whole area. The factors such as wind, temperatures and solar radiation and everything else that goes into this determination are all going to be taken into account. I, at one time, thought we had pretty good formulas to do this and then I found out all of a sudden that

there's got to be a lot of refining done and I think that's a continuous process. I think what we've tried to do here is to take one site in each state to try to get better data that would enable us to have accurate data for these particular areas as we possibly could have, as opposed to just taking the various formulas and trying to plan. I think it's become evident to the researcher that this doesn't always quite pan out the way you think it should and you find variances that are non-explainable so you go out and try to figure out why this is happening.

BOB HILL: May I just illustrate that for Hillyard Flat, if we used the Blaney-Criddle equation for Hillyard Flat the season coefficient is about .85. As I showed the data for the last two years out of the three we've studied, the actual water use has been greater than Blaney-Criddle coefficient of 1. It's about a 1.2 which is almost a 40% increase in consumptive use over what we would have previously estimated. I think that illustrates your point.

LARRY ANDERSON: Bob, one more question. Do you need a decision now so you can plan your activities at the university or can you wait until April?

BOB HILL: Bob Burman, Chuck Brockway and I have concluded that we are going to write a final report which is due on June 30, 1986, as it stands right now. In April, if the Commission decides they want to go ahead with another year we have an option to go ahead for a full year then we'll revise the final report for June 30, 1987. If the Commission just wants the residual - field data without full revision, then we'll still have a final report and an appendix for the field data. We've already concluded that's what we'll do.

LARRY ANDERSON: Are you going to save any money if we were to tell you today to go one more year and not write your report at this time. Would we save any money by doing that?

BOB HILL: If you want to go a full year then we're looking at $36,000 split 3 ways. If you want the residual we're looking at what's left in the budget we now have, just extend the contract until December 31, 1986.

KEN WRIGHT: But all that will be in your interim report for the Engineering Committee?

BOB HILL: Yes.

KEN WRIGHT: Sometime in what, Larry, January or February?

LARRY ANDERSON: Yes.

BOB HILL: I'm scheduled to be in India in January.

KEN WRIGHT: If you could just lay out the options and a look at some of the results it would be very helpful.

BOB HILL: What we've got right now represents about the best we can do with the lysimeter analysis.

GEORGE CHRISTOPULOS: I want to be sure we all understand what we're all going to do. As I understand correctly, what Bob is going to do between now and late February, early March would be to try to give some sort of an interim report with some cost options and so forth to an engineering committee which will then presumably meet sometime and review this whole thing and prepared to come to the April meeting of the Commission to reach a conclusion as to where we want to go.

Let me ask another question. The $36,000 which we're committed to through the end of June 30, 1986, is it already budgeted for within our $42,000?

WALLY JIBSON: Right.

GEORGE CHRISTOPULOS: I think the reason we're raising the amount to $42,000 is probably twofold, one is to try to recapture some of the moneys we've used previously out of the reserve and the second part of it is to still have some additional money to take care of some of these kinds of things that we're talking about.

WALLY JIBSON: We dropped it from our tentative budget after June 30. We took the $36,000 off for 1987 and 1988, but I think you're going to decide on the stream gaging program and that will alter the budget probably, considerably. If you decide how much money you are going to need to get back to this implementation thing on the first of January, we've got a lot of potential changes in the budget that we approved last April.

KEN WRIGHT: As a scholar, someone exploring this thing, one of the recommendations will be the ideal in your report, right Bob. This is what you would like to have happen to make this thing turn out. Your fallback positions from that. Let's keep the other one in tact.

JOHN SHIELDS: I'm curious after reading the minutes of last April about the study using historical data that was done by the Water Lab at Utah State University. There was minimal discussion in the minutes about that. I was wondering if you might elaborate on how that fits into the work that's going on or will that be included in the report.

WALLY JIBSON: Bob, just before the meeting, Brockway called me and we tried to figure out a way he could get from Idaho Falls to Salt Lake and he couldn't. He said, will you just report to the Commission that, at no extra cost to the Commission, we want to look back at the water use and land use study that was made in the mid 60's, and apply the coefficients that we get after we're pretty well along on this study and bring that up to date for total water use.

BOB HILL: This is from the University of Idaho.

WALLY JIBSON: You and I talked about this a little bit, but you wanted to do that as a matter of interest, not as a matter of arriving at something that the Commission bought or something like that, it was a matter of interest you could do without additional funds. This is what John is referring to.

BOB HILL: Could I discuss that for a little bit.

WALLY JIBSON: Yes, as a matter of fact, I was a little bit vague on it and it might be well if you said a few words about it.

BOB HILL: If you look in the recent proposal we submitted to the Commission, we suggested we could look at a historical period of time and use the value we obtained from this study to calculate depletion by sub areas, and the sub areas have been defined by other studies. One is at Evanston, Randolph, Border, and we had indicated we would do that; but then our concern came in April and we met as researchers and wrote a letter to Wally to this effect that we were concerned that such studies,

if we did them, could be misinterpreted as representing the water depletion on acreage as of 1976, which we didn't know if the Commission, at this point in time, was willing to say this. We were concerned that we'd got ourselves into a box, by saying we came up with the depletions as a historical sense. What we proposed was we take the 1965 land use values for the Bear River drainage as published in a report of the Utah Water Research Laboratory. We'll just use those acreages to illustrate the process, that's where we take the 10 and 20 years worth of temperature and precipitation data using Evanston, Woodruff, and maybe Border, Montpelier, and long term stations. That's where we get the question of do we have good enough data to go back to a simple equation.

WALLY JIBSON: You would update it basically from 1965 to 1985, 20 year period - really update that water use.

BOB HILL: Not land use, we would demonstrate our procedure for how we would use our coefficient on the Upper Bear. We haven't done anything on the Lower Bear.

JOHN SHIELDS: That's still land that's got to be done.

BOB HILL: If you read the proposal that's in there; that's something we would be doing between now and June 1.

KEN WRIGHT: Any other comments?

SMITH'S FORK PROJECT - ECONOMIC EVALUATION
Status Report

LYLE SUMMERS: Mr. Chairman, Members of the Commission, I was picked sometime in April to head a committee of people from the 3 states to do an economic feasibility study for the Smith's Fork Project in Wyoming. We have had a couple of meetings and had input from several people in this room and I'm in the process now of putting together a draft report. We have got the various purposes of the project which is water quality on Bear Lake, recreation at the Smith's Fork Reservoir, irrigation in Wyoming and Idaho, hydropower on the Smith's Fork Dam and the existing hydropower plants of Utah Power and Light on the Bear River System, and flood control. I'd like to show you some charts today, tables mostly, and show you basically what we're coming up with. We haven't got the

hydrology simulated such that we can plug it into our computer and do the irrigation benefits the way we would like to, but that is nearly finished and we'll have that done probably by the time we have our next committee meeting on the 3rd of December. (Charts were then shown on the overhead projector). (A copy of this preliminary draft report is attached).

I'd like to show you, and I hope you can see. I hope you are all familiar with what the Smith's Fork project is. I'm going to give you the punch line first and then give you the joke. Table 1 is a summary of the various categories of benefits. I'll go through each of these categories on separate charts and talk about them. Water quality at Bear Lake we anticipated to be about $6 million benefit in terms of present worth.

Irrigation, about $3.7 million of benefits in Wyoming and about $5.6 million in Idaho. Recreation at the reservoir is anticipated to be about a $4 million benefit there. Hydropower at the reservoir is about a $10.8 million benefit. Hydropower existing at UP&L sites is fairly small about 3/4 of $1 million in terms of present worth. Flood control is also quite small about $2.2 million. You add all those up and you get about $33.1 million and you calculate the benefit cost ratio, assuming the project will cost about $60 million. You have a b/c ratio of .56. If you have a b/c ratio of less than 1 that means for every dollar you spend you are getting less than a dollar back. In this case you are getting $.56 for every dollar you spend on it.

I'd like to go through each of the purposes to show you how we did the analysis and to get your input. If you have any questions or if you think I'm using the wrong data feel, free to let me know.

The water quality aspect of the project at Bear Lake simply has to do with the fact that if you store water up at Smith's Fork you'd have less sediment and things - phosphorous carried into Bear Lake. Theoretically you would kind of stop the degradation of the water quality on Bear Lake. There was a study done by the Bear Lake Regional Commission. I think their consultant was Ecosystem Research Institute. They determined after their study that if Smith's Fork was constructed, it would kind of level off the water quality problem. With the project they say we would have the same amount of recreation going on the Bear

we're having now. Without the project they would anticipate water quality would degrade about the rate such that the recreation that occurs there would diminish. After about 35 years you would be down to subface recreation use on Bear Lake. What we know about Utah Lake, which is quite polluted, is that even though a lake is polluted we still get quite a bit of recreation use. There are still people out there in the summer on water skis and fishing and other things. We assumed there would be some kind of a base recreation use there even without the project. If you subtract the value of the recreation on the lake with the project and subtract from that the recreation you would expect without the project would the water quality be as great as the consultant said it would. You would expect $6 million difference in the value of the recreation on the lake.

WALLY JIBSON: Between the states, Lyle, what would you say that benefit is - 50/50 Utah and Idaho?

LYLE SUMMERS: That's how the Lake's divided so I would suppose that would be comparative.

LYLE SUMMERS: This one shows the irrigation. I've done this by hand. We haven't plugged in the hydrology with the economics on the computer, which is what we eventually will do. This is based on what the farmers, those who irrigate up there, told us when we had our meeting in Cokeville. About 60% of the land area is in alfalfa, about 10% in barley, and about 30% in meadow hay. Using 16,300 acres for Wyoming that means about 9.7 thousand goes into alfalfa, 1,163 goes into barley and about 4,900 acres in meadow hay. In Idaho we have about 25,000 acres area. I understand this is the Dingle area with about 15,000 alfalfa, 2,500 barley, and 7,500 meadow hay. You have a total acreage possibly to be benefited from the project of about 41,000 acres. They also told us that their reduced pumping would be one of the major benefits. Most of the alfalfa in the basin is irrigated by pumps, and that costs about $21 per acre. The Smith's Fork project would probably eliminate most of that pumping. You have $206,000 benefit for Wyoming and $315,000 for Idaho, for a total of reduced pumping cost benefit of $521,000. The other irrigation benefit is the increase they would expect on their meadow hay

production. Since the alfalfa is now sprinkle irrigated and probably has basically a full supply, we didn't anticipate there would be any change in that production.

The basic benefit from the project is from the meadow hay. We anticipate the increased net income from meadow hay is about $18 per acre, for increased net income a total of $744,000 which comes to about a $9.3 million total benefit for irrigation. The key number here is the $18 which is the increased net income to the meadow hay. In our meeting in Cokeville they told me that about 50% of the time they will get about 3/4 of a ton of meadow hay production. 20% of the time, or two years out of ten, they will get half that per acre. About 30% of the time they will get 1.75 tons per acre. Using the crop budget I had for Utah, if you get 1 3/4 tons of meadow hay, you should make a profit of $42. If you get a half a ton per acre, you are going to make about $12; and if you get 3/4 of a ton, you make about $18. The way to average that is you come out to about $24 per acre on the average throughout the base of the project. We've calculated to make it about $24 per acre on meadow hay. Assuming they went from what they are getting now to full production of 1.75 tons per acre, they would be making $42 per acre on the whole area in meadow hay. If you subtract the $24 from the $42, you get the $18 we used for the benefit. That is basically how we came up with the $9 million benefit. You are actually talking $744,000 per year, which runs present value to $9.3 million.

BOB HILL: The data we have on an alfalfa field at Randolph on sprinkler irrigation we estimated there would be a potential increase in yield of about 1/2 ton to 3/4 ton per acre.

REED DAYTON: Why would there be reduced pumping costs?

JOHN TEICHERT: We're pumping from wells at the present time. Practically all have supplemental wells.

REED DAYTON: That's why the water supply has increased when they use it all by gravity instead of pumping.

WALLY JIBSON: John, all these years you calculate your yield has cut, do you think it's always due to a deficient water supply or to early frost

or late frost you get every year? How much does that affect it or is it all deficiency in water supply?

JOHN TEICHERT: I don't think it's too much a deficiency in water supply. Sometimes you've got to pump it. You get kind of stingy when you raise that out of the ground. If you don't get it all as much as you should, the frost gets it.

WALLY JIBSON: You get 3/4 of a ton on a certain percentage of years, you get 1/2 ton a certain percentage of years, you get 1 3/4 tons a certain percentage of years, my question is, is it mostly water that brings it about or is it other climatic conditions?

JOHN TEICHERT: I'm not prepared to answer that.

BLAIR FRANCIS: A combination of all of that, the water would be the biggest input, I'm sure.

BOB HILL: What is the typical pumping lift? How deep are the wells?

JOHN TEICHERT: Most of them are 75 to 100 feet. If you're pumping out of the ditch, maybe a little head on it that would reduce your cost considerably.

REED DAYTON: There are different factors that would cause the increase or decrease that could be the weather and water, both of them. Sometimes we might get an early frost and that will cut your production. Then, on the other hand, if you have a good wet year so to speak you are going to have a better crop.

WALLY JIBSON: This is my point, even if you had a reservoir and you had a full water supply every year. They're not going to get 1 3/4 tons per year, every year. You are going to get frost once in a while.

LYLE SUMMERS: This approach does give us a little estimate of what the project is, and I think, given the situation that the bottom line is .56 b/c ratio maybe that's the way we ought to go.

The next table talks about recreation. We don't have any idea how many people are going to recreate on this lake. We do the best we can with the data we've got to estimate what it's going to be. I took the 1982 report from the Bureau of Reclamation on the use of their reservoirs in the 3 states and we come out with an average use per surface acre on

the reservoir of 22.3 visits per surface acre. There's going to be, on the average, 1,061 surface acres on that reservoir from May through October. If you multiply the use per acre times the surface area you get about 23,693 visits. We applied to that kind of a stock number the agencies in Utah have agreed on for our recreation areas of about $15 per recreation visit. That gives you an annual recreation value of about $355,000. If you subtract out a little bit of operation and maintenance cost for the upkeep of the reservoir recreation facilities, you come out to an annual recreation benefit of $325,000. The present value comes to about $4 million for recreation.

KEN WRIGHT: Is that over a 10 year period?

LYLE SUMMERS: It's over 100 years. We use the life of the reservoir, which we figure is 100 years. We use an 8% discount rate which is kind of a negotiated rate that those of us who were at the meeting in Cokeville decided we'd follow. It should be approximately the state's bonding rate. You have to use a discount factor which is a mathematically derived number which accounts for the time value of money. You may get $355,000 per year but in 10 or 20 years down the road this isn't worth as much as it is today so your discount factor comes in. We also didn't know if there would be a demand for the 23,000 visitor days up there and so I did some calculations and I got a participation rate out of the Recreation Working Paper of the Bear River Basin Cooperative Study showing about 25 recreation activities per person. You multiply the 1970 population by that factor and subtract and multiply the 1980 population by that factor and subtract the two. It looks like there is a demand up there for about 1 1/2 million visits more than in 1970. It may be the recreation facilities that are there are just being used more heavily now. I think it indicates the 23,000 visitor days as predicted at Smith's Fork will probably be used.

BOB HILL: Do you have any information on Lake Alice?

LYLE SUMMERS: I don't. I don't know Wyoming.

BOB HILL: It's a lot more accessible to get to.

LYLE SUMMERS: This is the hydropower analysis provided by Energy National Incorporated, a subsidiary of Utah Power and Light, which

estimates the hydropower facility there including a powerplant, transmission line and equipment would cost about $5,825,000. We cleared a project life of 50 years. The project capacity would be 5,000 kw. Total output of energy would be $13,863,620 kwh/yr. The energy price is 22 mills. The capacity sales $433,000 - $226/kw/yr which works out to about 31 mills per kw/hr. That 31 mills and 22 mills is basically what the Public Service Commission in Utah has decided what the avoided cost is so that's what Utah Power and Light has to pay for power or energy produced. If you have a hydropower plant and want to sell power, Utah Power and Light is required by law to buy it. They are required to pay the avoided cost. The Public Service Commission of Utah has determined that the avoided cost is 72 mills. This works out at 53. We've assumed the energy price is going to escalate 5% per year, that the O & M cost will escalate at 5% per year. The capacity factor for the plant is 31.7%. There's going to be some costs in operation, maintenance, replacement, insurance, property taxes and working capital. Based on that information the hydropower benefit is $10,823,057 over this 100 year period discounted at 8%. If you are interested in the calculation I'll be glad to run through that for you. The energy sales is $305,000 and we multiply that by a factor that takes the escalation of 5% energy price and O & M into account a present worth of $8 million. The energy with a capacity income is multiplied by another present worth factor which brings it to $5.3 million, so you have total revenues of $13.3 million. If you subtract out the insurance, O & M costs, and everything else you come down to your $10.8 million as present worth benefit. This part of the project looks really great. The cost is about $5.8 million and the benefit is over $10.8 million. That part of it looks pretty good.

The next category of the benefit is the increased power production at the existing facilities of Utah Power and Light on the Bear River. It looks as though they took the number of years they spilled at these various plants, add a total volume of the spills, the credit given for Smith's Fork and I'm not sure, I understand the term savings, but the average annual spill credit. That's the water that goes through that would have otherwise gone over - 2,000 acre-feet at Soda would go through the generators, Grace 4,000 Cove, 3,000, Oneida 2,000 and Cutler 5,200 every year on the average. You apply the energy factor to that you get

130 megawatt hours at Soda, 1660 at Grace, 207 Cove, 220 at Oneida, 535 at Cutler. You attach your 22 mills to the energy and that's basically what you get, total megawatt hours 2,752 per year, the annual value is about $60,500 and when you present worth that over 100 years at 8% you get about $3/4 million.

The final category of benefits is flood control. That's the one, I admit, I know the least about. We took the damage figures from the "USDA Floods Working Paper, Bear River Basin Cooperative Study" for the 3 drainages that are below the Smith's Fork project, totaled them all up, indexed them up using a Consumer Price Index from 1970 to 1984, and it comes to 2.56. Apply that to the total damage and you have a total annual damage for 1984 of $179,100. At your present worth you get about $2.2 million worth of flood control benefits. At any rate the bottom line again is about $33 million worth of benefits and about $60 million worth of costs. The only part of that we expect could change some is the irrigation analysis when we get the hydrology simulation and can put that in our computer, we may be able to refine the estimate.

KEN WRIGHT: What does it take to get the go ahead?

LYLE SUMMERS: There's at least one thing we can do. We can look at the smaller size reservoir and what I suggested to Mike O'Grady of Wyoming is that somebody spend some more money and do some more engineering cost estimating so that we can plot curves for various reservoir sizes then we can do the benefit analysis and see if we've got a size of reservoir that will produce the benefits to decrease the costs.

KEN WRIGHT: What do you try to get to 1 to 1?

LYLE SUMMERS: Yes. That's really the bare minimum. This is just one aspect of the feasibility. It's physically feasible. It's not economically feasible, but maybe it's politically feasible.

ENGINEERING COMMITTEE REPORT

BOB MORGAN: Mr. Chairman, Members of the Commission, the Engineering Committee last meeting was assigned two tasks, one to look at and evaluate the gaging stations, and also to look at the documentation and summarizing the acreages in all 3 states as of 1976 and determining those

acreages. I'm going to make the presentation concerning the gaging stations and Bob Fotheringham will summarize for the second study. He was my representative.

I want to express appreciation to the other two State Engineers and Larry's office. We had at least 3 meetings on the gaging stations and after getting into this and being buffeted back and forth I can see why Ken and George were so eager to let me be the chairman.

All the members of the Commission should have received a copy of a memorandum dated November 15.

As I understand the chart we were to look at the gaging stations and evaluate are they needed, or are they not needed in accordance with pursuing and executing the law of the River as contained in the Commission's chart. We looked at what gages were absolutely needed, what gages we felt were indirectly needed, and what gages we felt were not needed at all. At the present time there are 43 gages maintained in the Bear River system, 11 are maintained by Utah Power and Light. I would like to throw out what we determined were needed, indirectly needed, and not needed and I would suppose there will be a little discussion generated. We proposed that there are 13 sites that are directly needed for the execution of the charge of maintaining measuring the River. We determined there were 15 sites that were not needed, and that there were another 15 sites that were indirectly needed.

In addition to the discussion that will be generated here I think the Commission has at least two questions that they need to answer. One is, if it is decided to accept the report of the Engineering Committee of those sites not needed, and those that are to be dropped from the gaging program, we are now 2 months into the water year. There are 10 months remaining. Are these sites to be dropped immediately or should they continue so they have a full year's record for these sites and discontinue reading these stations after September, 1986. The next question before the Commission is there were several discussions on stations that would give us indicators on a regional basis. As near as I can remember, there were three sites, Thomas Fork near Wyoming-Idaho line, Logan Hyde Park & Smithfield Canal, and Logan River above State Dam that are used quite exclusively as indicators in that region. It was

recommended, although they are not used absolutely for the distribution of the waters, that they be maintained. I'm sure this statement will generate some discussion. There are those that do not believe this is true. That's a decision the Commission has to face.

Sites directly needed for administration of the Compact are: 1. Bear River near Utah-Wyoming line, any discussion; 2. Sulphur Creek above Sulphur Creek Reservoir; 3. Sulphur Creek below Sulphur Creek Reservoir, 4; Chapman Canal.

KEN DUNN: Mr. Chairman, as to whether that gage can operate as a crest gage rather than a full station, as I understand it, the purpose of it is to limit the maximum flow to 134 cfs rather than being concerned about what kind of flows are there throughout the year and I think somebody goes up there regularly, like everyday, and I think a crest gage might be sufficient.

WALLY JIBSON: We do have in the USGS what we call a Dauman Indicator which works off a float in a well; and in a discussion once with Ted Arnow, we saw no reason why that station couldn't be left in as far as the structure. If we put that type of indicator in it shows the peak since the last visit. It's been my feeling that since the Wyoming Commissioner is down there frequently during the summer, because he has canals right down to that point he has to regulate, that he could attend to that indicator and pick out the peak. If we want to get practical about it if they exceed 134 second feet I don't know it until maybe a few weeks later anyway, and the water's gone by. The purpose of that in the Compact was to prevent an enlargement of that right over the Neponset Reservoir. In a way it's kind of an academic thing. I'll wait until the record is published now and look back and see if we complied with the Compact or in two instances we didn't. It seems rather pointless to me that it should be kept as a full fledged station, particularly when it's a seasonal record. As far as the Bear River Commission is concerned, it's not needed except for that peak. The Wyoming Water Commissioner may want that record for delivery over to Saleratis Basin. I also was informed by Norm that as far as the studies on the River they would like that to supplement the Bear River above Woodruff Narrows Reservoir to get the total flow at that point. It goes into the reservoir and it goes

into Utah across the lines so that may raise another issue, but as far as the Compact itself is concerned the only purpose of that gage was to determine the peak.

DR. NORMAN STAUFFER: The Commissioner if he reads that could be published at the highway where the gage currently is. Is that right?

WALLY JIBSON: I say the Commissioner could read an indicator there.

JOHN TEICHERT: There's an A-35 recorder on that.

WALLY JIBSON: As far as the Commission is concerned it has no other purpose.

MARVIN BOLLSCHWEILER: As far as administration it's very important because the livestock's entitled to certain percentage, 85% of the use of the amount of water. There's a discussion all the time in regards to the livestock getting there and who's entitled to it. We need to take into consideration the channel that develops between the head and the gage.

KEN DUNN: Mr. Chairman, I think we need to talk about some ground rules and Bob certainly mentioned them but we may not have caught clearly what he said, and that is the gages that we're considering leaving in are those gages that are necessary to operate the Compact. The gages we're leaving out doesn't mean they are not needed by somebody. They may be needed by Idaho or Wyoming or Utah but not for the Compact. Those states that feel they're needed for their operation ought to pay for them and contract with the USGS to have them in. We're looking at only keeping those gages in as far as the Commission is concerned that are necessary to operate the Compact. As we went through this this year, all of us got into that kind of a problem. We'd say okay we can take this out and then we're saying no we want to leave this in cause I need it. That's tough. Keep remembering it's for the Compact not for the individual states.

MARVIN BOLLSCHWEILER: Actually the benefit on the regulation there is for Utah because of this disagreement all the time that they are not getting their share of the water. I don't know whether you would say it was for Wyoming's benefit or Utah's benefit, but I would think it would be mainly for Utah's benefit although the Wyoming Commissioner handles the administration of it. Cost-wise it should be shared mainly by Utah.

GEORGE CHRISTOPULOS: The limits on the Canal are imposed by the Compact, as I recall.

MARVIN BOLLSCHWEILER: As recognized by the Commission.

GEORGE CHRISTOPULOS: I can't remember specifically here, but there's a gage near the diversion point.

WALLY JIBSON: Yes, that's the one we use for the Compact.

GEORGE CHRISTOPULOS: There's many diversions between that point and the point crossing the state line. The state line's the one that carries the water to the reservoir. I guess what I'm doing is questioning in my own mind as to whether or not that should be a Compact gage.

KEN DUNN: The measurement is made at the diversion. As I understand the measurement at state line is for the benefits of those states to distribute that water in the canal. The Compact doesn't care where it goes.

JOHN TEICHERT: The Wyoming Commissioner maintains the gate at the head of the ditch. The USGS maintains it at the State line.

WALLY JIBSON: Ken, in answer to your question, let's read quickly what the Compact says that requires that. On page 11, under the initial Compact we recognize three canals that have some question about the right. That's the reason we picked three out and mentioned them in the Compact - the Hillyard East Fork, Chapman, and Francis Lee Canals. "Under the right as herein confirmed not to exceed 134 second-feet may be carried across the Wyoming-Utah State line in the Chapman Canal at any time for filling the Neponset Reservoir, for irrigation of land in Utah and for other purposes. The storage right in Neponset Reservoir is for 6,900 acre-feet, which is a component part of the irrigation right for the Utah lands listed above." We listed the various rights under the Chapman Canal in order to confirm them because there was some question at the time of negotiations as to whether that right was valid or not. It does say 134 second-feet at the State line crossing, so that's the purpose of the gage. My point is, that we can determine that maximum flow without carrying it as a full-fledged station.

GEORGE CHRISTOPULOS: You are saying we are maintaining two full-fledged stations now, we can maintain the one at the head and make the other one a gage that will make sure it doesn't exceed the 134.

WALLY JIBSON: The one at the head is actually in the same category as the other 65 or 75 diversions. We shouldn't probably accept it in our Commission report. The record is collected by the Wyoming Commissioner. It has nothing to do with the USGS. The record has to be maintained at the head to get the amount of water diverted in the canal.

REED DAYTON: Who's responsibility would it be to maintain that? Utah or Wyoming?

WALLY JIBSON: I think it's an advantage to both states. I'd sooner not say it's one or the other. My point is, what is the advantage to the Bear River Commission.

GEORGE CHRISTOPULOS: It's very much a feature of the Compact too though.

WALLY JIBSON: Another point there too, though, George, it says, "under the right as herein confirmed". This was put in primarily by L. B. Johnson to keep them from enlarging the right. I've checked with our Legal Counsel on occasions since then and there's nothing that can stop them from going in and getting another right and doubling that flow across the state line. It says "the right as confirmed". If Utah wanted to grant another right or Wyoming wanted to grant another right they could go ahead and put 250 second feet across it.

GEORGE CHRISTOPULOS: Wouldn't you have to think that was part of the modified Compact?

WALLY JIBSON: No, because it says as "herein confirmed" and we're only confirming these various rights that are listed up above. It doesn't say they can't get another right.

GEORGE CHRISTOPULOS: If they get another right they're going to have to get it under a later priority and you have to ask yourself what right and they'll do it under the Modified Compact.

WALLY JIBSON: Yes, but they can still take more than 134 second feet if they wanted to apply to the State Engineer and get another right.

KEN DUNN: Mr. Chairman, I guess my question is is that right is there, that flow is there and how do we manage it. Does the Compact, Wally do

you do anything to regulate, control, punish, for somebody that might take an extra second foot. Is it something you just try not to do.

WALLY JIBSON: I just as well be candid about it, because they can't stay on that canal day in and day out to see that they don't exceed it. There's only a month or so when the maximum flows are going across there, but I've looked back through the record each year and I found, let's say in 25 years, plus or minus. I've found about 2 years we exceeded it a little bit. We went up to maybe 140, but it's water under the bridge. Had I known it on the day it was being exceeded I could have notified the Wyoming Commissioner - okay cut it.

DANIEL ROBERTS: There was another way we used to put it. We used to say do you have a higher right or a prior right.

WALLY JIBSON: It's a difficult thing to determine until the end of the year. That's the problem.

MARVIN BOLLSCHWEILER: It seems to me the Wyoming Commissioner regulates and administers the water at the head. If there's 150 at the head he has no way of knowing how much is going out at the Wyoming diversion unless you want to make an assignment that the Wyoming Commissioner visits that once a week, he never goes there except when he's needed.

JOHN TEICHERT: It wouldn't be that big of a chore for the Wyoming Commissioner to check that out it's right on the road.

WALLY JIBSON: If we get down to the technicalities, a peak flow says we've got over 134 second feet. Then we can see how much over it we've got, because it'll show on the tape, how far above it. We don't know how many days it got there. It maybe got there for 5 minutes and it maybe got there for 5 days. Here again, if Ted would loan you a 35 recorder we could keep a continuous record of it but still not publish it except possibly in the Bear River Commission report, in other words, just take it out from under the USGS Coop program. There's a number of ways it could be handled. If you want to get down to a strict interpretation of it we should have a continuous record, whether or not we publish it or not is something else.

PAUL HOLMGREN: Mr. Chairman, it sounds to me like with this much discussion that it ought to be kept. There's a lot of controversy here

and a lot of questions raised and I think if there's that many questions you ought to keep the station.

KEN DUNN: I disagree, I don't see any reason to keep it because there's discussion. I think the discussion is to determine if it's needed or not. I haven't heard anybody say it's absolutely needed. Not a soul.

KEN WRIGHT: If it doesn't qualify on the basis of the Compact or that we can get the necessary information we need through another measurement devise. It seems that would be the way to go.

WALLY JIBSON: There's another point on this station - a technical point, but it's one of the most difficult stations to get a few months record than we have anywhere in the Basin. We have a diversion dam immediately below it and a diversion out of that, unless we can get cooperation from the men over on Deseret Livestock to make a note and put in the gage when they change the amount of diversion coming from their diversion dam we never know what the rating is on it. The rating fluctuates constantly and for a couple of years I had the foreman agree that he would make a note. He soon forgets it. It is a very difficult record for the USGS to work up. The control is changing every time they take an additional amount or cut the amount going out in the side ditch that goes around the control. There's no place else we can move it. If we go upstream we're above the one diversion; if we go downstream we're not measuring all the water that crosses the state line. We've got about a 50 foot stretch in there that we have to be restricted to. This is not an argument. If I were back in the USGS again, I'd like to get rid of it.

GEORGE CHRISTOPULOS: I think it's important to have that record, I don't know who should do it, but we need that record. What it really says to me is that that's the limit on the water that should cross the line there. I think it's important to make sure that they're limited to that amount. It's important during the regulation that everybody takes only what they're entitled to. That's why you have these other stations in the picture. The only real question is how you actually do handle it. I guess I'm understanding from what Marvin's saying is that we don't go to that station.

MARVIN BOLLSCHWEILER: No. We only go there when needed for us to look at. The USGS has been handling this.

GEORGE CHRISTOPULOS: I guess maybe what I'm getting at, is you've mentioned before that if the USGS is going there, you are not going to discover whether they exceeded the 134 until later on. They're not interested.

KEN DUNN: If they've exceeded it there's nothing you can do about it. Most years, by the time you go back to the head end of the ditch and reduce the diversion and get it down to the level it's dropped and you are below it anyway.

WALLY JIBSON: When the USGS visits once a month, two weeks before they visit it may have gone above that. We can't do anything about it except to note it as a violation of the Compact, but unless someone visits it everyday we can't prevent it from happening.

MARVIN BOLLSCHWEILER: The Wyoming Commissioner could visit it once a week without a problem.

GEORGE CHRISTOPULOS: Utah's Water Commissioner doesn't visit it at all because it's a diversion in Wyoming?

JOHN TEICHERT: I think we could have a better record if our Commissioner would visit it once a week. At least we would know whether it's going down or up.

DANIEL ROBERTS: Would it be possible, when it's apparent we've got a water short year that we would have that gage looked at every day. In water long years you don't have to do it. In water short years, that thing can go on, and how do we know down the river whether we've got it or not.

WALLY JIBSON: In water short years we won't be up to 134.

GEORGE CHRISTOPULOS: The other station at the head of the canal is maintained by the USGS also?

WALLY JIBSON: Oh no, that's one of your Commissioner's stations. That's a diversion, just like 130 others up there.

GEORGE CHRISTOPULOS: Why don't we carry it through the rest of the year and maybe Utah and Wyoming can get together and figure out some way to handle it between now and next fall. I so move.

BLAIR FRANCIS: I second it.

KEN WRIGHT: All in favor. Any opposed.

MOTION CARRIED.

BOB MORGAN: The next gage is the Bear River above Woodruff Narrows Reservoir, Woodruff Narrows Reservoir, Bear River below Woodruff, Bear River below Pixley Dam.

TED ARNOW: Is the USGS maintaining that one?

WALLY JIBSON: They have a slightly leaning cableway there that's got to be repaired, Ted.

BOB MORGAN: Bear River at Border, the next 15 are those sites that are not directly needed to administer the Compact and yet was felt by members of the committee they were indirectly needed as a regional streamflow indicator. Bear River near Randolph, Smiths Fork near Border, Thomas Fork near Wyoming-Idaho line. Bear River at Harer, that's the Power Company, Bear River at Pescadero, Bear River near Soda Springs, Bear River near Alexandria, Bear River below Oneida, Bear River at Idaho-Utah line. Hammond East Side Canal, West Side Canal, Bear River near Collinston, Logan Hyde Park & Smithfield Canal, Logan River above State Dam, Bear River near Corinne.

KEN WRIGHT: Shall we take the Chapman Canal and put it down in the "indirectly needed" category.

WALLY JIBSON: It's either directly needed or it isn't.

LARRY ANDERSON: I thought the Motion was made we'd keep it till next year and Wyoming-Utah would decide what to do with it.

BOB MORGAN: Rather than go through the other 15 sites - these are sites we suggested were not needed to directly administer --

KEN DUNN: Before we get to the others, I think there's a question on the three we talked about. The question I have is what does "indirectly needed" mean? The definition that I used in determining the sites we thought did not need to be in, by my definition I didn't come up with "indirectly needed" on the sites the Logan, Hyde Park and Smithfield and Logan River above State Dam. I think they're needed or at least wanted for planning purposes by the State of Utah, but I couldn't find any need for the Compact, in terms of its administration.

WALLY JIBSON: I questioned the same thing. I noticed the parenthetical statement here (needed for at least a regional streamflow indicator) under those. So, I said okay. I can't say the Logan River station has any direct or indirect need for administering the Compact. To me it's a regional streamflow indicator. You go ahead and cover it in this group that's listed here.

KEN DUNN: What does the Commission use it for, anything?

WALLY JIBSON: They show it to you twice a year to see how the total flow out of there compared to what the SCS or combined forecast shows. It's an indicator. The thing we in the USGS like about that Logan River station (the canal is a supplemental record to it, it takes both records to get the total flow out of the canyon. Basically, it's the second oldest site in the State of Utah. It goes back to 1895. Basically it's unaffected by man, except as he grazes his stock differently than he did back at the turn of the century up the canyon. There'd been no diversions out of the river up above the site. Looking at it from a regional hydrology standpoint or from an indicator standpoint, it is an awfully good record to have, because it is natural flow, unaffected by man.

KEN DUNN: We have 90 years of record - what's another 20 going to add to us.

WALLY JIBSON: Only that you just keep the record going. I felt the same thing about Bear River at Collinston and the Power Company is picking it up, but it goes back even farther yet. I have no direct use for it, as far as Compact.

TED ARNOW: The Smith Fork would probably fall into the same category.

WALLY JIBSON: Smith's Fork is a little different category because the Water Commissioner of Wyoming is checking the Smith's Fork record two or three times a week to give the figure to me so we can project the amount of regulation he needs for the following week. It wouldn't be out of line to say the Smith Fork record is directly needed. It is an indirect station in terms of the Compact. If he didn't have that go by he comes in and says we've got so much water, what's the trend up there. What are we going to guess for next week and we use the Smith Fork record to make that guess.

GEORGE CHRISTOPULOS: Mr. Chairman, I need some help, probably because I didn't do my homework that well. I wish somebody could tell me in just a few words what our purpose here is. I presume it's to try to reduce the cost, which I think we see going up over time. These are all stations that have been maintained through the years under the program. It seems to me what you're telling us here, and as I say I apologize for raising this question at this time, but we've had 43 gaging stations and you're talking about maintaining 13 including Utah and Power and Light Stations that are directly needed. Then you go to the next category and you've got the Utah Power & Light Stations, you are saying we still need these stations in the second grouping. In the 3rd grouping there's about 15 that you are indicating we maybe can drop from the Compact co-op program, and maybe somebody else should pick them up. I guess the thing that bothers me some - who is going to pick these up. I can guarantee you I don't have any money to pick up most of them, not all of them that are in Wyoming.

KEN DUNN: If somebody doesn't have the money to pick them up, then they aren't needed. I don't see the Commission continuing to pay for some gages that aren't needed to operate the Compact and haven't been needed for a long long time.

GEORGE CHRISTOPULOS: I'm not disagreeing. I understand that. It seems to me that we're talking about taking some pretty drastic steps here.

WALLY JIBSON: It's a big factor in the budget. I refigured the budget based on if you accepted this recommendation. It runs from $31,000 to $35,000 annually during this three year period that you would save, from the Commission's share not counting Ted's share. At the last meeting, which you didn't attend, I just picked one station as a glaring example, that was Cottonwood Creek near Cleveland in Idaho. It was put in at the request of the Bureau of Reclamation for a development station with the idea of getting 10 years of record. We have 50 years of record. We still keep it in each year because Ken says he hasn't nerve enough to throw it out.

KEN DUNN: The question I raised on the two sites at Logan River, I brought that up for discussion. I have no problem leaving those in as "indirect".

KEN WRIGHT: I was going to ask you Ken, the "indirectly needed" definition that you questioned doesn't apply to all these, just those two?

KEN DUNN: Right, the indirect definition that I used, they would be sites that would be needed in connection with Compact use, such as tracing depletions, within the new Compact revisions. I didn't see that those two met that, but I don't have much access to it.

WALLY JIBSON: Actually, Ken, I could go through those very quickly and give you the ones I consider streamflow indicators - Bear River Randolph is one because it's a stateline station, and we look at quality of water once in a while. It doesn't help us that much in administering the Compact but to me, it's a regional streamflow indicator. Thomas Fork, is another one; Bear Pescadero is a station that's needed in modeling on the River. These others are power stations and we have nothing to do with them anyway, except to use them where necessary. Bear River at Idaho-Utah line is another regional streamflow indicator that we put in to replace the Bear River Preston record which went back to 1914 and we wanted enough overlap to get correlation and then eliminate the Preston record, which we did. It's another state-line gage that during negotiations on the amendments we felt was an important station and it might still be in the future. The Logan River and the Logan Canal, which combine to make one record, we talked about. The last one is Bear River near Corinne. I think that record is important to everyone because it's the last record in the Bear River Basin before you get into the Great Salt Lake. It is the lowest feasible site we could put in a gage. Norm and your boys in Idaho have used this record. I think it has indirect connection but it is still a regional streamflow indicator.

LARRY ANDERSON: We feel very strongly in Utah that the Logan River above State Dam is important as a regional streamflow indicator just for that area. If you eliminate that somebody's going to pick it up, but I'm not certain who. It's just as easy for me to pick it up through the Commission as it is to take it out of the Commission. I wouldn't have the funds to pick it up. I'd sooner fund it through the Commission, the way it is right now, as the budget is set up. If we eliminate it that doesn't make those funds available anyplace else in my budget.

BOB MORGAN: The next 15 are sites we recommended be dropped. I might add that there is a lot of interest with not only states, but with irrigation companies, people that are in these regions who utilize these stations for their own benefit. Some of them are for court decree distributions in Utah. I'm not playing on your sympathy, but if the stations are dropped immediately some of us would be hard pressed to pick them up the first of December to carry them on through. I'm not speaking for the Engineering Committee at this time, I'm speaking from the standpoint of State Engineer in Utah - the financial burden becomes very apparent if these sites that are needed by us, in the "sites not needed" by the Commission are dumped on us now, we would have to drop them until we could get back to our Legislature for money or have them funded through the irrigation companies or through the Legislature or by an order from court. I ask that that might be considered in your determination of whether these should be dropped immediately or whether they should be dropped as of the end of September and give some planning and time for those individuals to pick up these stations.

WES MYERS: Evidently you have Sulphur Creek above Sulphur Creek Reservoir and Sulphur Creek below Sulphur Creek Reservoir and then you have Bear River above Woodruff Narrows and at the Woodruff Narrows. Some of these smaller sites like the Woodruff Creek site are not even mentioned. Then the little Whitney Reservoir up at the top you are dropping that one. What's the difference, the larger reservoirs you are keeping them on? What's the difference between the type of reservoir.

WALLY JIBSON: We're all getting too involved in it. I think maybe I can answer it. It would be desirable on every reservoir developed under the terms of the Compact to have an inflow and an outflow. As an example, we've got West Fork below Deer Creek. If you go ahead and build your dam there the station will be inundated and should be replaced by a gage above and a gage below just like Sulphur Creek is so we can determine the amount of water being diverted to storage at any particular time. The Compact covers that. There are certain times of the year you cannot divert water yet. That is the reason for it. Whitney Reservoir there's about 5 inlet channels in the high mountains above that. No practical way can we gage it. We say okay the gage below it is maintained, but

we have a staff gage on the reservoir that we can read and we can tell from that what we need to know as far as the Compact is concerned. When we come to Woodruff Creek Reservoir same deal, to gage above it there are no roads, no access at all to the inflow of that even in the summer you'd have to try to get in by horseback or helicopter. To me, it's impractical to gage the inflow. We have the outflow gage and we have a gage on the reservoir itself. We can see if they are diverting water to storage illegally.

WES MYERS: That isn't on the list here.

WALLY JIBSON: It's on the list to be discontinued. What you say is true, we're inconsistent. We use Sulphur Creek, we use Woodruff Narrows Reservoir, and we carefully gage them above and below because they are big reservoirs and we don't do it with Whitney and in this sense we don't do it with Woodruff Creek Reservoir. If you went on the Deer Creek side there's only one channel coming in. I would recommend you put a new gage in there and one below it, just like you do Sulphur Creek. All we've done in the past is have the water users pay for the equipment and the installation of these gages and then the Bear River Commission has picked them up. We've done that on Sulphur Creek and of course Woodruff Narrows, which was in long before the dam was built. This has been our procedure in the past. You people under the Sulphur Creek Reservoir paid for the installation, and then we picked them up under the co-op program because they became Compact gages.

DR. NORMAN STAUFFER: I have the same concerns that Wes has. It looks like selective picking of the Compact up there, and you are talking about dropping the stations that come out of the reservoir. In the past you have made stage recordings there but not continuous, only periodic, and I bet you money you can't go there and tell me what happens because we have tried it on those two reservoirs. What you need there is a continuous record of the stage and the continuous record of the outlet - high elevation we can estimate evaporation, you can get a good record there if you want to pay for it. I think those reservoirs are just as important as the others and you ought to be adding gages - stage recorders for those reservoirs and not eliminating the gages below them as well.

WALLY JIBSON: Norm, I can tell you as far as Whitney Reservoir anytime the water is being released there. I can tell you whether it's a violation of the Compact.

DR. STAUFFER: You can't tell me what's happening at the stage because it's only read every two weeks, maybe every month. You don't know what's happening in there.

WALLY JIBSON: By Correlating with the Utah Water Commissioner you can.

DR. STAUFFER: Not when you only read the gage every two or three weeks.

WALLY JIBSON: Are you suggesting the Commission continue these or the State?

DR. STAUFFER: I'm suggesting the Commission. If they're monitoring Woodruff Narrows and Sulphur Creek, they ought to monitor Woodruff Creek and Whitney. They can do that if they'll have continuous stage recorders in the dams that can measure the inflow and have a continuous record of the outflow.

WALLY JIBSON: We do have continuous record of the outflow.

DR. STAUFFER: You're talking about dropping it. I think it's a mistake to drop that.

MARVIN BOLLSCHWEILER: You mention the damsite on West Fork below Deer Creek is going to be inundated. My understanding is that the reservoir just above that on this site is on an ideal site for release.

WALLY JIBSON: The first time I looked at the reservoir with Wes, I think our dam site was a little bit below where you are going to have it now. There should be another station put in there. It's true what Norm says and what Wes says, we are inconsistent. Where do you draw the line. We have plenty of reservoirs up there and certainly you can't gage above and below each one. You have to take their capacity and say this amount was stored this year.

KEN WRIGHT: If the criteria is to have the measurement stations necessary to meet the responsibilities and requirement of the Bear River Commission that's our objective. Those that are necessary to do that we keep, and those that are unnecessary to do that we drop. As worthwhile

as they may be for some other reasons and some other people or states, they are not the Bear River Commission's responsibility in meeting its requirements.

MARVIN BOLLSCHWEILER: If the stations are dropped, the recorders that are in there do they belong to the Bear River Commission or the USGS?

WALLY JIBSON: If you get technical they belong 50/50.

MARVIN BOLLSCHWEILER: If the state takes over that station though will they be allowed to keep that recorder in there - the West Fork below Deer Creek. When the West Fork Dam is put in that will be needed.

WALLY JIBSON: The Whitney gage will have to stay in, for you people. Why can't the Commission use the record.

MARVIN BOLLSCHWEILER: Why can't we use the recorder?

DR. STAUFFER: You need a continuous stage recorder on the reservoir at the outlet. Those are large mountain reservoirs. I think that's a Commission responsibility. I think it's a mistake to drop them.

WALLY JIBSON: What Norm is saying instead of dropping the two we add two. We add a stage recorder on Woodruff Creek and another one up on Whitney. Then anytime there's a question whether you're storing at a time that is illegal under the Compact by going to the two records at each station you can tell whether you've been storing illegally.

GEORGE CHRISTOPULOS: In looking at this last list, and it seems to me, and of course I'm going to say something which may not be right, because I don't know about the last few down there, but it seems to me that with the discussion we've had here in the last 15-20 minutes, it sounds to me like we ought to keep these, probably the middle 3 - West Fork Bear River below Whitney, West Fork Bear River below Deer Creek and Woodruff Creek below Woodruff Creek Reservoir as Compact Stations. I don't know about East Fork near Evanston, I presume that can be dropped. There's a likelihood you might have a West Fork Reservoir which means that if you do then I think in going along with what Norm is saying it would be important to have those as Compact stations.

WALLY JIBSON: I'm not questioning Norm at all on that one, the one he's questioning is why drop Woodruff Creek.

GEORGE CHRISTOPULOS: I'm putting that in the same category. As I size this thing up, unless somebody else has some reasons it seems we could drop the last ten or so and then talk about the middle 3 and drop the rest of them out of these doubtfuls.

WALLY JIBSON: I can see your point there. I don't think there's much argument on the rest of these. They are not needed.

LARRY ANDERSON: We, in Utah, would like to make an argument. I've asked Norm to do that.

DR. STAUFFER: Bear River below Smith Fork where the main stem of the system comes together below Cokeville, the station we have used in our computer modeling of the entire river basin system. We think it's a very important station just like Randolph and Border as far as the computer modeling system. I don't think Utah would pick that station up for that reason, but I think it's a station that ought to be kept.

WALLY JIBSON: That station was put in for those purposes because it's right below a big spring and it's open all winter and we use that record to compute the Border record. It has no bearing otherwise on the Compact operation. It's a computational type station.

DR. STAUFFER: That's what I said it's for computer modeling, it's a good station.

GEORGE CHRISTOPULOS: It's better than the Border station because of these things.

WALLY JIBSON: The Border Station will have 3 feet of ice on it and that station up there will have none. There's very little inflow in the interim in the wintertime so he uses that station in order to compute a good record at Border.

DR. STAUFFER: Let's put it back in as a station needed then.

GEORGE CHRISTOPULOS: That's fine with me.

KEN WRIGHT: If it's a good station and it's not needed to satisfy the Bear River commitment, then someone else should be taking it over.

DR. STAUFFER: Wally just said it's needed.

WALLY JIBSON: I said from the standpoint of the USGS, if I were a USGS man I'd say it's needed. Since I don't compute it any more, I'd say work a little harder and compute it without it.

WES MYERS: I think we're doing the best job we ever did in dropping them. If we drop the one and keep only 4 on that list or 5 on that list. That's a pretty good cut for one cut.

KEN DUNN: Mr. Chairman, I'm going to throw a little more salt on the wound. I disagree with keeping any of the reservoir gages. The reason being the reservoir is nothing but a diversion and states ought to measure their own diversions. We have left some in up above and I kind of let that go, but I disagree that the Compact Commission ought to be gaging all the reservoirs - inflow and outflow. That's no different than a diversion from the river and into a canal system and that's the responsibility of the state water master. I don't see any need for these for the Compact.

WALLY JIBSON: You are not questioning the fact we need them.

KEN DUNN: No, but I don't think it's a Compact need. Reservoirs are diversions, they are nothing but diversions and any effect they have on the River ought to be part of the responsibility of the folks who put the dam in. That's a cost of operating it.

WES MYERS: I wouldn't argue that. What I was arguing was why drop some and keep the others.

KEN DUNN: I think they all ought to be cut.

PAUL HOLMGREN: Mr. Chairman, it seems like the farther down the River you are the more important these gaging stations become. Some of these you are dropping here are very important to us at Cutler Dam - Blacksmith Fork near Hyrum, Little Bear at Paradise, Cub River near Preston. All these over in Cache Valley. We are concerned about on the dry years if we are getting the right amount of water out of there. In 1977 we had a very dry year and UP & L assumed the first part of the irrigation system all the water came out of Cache Valley. I, personally, lost many many thousands of dollars because we didn't have any water in the canal because Utah Power & Light had not turned the pumps on, and when I

finally called Lifton, they assumed that we were getting the water out of the Cub River and the Little Bear and there was no water even out of the Logan River. It ran at the lowest level in the history of the state. It took five or six days for the water to come down from Bear Lake to supplement what little we had. In the meantime if you were raising barley or sugar beets, your barley started heading out because it was so dry and you got a 30 bushel crop instead of 100 bushel. That's exactly what happened to us. That's my concern. Maybe the Compact Commission shouldn't handle this, but I think the state should or someone should. We should know what's going on above our diversion canals so that we at least can anticipate and get on the ball and get something done.

KEN WRIGHT: That goes to the second question as to how long we want to maintain those that are being considered to be dropped out. If the period is long perhaps even short you'll find out how important these are.

PAUL HOLMGREN: They should be maintained by someone.

WALLY JIBSON: A water management type station is a continuous station; it is not there for 10 years, 15 years, it is a continuous station. That is a water management station. Is that a responsibility of the Commission or a responsibility of the state of Utah.

KEN DUNN: I think it's the individual states and that was the purpose and the way we approached it, the decision to present the report to the Commission as to which ones ought to be removed. If it wasn't necessary for the Compact the state or somebody ought to pick it up if they wanted it, but the Compact ought not to pay for it.

KEN WRIGHT: That really is the key consideration. Right now, the current status is we want to reconsider in the third grouping, #2, 3, 4, and 5 as being retained and the others are eligible for being cut. Paul just raised his concern over some of those. That's the point we're at right now.

GEORGE CHRISTOPULOS: I think I'd like to make a Motion. Maybe we can bring this to a head. I'll make a Motion we maintain all of these stations until the end of the water year, which would then allow Utah as they asked for an opportunity to try to pick up those stations, especially that they might have problems with. I would make further

Motion that at the end of the water year, drop from the Compact under the sites not needed #1 East Fork near Bear River, retain the next four which include Bear River below Smiths Fork and then drop the remainder.

ROD WALLENTINE: Let's take them all through the water year and then take them like the Engineering Committee gave us and go the top two stations and drop the third.

BOB MORGAN: With the exception of Chapman Canal.

REED DAYTON: I would agree with Norm. I think this gaging station - Bear River below Smith's Fork is important. Smith's Fork flows into Bear River. If you take a measurement just above where the Bear River empties into Smith's Fork; and if you take one below Smith's Fork, you know actually how much water is being used out of Smith's Fork as it empties into Bear River.

KEN WRIGHT: We have a Motion non-seconded that says we should extend all the sites not needed as classified until the next water year through September 1986, and at that point in time we will drop every site except #2, 3, 4 and 5.

LARRY ANDERSON: I second it.

ROD WALLENTINE: I really feel strongly. I'm putting my faith in this committee that developed this report we're looking at, to say if we're going to do it, if we are going to pick a few, then we can all pick on down and put the whole thing back together and call it enough to make any motion. Is that wrong to look at it that way.

KEN WRIGHT: Are you saying look at these individually?

ROD WALLENTINE: We have for about 30 minutes. I'm saying if we are going to make a head come to this thing, then let's go with what the committee recommended and give them the leeway to have until next year to prepare to take them over.

WALLY JIBSON: I'm discussing this with their technical people in the committee. It seems like we don't really have a united committee action here today. It seems to me there's a difference of opinion of members of the committee on the philosophy of what we're doing, and certainly we're

not ready to make a decision unless you want to try to thresh it out. This thing Norm brings up has a point. Ken brings up the point we shouldn't even be fooling with reservoirs. I think there's a point there. The Committee itself doesn't have a united front on the matter.

KEN WRIGHT: Can't you knock out some very obvious ones.

WALLY JIBSON: There are some very obvious ones, if you wanted to you could knock them out now.

BLAIR FRANCIS: This is an ongoing thing and I think the way this thing is presented to us is to kind of get our attention as to what's really out there in the real world, but there's some problems with funding it within the states. It is my feeling, how critical are the budgetary constraints. Can't we keep this as an ongoing thing and pick out two or three of these so it doesn't do a burden to another in trying to pick this thing up and keep this as one of our businesses before us every time we meet.

KEN DUNN: This has been going on for ten years, a long time, we're looking now at about a $30,000 a year expenditure for the Compact that, I don't believe is warranted for the Compact to spend it. The states who want to maintain those gages, I think have got an obligation to get the money in their budget. If they can't do that, then they must not need the gages. They are going to have to set some priorities whether these gages or some other gages in their state are more important or not. I object to the Compact funding any gage in any activity that's not a function of the Compact. As near as I can tell, when the committee met, we agreed on everything except the three gages in the front as to what we had here. For the states to say they don't agree, I think is wrong. There may be some members of the Commission that don't agree. I suspect some of it is they don't understand how we got to where we're at. Irrespective of that, if that gage isn't part of the Compact, and if we're going to run the thing until the first of October of 1986 and the state isn't ready to pick it up at that time, it must not be very darned important for them. I object to spending some money for something that isn't part of the Bear River Compact.

BLAIR FRANCIS: If I interpret you right, Ken, then really what you're concerned about - the only thing we need to keep is the top two categories.

KEN DUNN: The top two categories, we as a committee agreed, were a Compact function. The ones below we couldn't find a Compact function. There was a function for the individual states, or districts, or whoever used the thing, but the Commission hasn't used them in the past.

PAUL HOLMGREN: Mr. Chairman, one of the concerns I have is that they have plans for building a dam on the Blacksmith Fork River and they have the Porcupine Reservoir in Cache County. They have plans for another dam on the Little Bear. These dams are going to be pretty high so they can bring the canals along the foothills and eliminate pumping charges for sprinkler irrigation. I think, 90% of that water is going to be used for sprinkler irrigation, and to me that's a total depletion when you sprinkle irrigate you get very little stream flow as Dee Hansen found out. I was on his committee when he investigated the Sevier River, and some of the rivers down in central and southern Utah. These guys had had a right to a certain number of acres of water in a flood irrigation situation, sprinklers came along in the early 70's when power was cheap, they decided to move out and take on another 20, 40, 60, 80 acres of sagebrush land. They started sprinkling all their ground, and the guys down below them found out they were dried up. I know you guys up in Grace had the same experience. The sprinkler irrigation system dried them up. My concern is if somebody doesn't monitor the Little Bear and the Cub River and these down low, we could end up with almost no flow hitting Cutler Dam in the summer time. Maybe it isn't the duty of the Compact Commission, but it's the duty of someone to monitor that, because if this goes like I think it's going to go and it's already started - Porcupine Reservoir is using a lot of high ground and they're sprinkling a lot of land, and I don't think any of that water ever returns to the Little Bear River in the heat of the summer. We're short just that much water. This is what concerns me. If somebody isn't monitoring that, we could end up with no flow out of Cache Valley at certain times during the summer.

KEN DUNN: Mr. Chairman, I think Paul describes the exact thing we're talking about and that is, it's a function of the state watermaster system, not the Compact Commission to make sure you get your water supply when somebody else is taking it from you. Wally and the Commission won't use those gages to do what you want to do.

PAUL HOLMGREN: I have no quarrel with that, all I want is someone should periodically check to see what's happening to the water and I think with this inclination to go to sprinkler irrigation this situation presents itself so that they will possibly, in most cases, eliminate pumping charges, which is the limiting factor on sprinkler irrigation today. This could be a bonanza for Cache Valley, and I'm not against it; I think that's fine. We've depended on this water for 100 years, and it's eliminated by one reason or another and we get 25% of what we were used to getting, it's going to affect Utah Power & Light at Cutler Dam.

KEN WRIGHT: I think the first Motion you mentioned George, if the Commission agrees to fund these stations for a grace period through September of 1986, that has a great bearing on what kind of motion we make as to what stations we may or may not drop from the grouping. It gives them a year to adjust and have the states maybe or maybe not assume some of the responsibilities they rightfully should assume that the Bear River Commission should not be assuming. It gives us a one year grace period in there where you can get your story across. It is a state responsibility and at least we're providing the time period necessary for these problems to be considered. At the same time we're meeting the requirements of the Bear River Commission where we just don't flat out leave these stations to meet our responsibilities.

KEN DUNN: Mr. Chairman, one approach we might take is that the Commission then notify the states that those gages will be dropped and if they want them they will have to pick them up. You could also require them to notify you by April 1, if they intend to pick them up or have plans to pick them up, or maybe some earlier time. If nobody has a plan to drop the things, if they have a plan to drop them, we could carry it till April 1, or October 1. Some of these, you may find out nobody will pick them up anyway. I have problems carrying $4,000 gages.

WALLY JIBSON: Ted usually makes that notification to other agencies when we are going to drop a station. We could use that means of notifying the states, the forest service, whoever. You have a rather large list, Ted that you notify well ahead of time when a station is going to be dropped.

GEORGE CHRISTOPULOS: The difference between the Motion I made and the amendment he proposed was the fact he proposed all of these be dropped. I selected four of them that ought to be retained based on the discussion I heard today. First, I think Wally admitted, the West Fork Bear River below Deer Creek, Woodruff Creek are essential, they're necessary in the administration of water. They're necessary because the limitations are Compact limitations on many of these things. Again we've got an inconsistency because we do have in some places because it depends on the size of reservoir. That's the only major difference between what I'm saying and what Rod is saying. I'll withdraw my other motion and make a new one.

I would make a motion that we retain these stations until the end of the water year (September, 1986), and then at our April meeting we look at those four again - #2, #3, #4, and #5 and make our decision then.

LARRY ANDERSON: I'll second it.

WALLY JIBSON: I'd like to ask one question on it. There's about a half dozen stations here that everyone has agreed we don't need. George, would you still think they ought to be carried through the end of the water year.

GEORGE CHRISTOPULOS: I'm doing that primarily because of Utah, because I think Utah and maybe Idaho may feel the same way. If they don't, that will certainly become evident because they won't get the money. I think Utah was asking for some time to be able to address it legislatively. I think if you start into a water year, you might as well finish up the water year.

KEN WRIGHT: Any further discussion. All in favor. Any opposed.

MOTION CARRIED.

DANIEL ROBERTS: I'd just like to make a comment here. I've been with this a little while - 40 years. I remember when Criddle and those boys made their studies, and all these things. I bought a place in Franklin County and the first thing I got into was a water fight on my local ditch. I'm a strong believer that we need adequate records all along the system to legitimize all water rights. I know, part of this is state's rights, so I'm willing to go along on this thing as stated, but I am very firm in saying we need adequate detailed records on all streams.

KEN WRIGHT: Can we be sure that we alert whoever we should alert that we will be dropping all sites except the four we're going to reconsider in April, as of September 30, 1986.

BOB MORGAN: I'll work with Ted on that. I assume that George and I will discuss Chapman Canal between now and next September.

The next part of the Engineering Committee has to do with the land survey to determine the acreage and consumptive use as of January, 1976. Bob Fotheringham chaired that committee, my representative from the Logan area. I know both Idaho and Wyoming were represented on it. Their study is just completed and they are passing it out. It will show how we can arrive at the base map, how we would determine the acreage, the alternative and the costs of each. Bob is capable of representing me and handling this so I'm going to turn the time over to him and he'll make this presentation.

BOB FOTHERINGHAM: We'll try and get through this real quickly. I won't read the whole thing I'll let you read it later. Basically under the introduction when the committee met we basically tried to come up to speed with what the Commission had done previously and what the members of the previous committees have done. We basically saw that the Commission tried to develop a base map of some kind to determine depletion after 1976. They had also wanted a consumptive use study to help that base map become something they could implement in the Commission. They could already determine the methodology - what you asked us to look at and that methodology was to look at planned satellite data. The recommendation by the committee was that you use the same kind of information, you just use different alternatives to implement.

On page two I indicated there were basically three methodologies you could use under that landsat satellite data. Two of those were geographic information system approaches - one was a manual mapping approach. The difference between two geographic information system approaches was that with the preferred you would use a 1975 season data tape and the second one you would use a 1980 season data tape. There are some advantages with the 1980 growing season, the imagery is a little bit more rectified and you can make a little bit better determination with that, and then work back to the 1976 base map. Three ways to implement that would be to: 1. Have a lead state and have them basically acquire the data and acquire the data they need from the other states and put together this base map you've worked on before. 2. Have all states prepare their own base map and then try to work that together and come in with the other states base maps. 3. Contract the whole thing as was done in an attempt to complete a base map back in 1982. That report was submitted by the Remote Sensing Center up at the University. Or you could use a combination of all alternatives.

On page 3 it discusses figures that would indicate costs involved in producing this base map. We mention those in the context there but if you'll turn to the back there is an attachment on the base map production methods one and two - comparison of alternatives. These are very general, and by no means specific figures, but we looked at the cost by lead state approach, all states doing the work and a contract. An asterisk is placed by the word contract indicating there may be additional costs generated by the Commission to negotiate prices and hear results and those kinds of things. There is dollars times a thousand, base times ten would be the number of days required to complete the report you would have 45 days and 550 days and 300 days on the contract.

As you turn the page there is another graph that would indicate the net cost, which came up to be around $35,000. Since some of the work was done by the Center for Remote Sensing I also attached this letter from that group with some ideas as to how they would approach it and those costs. Those are also in the graphs.

There was a general consensus from previous committees that there ought to be certain things included in the report. I've listed those 1,

2, 3 and whatever. There would be a Bear River Basin boundary established and they would recommend that they use the type 4 study which had already been done by all states and they came up with basically a boundary of the basin and they used the 1 to 100,000 scale. You outline the municipality and service areas, then you outline the pre-'76 area acreage and the reservoir areas for completions. There may be more you would want to recommend. Those are the ones that have been recommended previously.

The alternative chosen to implement to methodology already determined by the Commission should hinge closely on the accessibility of the data produced. In other words, we reviewed what had happened previously to bring about a base map, it seemed like the accessibility to review what was being done by the Commission wasn't there - not saying it couldn't be established if the Commission decided to contract it but that you would have to make that a part of this. The more comprehensive data gathered the more costly the study will be under the methods.

Basically, if you chose alternative 3 to upgrade the base map, which was done by Center for Remote Sensing then it wouldn't be as costly as if you went to the total approach of the digital tape. I don't know if there are any questions on that. If you have questions you might direct them to myself, Hal Anderson and John Shields, representing the three states. Are there any questions?

LARRY ANDERSON: Do you have a recommendation on which way we should go?

BOB FOTHERINGHAM: Well the preferred alternative was we use the 1975 data tapes to the total GIS approach. That will probably be the most comprehensive, but it will probably be the most costly rather than the alternative of taking what's already been done and trying to upgrade that. That would be least costly, and would be one of the processes you would probably go through to get this preferred method. I don't know that that would be acceptable to the Commission. That's an alternative they can look at.

As far as implementation goes on the lead state, or all states or contract - initially Utah thought they could possibly be a lead state and then there were some decisions made by policy makers in the AGR

system into planning type organizations instead of Natural Resources so I think our abilities are a little bit lacking right now. We'd probably still have to contract some of that done through AGR or some other entity. Idaho may have some comments on the lead state approach, I don't know.

HAL ANDERSON: This was a kind of a short fuse type of a thing. We got together for one meeting in October and put together a number of different scenarios. Remember, we're talking about several different things here - first of all the overall objective like Bob said was to develop a base map - land use, land cover map and additional boundaries and that sort of thing so that the consumptive use work and everything else being done could be applied to some acreage figure like division boundary. We came up with a couple of different things, first of all the technical approach which Bob mentioned. The committee decided that primarily because of the complexity of the issue of separating irrigated land from non-irrigated land and also the separation of surface water from groundwater sources and the inclusion of municipal uses and a number of other water use categories that really the most complete and accurate way of putting these datasets into a form that would be compatible, because we're talking about not just one dataset, not one satellite dataset but a number of different datasets, the service source, the SCS irrigation district boundary map was developed in 1976, the municipal boundaries and their usage by municipal areas. Put all those into one system that could essentially be where you have all your datasets being apples and apples, not apples and oranges, would require some sort of computerized approach. That is the GIS thing that Bob has mentioned there.

The committee decided that using the best synoptic view of landuse that we had for 1975 was the landset data tapes. That was agreed upon. There are other types of information that could be used on that aerial photography and a number of others that are not the same. They are not consistent between states for the entire basin. It is the same using the land data satellite disc. If we use the satellite data as a base and then applied all the other information that we have from our various states and our various agencies that we know from our work in those areas the landuse and municipal uses and etc. that are occurring in those areas

we could put together a comprehensive database. Both in a map type of a product that the Commission could have and put on the wall, but more importantly in tabular form with acreages and amounts associated with each of these and that they relate to each other. That was the one thing we tried - the overall technique. The other thing was how that would be implemented. The Committee pretty much decided that probably the best approach to that would be to have one lead agency or lead state be in charge of working with the other states to develop this Bear River Basin dataset. The reason why that would be a little bit better is because logistically it would be a little simpler because each of our own states have different capabilities both computer processing and otherwise - politically.

The reason that was preferred over contracting was that when we were completed with it we would have a computerized data base file associated with each of these in our states that the states could be using in their resource monitoring efforts. That's why the lead state approach was preferred to contracting approach. Also, because the contracting approach could be difficult to implement. There are a number of people out there to form a contract. We'd have to go out to bid and somebody in the Commission would have to review those bids. Sometime through the process we'd have to check a little bit more on the accuracy of the results we were getting from the contracts so you wouldn't have a repeat of the last contracting endeavor.

The all states approach to implementation of the digital approach would also be due to the fact that each of the states could work towards developing their own capabilities in this digital world, but because of the difficulties in doing that that would probably be more costly and we weren't really sure the Bear River Commission should be absorbing some of that technique development and training associated with all the states. That's the rationale for what you have in your hand here. I think, realistically, when you look at the implementation, even though when we put these 3 scenarios together - lead state, individual states, or contracts, actually realistically I think 4 as Bob mentioned since each of the states data is in different forms, you're probably looking at some

sort of a composite associated with all of those to get to the final product. We won't know exactly what's involved other than I think looking basically at what discussions we've had we feel that the dollar figures we laid out here are relatively adequate for developing the end product.

BOB FOTHERINGHAM: One comment there, in coming up with a decision on which method you want to implement - lead state, all states, or contract. One thing that may be a good idea for the Commission to do is adopt something that would ask the Engineering Committee or someone else to send out a request for prices and see exactly how much it would cost. Idaho, I presume, could be a lead state. I presume Wyoming could be a lead state and I presume that Utah could be. It's just the amount of work done inhouse would be the amount of work done by a contract that we might let, Idaho might let, or Wyoming might let would be different. As far as tying down the prices, I don't think we've tied them down to a dollar figure. I think the thing you ought to realize is what it's going to cost if you want this GIS system approach like we've been talking to you about. It will be in the tens of thousands of dollars approximately $80,000, in that area. Whether or not you will be able to save $5,000 by going one way or the other, or $10,000 we couldn't tell you that yet. We do not have that tied down.

JOHN SHIELDS: The committee in looking at this was unanimously in agreement we had serious doubts in our own mind what attempting to interpret landsat is going to yield as a workable product. I might refer not only back to the previous contract with the Utah Center the Commission funded but working with enhancement photography. This is something the committee themselves discussed and I think each of us has talked around with people in our states. We just feel there isn't the capability there to yield to something that's got accuracy good enough for us to use. We would be fooling ourselves to think we could do so. The second point that perhaps ought to be made is that in looking ahead to doing future updates we're talking here about generating a map showing what's irrigated in 1976, but what about the years ahead when new acreage comes in production or it just becomes necessary to go back and see where we're at. The committee agreed again that the digital approach lends

itself to future update. It's more easily done than by doing this by hand. To do it by hand you'd almost have to start over to square one again rather than do an update whereas with a geographic information system in the digital approach you will have a lot of that done for yourself. It becomes just a matter of entering in the computer the changes that have occurred.

JOHN TEICHART: What happens if land goes out of production how is that going to be included in the Compact. I can see in our area with the cost of pumping a lot of this ground may go out of production.

BLAIR FRANCIS: You establish that depletion from 1976 and whatever you add or subtract from that that's basically what the difference is. If that land came into development after 1976 then it would be another depletion that would be added on. If it came out then it would be added to the depletion the next year. That's what he's saying when you have those changes sometimes rapid, sometimes not so rapid, to go back and look through the Remote Sensing is a lot easier than to go out and remap it again for another $30,000 or $40,000. You'd basically save a lot of time in the future.

GEORGE CHRISTOPULOS: I think the most difficult thing you are going to have to do is establish that base map. There can be lands that came back into production that was pre '76, and then come into production after 1976 and they've not been counted against your Compact. You could get into water right mapping, and probably will and that'll be another feature of the GIS type map you are talking about. There'll be lands that are subirrigated without the efforts of man that you'll have to decide whether you will include or drop out because they may or may not be lands that should be counted. If they were there prior to '76 you would probably leave them alone. It seems to me, and I think you've said that, maybe the best way to approach this is through the individual states because I think each state is going to have to sort out their own situation in their state based on certain standards and criteria that we've all agreed to. We, just as Idaho and Utah, are in the midst of trying to do a lot of this mapping in our state and we'll be doing a fair

amount of it. We're getting to the point where we'll get geared up on one portion of the state and what we learn and do there will be very appropriate in the Bear River area.

HAL ANDERSON: I think that's exactly what we plan on doing. The only difference between the lead state and the individual states is that the individual states would be providing all the base information that would go to the lead state for simulation and compilation as opposed to in the individual states where all the individual compilation and putting that into the digital form is done at the individual states and then we've tried to glue that together by contract or just cooperative development. I think you are indeed right, and the committee agreed to that that the individual states were the ones to put together the base information that would go into this GIS package.

BOB FOTHERINGHAM: Eventually someone's going to have to cross the lines and make sure they line up and those kinds of things. I guess to what point each state would carry out the individual work would have to be evaluated as we went along.

JOHN SHIELDS: We all have different capabilities and different datasets. Some of us can take it a little farther than others.

WALLY JIBSON: Bob, when you suggest you delineate Compact divisions I assume you figure you will develop your acreages and your depletion also on Compact divisions. There's a little complication there. You won't need to worry about it now, but even when the Compact division is on a state line it isn't on a state line basis. Most of Blair Francis' farm is in Utah, as far as the Compact is concerned he's in Wyoming, because that's where we allocate it. I think when you delineate those you're going to have to decide well do we follow the state line or do we follow actually what the Compact division is.

BOB FOTHERINGHAM: The Compact division is what we'll do it by.

The Commission could either decide today and pick an alternative either 1, 2, or 3, (GIS or manual mapping) and they could pick an alternative to go with a lead state or with all states, or contract. I think that the engineering committee, once it's decided, ought to be required to give some kind of a directive to come back with a cost.

GEORGE CHRISTOPULOS: I have a question, you say you are recommending alternative one, using the 1975 tapes as opposed to using the 1980 tapes.

BOB FOTHERINGHAM: Right.

GEORGE CHRISTOPULOS: Do any of you have any problems with those tapes as far as accuracy and so on.

HAL ANDERSON: One of the reasons the 1980 is in there is because of the work we've done in Idaho. We've got pretty detailed land classification data in 1980 in the Bear River basin in Idaho. They went to a different landsat data tape in 1980 a different format and the quality of the format is indeed better. That's why that recommendation is in there and in fact we've got three of the four scenes in Idaho already that are necessary to cover the entire Bear River Basin, so we could have some sort of a 1980 dataset established and it's a little bit easier to go from 1985 back to 1980 than it is all the way back to 1976. Then you have the problem of in 1976 you've got to make a change map from 1976 to 1980 and subtract that out of the digital data. There's no problem with doing that it's just that several of the committee members felt it would be better if we used that 1976 and just established that base so we didn't have any problem with confusion from going back to 1980 or 1976 and subtracting that information out.

BOB FOTHERINGHAM: So there's positive things and negative. If you go with the 1975 data tapes then you're back to 1976 and that's the base we're trying to establish, however with the clarity you can get in the 1980 tapes the map established as a base map may be just as correct.

GEORGE CHRISTOPULOS: It seems like to me that you would have to do some field investigation whether you use the 1976 or 1980. You are going to have to do some adjusting because of water rights or because of the fact you may have lands getting inadvertent irrigation that are going to happen and have happened that you will have to somehow adjust out.

KEN DUNN: Hal, you say we've got part of the scenes for the Bear River Basin beyond Idaho. What's the cost of those scenes and what additional scenes will be needed in comparison to 1982.

HAL ANDERSON: In 1980 the cost of the digital tape is around $700. We'd only need one more complete coverage of the Bear River Basin for 1980, whereas for 1975 we'd have to order all 4 of them. We've already got the data essentially worked up for the Idaho portion. We could try to match that for Utah and Wyoming which would probably cost around $5000, if the Commission would agree that we could indeed use the 1980 and back it up to 1976. The longer we wait on this issue the more difficult it is to recreate the maps. The Commission really needs to adopt something and get going as rapidly as possible because you're right we have to go out and there's a lot of confusion out there that is going to have to be ground checked by each of the division tapes and verified especially where we have subirrigated fields and naturally occurring vegetation. I guess my particular feeling is the 1980 data is of a better quality than 1975 as far as the digital data itself.

WALLY JIBSON: The difficulty that Ridd had, University of Utah study, using the 1975 photos how are you going to correct that or make it more accurate other than by additional field checking of what he did.

HAL ANDERSON: What he did was a photo interpretation. What we're planning to do is do a computer assisted classification. He was relying upon photo product that he ordered from the U.S. Geological Survey at the EROS Data Center. He got those photo lab blowups. They were just like a photograph and then he tried to photo interpret them. He had problems with the quality of those photographs. Basically the approach he laid out is the way to correct that is to get those digital tapes that those photographs were created from. Satellite data doesn't come in a picture, it comes in a computer and recreates another picture that was enhanced. He didn't feel he was getting the right correct enhanced product from the EROS Data Center. What we're saying we wouldn't even fool around with the photographic product. We would get the digital tapes ourselves and do a classification based on very detailed ground measuring technic. In other words, we'd find certain fields that we knew were irrigated and certain we knew were not. We'd do a rough image classification. We'd put it into an agricultural land, range land, forest land, just a rough image classification and then take the other information we've got like there's a series of wet land maps that have been developed in the Bear

River Basin with Fish and Wildlife service. We could enter those into a computer readable form, look at those individually, and determine if those were naturally occurring wet lands or if they were subirrigated pasture, enter that information into our system and subtract those confusion areas out of our digital classification. A lot of the problems Mr. Ridd had was separation of irrigated and non-irrigated.

WALLY JIBSON: You wouldn't really be using his report.

BOB FOTHERINGHAM: We would use it to assist in the geographical information system. It would be one source of data we would implement. We would go out and field check and basically correct and put in kind of an overlay.

BOB HILL: It seems like there was another question as to what the actual resolution accuracy was. Are we talking about 100 meters, 300 foot resolution and if so that would mean we would have a certain size field that we could not detect.

HAL ANDERSON: The resolution satellite is .8 of an acre for the 1980 data. It is 1.1 acres for 1975. To be realistic even though the satellite can't see one individually at a time, to be realistic about saying you can identify something on the ground as being different or something you know isn't in a particular category on the ground. You really need a 5 fixal minimum resolution before you can really put any significance to create accuracy to determine that's what it was. Anything much smaller than 5 acres is not going to be essentially classified by the satellite. It would be nice if we had an alternative, but it doesn't look like we do. We've got some aerial photography that covers some of the Bear but not all of it. Utah has some Bear River photography and Wyoming has some Bear River photography for all different years, different scales, different times. Once again one dataset covers the entire thing. The landsat is the only thing we've got.

KEN WRIGHT: We are today supposed to pick a method by which this is going to be done.

BOB FOTHERINGHAM: I don't think you'd have to do that today. I guess you have two alternatives, you can chose that today or you can quantify the price a little bit more objectively by having requests for a price

sent out to different people, some kind of a bid from Utah, some kind of a bid from Idaho, some kind of a bid from Wyoming on a lead state and then you could get the same kind of request out for all the states and some kind of a request for contract from some entity. You could get two or three different ones. If you could get some clarification on costs.

GEORGE CHRISTOPULOS: These costs you are talking about, are these estimates you have in the back for different ways just for the production of the data. What are we thinking as a Commission of how we'd accomplish this from the standpoint of cost to the Commission. Have we thought that far yet.

WALLY JIBSON: I'd assume we're going to make some drastic changes in the stream gaging program and we're going to pick up that money to carry this on, maybe we will in another year.

WALLY JIBSON: Actually to carry this a little further, George, this new assessment of the states $42,000, a nominal reduction in stream gaging as of next September 30, I think your funds are going to build up and become available in another fiscal year that you can handle this kind of a program without going back to increase the state's assessment.

KEN DUNN: We have a $90,000 carry over too.

GEORGE CHRISTOPULOS: We probably don't. I think we probably have more nearly, if you adjust because of that we just now paid what we already committed to the USGS for the year previous, so we really are running about $35,000 or so surplus instead of $98,000.

WALLY JIBSON: In April, I figured we had a $32,000 surplus. That will pick up because of the increased assessment. It looks like for sure, we'll cut the stream gaging program some as of September 30. I think we're going to be in pretty good shape budget wise if you maintain this assessment at that level.

KEN DUNN: Mr. Chairman, I think if we're going to go out to the states and say let's get some bids, before we do that we ought to be committing we're going to do something. I don't want Hal to spend some time putting together a good cost estimate so we can come up and say this is what we can do it for and we decide well we don't think we can do it anyway.

BOB FOTHERINGHAM: Most of the alternatives would be done in about a year and a half.

GEORGE CHRISTOPULOS: I'd like to comment. I think what Ken is asking and I certainly would be willing to commit Wyoming without speaking for the other two commissioners. Just from the standpoint, I think this is the coming thing and I think this is the only way you're going to do it. What you're really looking at is a system whereby you can concern and identify year to year changes. You're going to have to get a system that works and then you are going to have to look at it and compare 1987 to 1988 and see what the change was up or down, plus or minus. You identify the post 1976 uses and then one year you have x-thousand, the following year you drop some out or add some back in and then you are going to have to identify that and you're going to have to identify crops and so on and identify your depletion for that year. I think that's the only way you can do it. The only way you can do it is with a computer because you cannot do it manually. You just can't keep up with it, so you start out with a base map and you get this thing put together properly and you've got the proper base map and then after that it's just a question of looking at change. I think this is the only way you can do it and again I feel that's the only way we can go. In answer to Ken, at least from my perspective I feel, I'm sure the other two commissioners from Wyoming would agree that I don't know any other way you can do it. I'm sure Utah feels the same way.

KEN DUNN: I'm for it.

LARRY ANDERSON: I think it needs to be done and we ought to move ahead with it.

GEORGE CHRISTOPULOS: I think there are problems, but there will be problems no matter what you do, whether you do it manual or anything else you've got the same problems. You've just got a better tool to work with.

WALLY JIBSON: We're going to have a certain amount of pick and shovel work anyway.

GEORGE CHRISTOPULOS: I think it's far better to do it by states whether you do it by lead state or all the states you need to try to develop that expertise within your own state because we're going to apply this same technic all over the state not just in the Bear River.

KEN DUNN: I agree. I think because it's an ongoing thing we need to have it done.

JOHN SHIELDS: I think the point ought to be made too that you don't necessarily want to have to go back to a contract every time you want to do the update. You certainly would want to do that on the basis of a year-to-year period. That's kind of another argument against the contract.

GEORGE CHRISTOPULOS: I'd make a Motion we use the alternative 2, the 1980 tapes and that we go ahead and seek the cost figures so we can have them for the April meeting and if there's anything that can be done between now and April to continue the work the committee's done in looking at this, because I think it is something you want to keep talking about. I think that should also be done.

ROD WALLENTINE: I second it.

KEN WRIGHT: All in favor, any opposed.

MOTION CARRIED.

LARRY ANDERSON: Could we direct the committee that part of their responsibility that they set down a proposal of what each state ought to have - define terms and ground rules. This would be an appropriate time to do that. I think the committee is the appropriate place for that to be done and bring it back so that each state does their own. Let the committee build that document.

GEORGE CHRISTOPULOS: I believe the most important thing we do - two things will be very important. First is to set down some guidelines and ground rules for everybody that works on it so if we all do it the same way; and secondly, the physical, mechanical work, putting it all together.

LARRY ANDERSON: One question, when is the best time to start this meeting for everybody and we will assume we've all agreed to a starting time.

GEORGE CHRISTOPULOS: In the past we've started as early as 10:30 a.m. Let's start at 11:00 a.m. and break at 12:30 p.m. for lunch.

JOHN SHIELDS: As the engineering advisor for Wyoming I'd like to request we receive full verbatim minutes. It's awful difficult to work with a summary. I called Nancy Fullmer and had her send me a section of verbatim minutes and that helped considerably in ironing out just what it was that was discussed. I'd like to make a request we receive verbatim minutes. You just can't quite go on summary sometimes.

LARRY ANDERSON: We're happy to provide verbatim minutes of any section to anybody that wants them.

WALLY JIBSON: In the April meeting I got a verbatim copy. Things are going to get better. In about half the cases we don't know who made a statement or who made a motion. There were a lot of corrections in it.

Meeting adjourned at 3:37 p.m.

ANNUAL MEETING

April 15, 1985

Summary of minutes

The Annual Meeting convened at 12:00 p.m. with three voting commissioners from each State and Commission officers present. The Cheyenne group was delayed in Denver by weather and did not attend. Dan Lawrence introduced Bob Morgan, new State Engineer from Utah and Larry Anderson who replaced Dan in the Division of Water Resources.

Minutes of the November 16, 1984 meeting were summarized and approved, Also, the corrected minutes of the April 1984 Annual Meeting were approved.

Bob Hill and Chuck Brockway were unable to attend, so the Engr-Mgr gave a brief report on the Consumptive-Use study based on a telephone call from Brockway. Correlation of 1983 and 1984 data with published data (Blaney-Criddle) was disappointing, so it was recommended that an additional year be approved. If continued, the program would include at no additional cost an analysis of water use by sub-basin extending a study made in the mid-sixties of land and water use in which the newly developed coefficients would be applied to the previous data to get an estimated updated water use. The team also requested Commission recommendations for a field trip.

The field trip was kicked back and forth at length with a half dozen different plans proposed. A committee of one commissioner from each State was appointed to plan the trip for early July. (A one-day trip was made July 11th.)

Mike O'Grady, Wyoming Development Commission, reported on the Smiths Fork project on which meetings have been held with representatives of the three States and the Power Company. They are looking at a sixty-million dollar project that would store 125,000 ac-ft and are attempting to assess benefits to each State and the Power Company.

The Engineer-Managers' report indicated prospects of a better-than-average runoff from the Uintas but deficient supplies from Smiths Fork. He also stressed the need of a review of the stream-gaging program. Budget and State assessments were presented and approved for the 1986, 1987, and 1988 fiscal years.

Norm Stauffer reported that Utah would like to install and pay for some sediment gages, but as they would likely overlap State lines, it would be expedient to have the Commission be the cooperator as the Utah USGS could not operate in other States under a contract with Utah. The request was granted by motion.

A suggestion by Ken Dunn that the State Engineers review the stream-gaging program was approved with Bob Morgan serving as Chairman.

The Commission agreed to pay publication costs for the three gaging stations at Cutler Dam now operated by the Power Company.

The Treasurer's report, given by Bert Page, showed a reserve as of March 31st of $119,277 that projected would give an unobligated cash reserve on July 1st of about $32,000.

A motion was approved to give the State Engineer's committee a second assignment, that of preparing a statement of procedure to move ahead in determining consumptive use as of January 1, 1976.

The Engineer-Manager's contract was renewed without change and the meeting adjourned at 2:00 pm.

BEAR RIVER COMMISSION SPECIAL MEETING

Cokeville, Wyoming

July 11, 1985

Chairman Wright called the meeting to order at 12:55 pm and announced that the purpose of the meeting was to select a Secretary-Treasurer to replace Dan Lawrence who had retired.

All commissioners were present except George Christopulos who was represented by John Teichert, Alternate.

Don Gilbert nominated Larry Anderson as Secretary-Treasurer, seconded by Reed Dayton, and the motion carried.

Wes Myers moved that the Engineer-Mgr and new Secretary-Treasurer draft a resolution commending Connie Borrowman, Bert Page, and Dan Lawrence for the work they have done. Motion carried.

Larry Anderson distributed the new printing of the Amended Bear River Compact and the Bylaws of the Commission; also, a draft of minutes of the April Meeting. The meeting adjourned at 1:00 p.m., and the group was given a presentation of the Smiths Fork project followed by a trip to the damsite.

BEAR RIVER COMMISSION
880 River Heights Blvd
Logan, Utah 84321

November 25 1985

Engineer-Mgr Report

Wallace N. Jibson

1985 Water Supply

Seasonal runoff was somewhat less than forecast last spring but, as forecast, the Uinta watershed yield was slightly above average, and Smiths Fork was considerably below average. April-September runoff past the Harer gage, above Bear Lake, exceeded the 20-year average by about 13 percent. Bear Lake water was used for power generation through Cutler power plant most of the summer which accounts in part for the comparatively high water-year discharge of 1,865,000 acre-feet past the Collinston gage. This discharge of course was far below the record-breaking 3,179,000 acre-feet in 1984.

The following table compares the Upper Bear River and Smiths Fork runoff in 1985 with 1984 and with the average for the period of record (Logan River record not available):

Streamflow in Acre-Feet

May-September

	Average 1943-84	1984	1985*	1985 as Percent of Average
Upper Bear River	117,600	178,600	119,500*	102 percent
Smiths Fork	112,300	157,700	81,300*	72 percent

* Provisional Record, subject to change.

Reservoirs

Hydrographs of Bear Lake for 1984 and 1985 are shown on page 3. The Lake peaked at 5,921.75 ft (1,287,500 Ac-Ft) June 17-20 and was drawn down to 5,919.45 ft (1,126,600 Ac-Ft) by September 30 which was 2.2 ft below that of a year ago. The Lake on November 17 was at elevation 5,918.97 ft (1,093,000 Ac-Ft) with 240 cfs entering through the Rainbow Inlet Canal and 500 cfs being released in the Outlet Canal.

Woodruff Narrows Reservoir operation for 1985 is shown on page 4. The Reservoir was full at the beginning of the water-year and was drawn down to 18,200 acre-feet by the end of September. Whitney Reservoir was down to 1,100 acre-feet, Sulphur Creek Reservoir to 4,660 acre-feet, and Woodruff Creek Reservoir to 1,800 acre-feet by the end of the water-year.

Compact Operation

Diversion records are not yet available for the Upper Division, but interstate regulation was not required this season. Operation of the Compact in the Central Division is shown on page 5. A "Water Emergency" as defined by the Compact was reached about July 20 when the Divertible Flow fell below 870 cfs, while the alternate condition initiating an emergency was reached about July 27 when the flow past the Border gage fell below 350 cfs. (Engineering consultants and others involved in planning should recognize that Wyoming is not required to maintain 350 cfs at Border.) Wyoming Section was diverting only about 75 percent of its allocation on July 20, and diversions remained below the allocation for the balance of the season. Residual flow from the upper basin and Woodruff Narrows Reservoir considerably alleviated the shortage from Smiths Fork, so extensive regulation was not required in the Wyoming Section.

Some Idaho users did experience an emergency about July 10th when the river bank failed and the entire Bear River was diverted down the railroad right-of-way to the next bridge crossing where it again entered the natural channel. Fortunately, peak flows had passed, but a temporary increase in river flow caused failure of the saturated and weakened bank. Local cooperation speeded up repair work; evenso, it was some time before in-between water users were back in business.

Budget

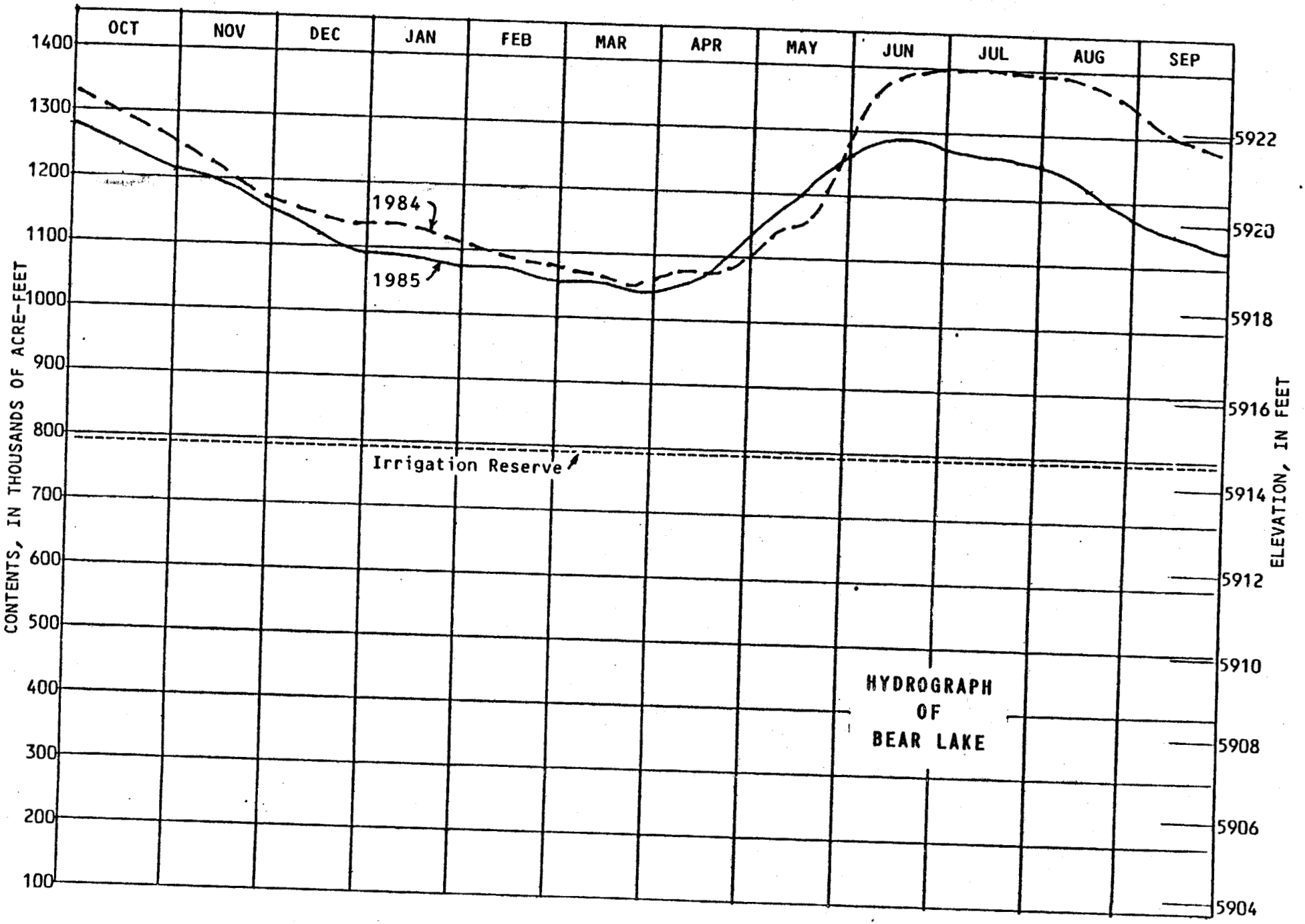
A detailed budget with State assessments was approved in the April meeting for fiscal years 1986, 1987, and 1988. Further action today would depend on possible modification of the stream-gaging program and/or adoption of implementing programs as might be recommended by the State Engineers' Committee.

Applications for Appropriation

Application summaries submitted for the past six months are shown on pages 6 and 7. Noteworthy, is an approved irrigation reservoir for 500 acre-feet on a tributary of Sulphur Creek in Upper Wyoming, a recreation reservoir for 40 acre-feet in Franklin County, and a power right (pending) for 140 cfs on Blacksmith Fork in Utah. The Wyoming right mentioned is the only filing for irrigation received.

Biennial Report

A supply of the 1983-84 Biennial Report is available. Nancy has distributed copies to the Governors, County Commissioners, etc. Please pick up additional copies today, as needed.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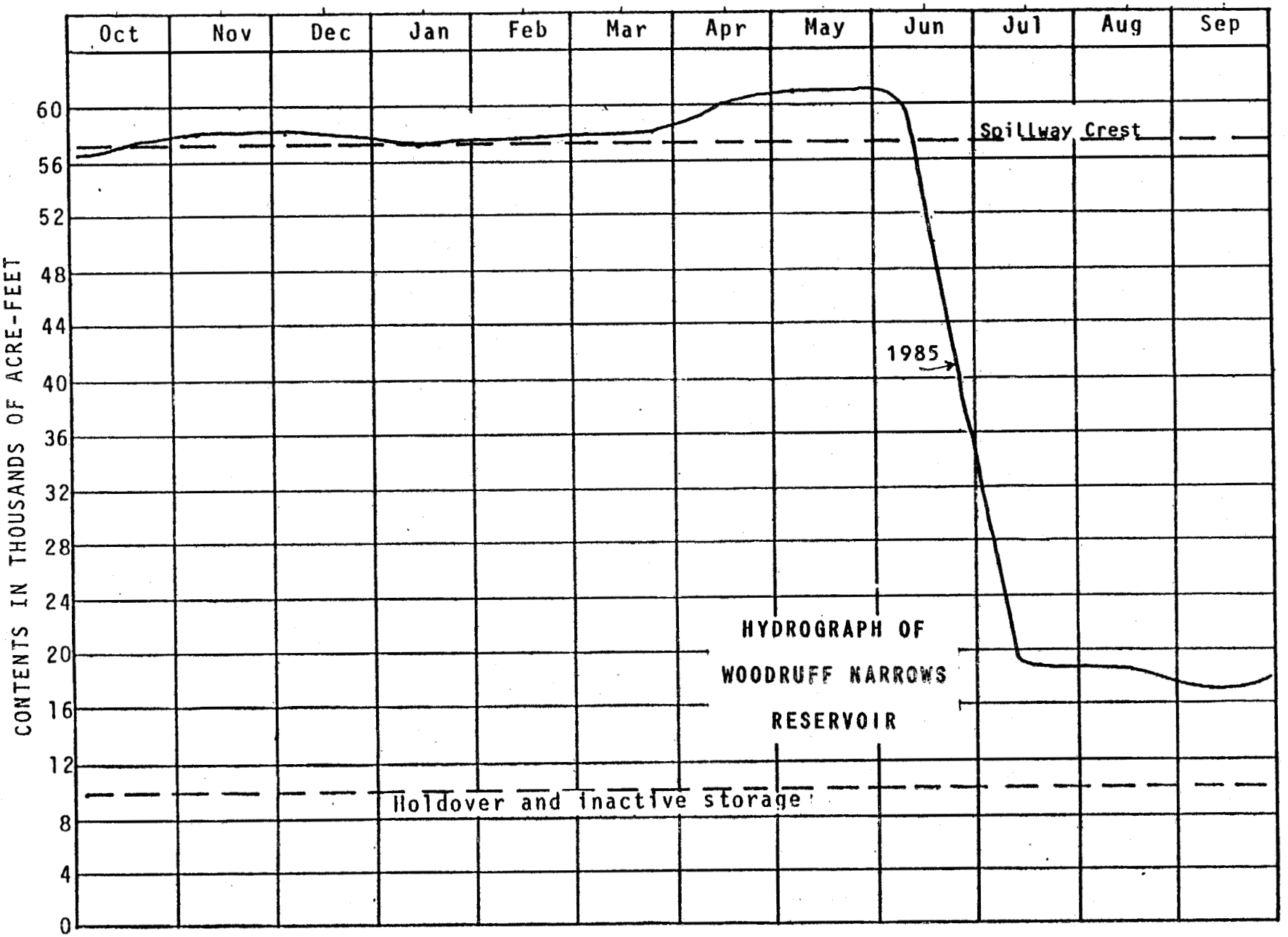
CONTENTS, IN THOUSANDS OF ACRE-FEET
5922
5920
5918
5916
5914
5912
5910
5908
5906
5904
ELEVATION, IN FEET
1984
1985
Irrigation Reserve
HYDROGRAPH
OF
BEAR LAKE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Nov
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Aug
Sep
60
56
52
48
44
40
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20
16
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8
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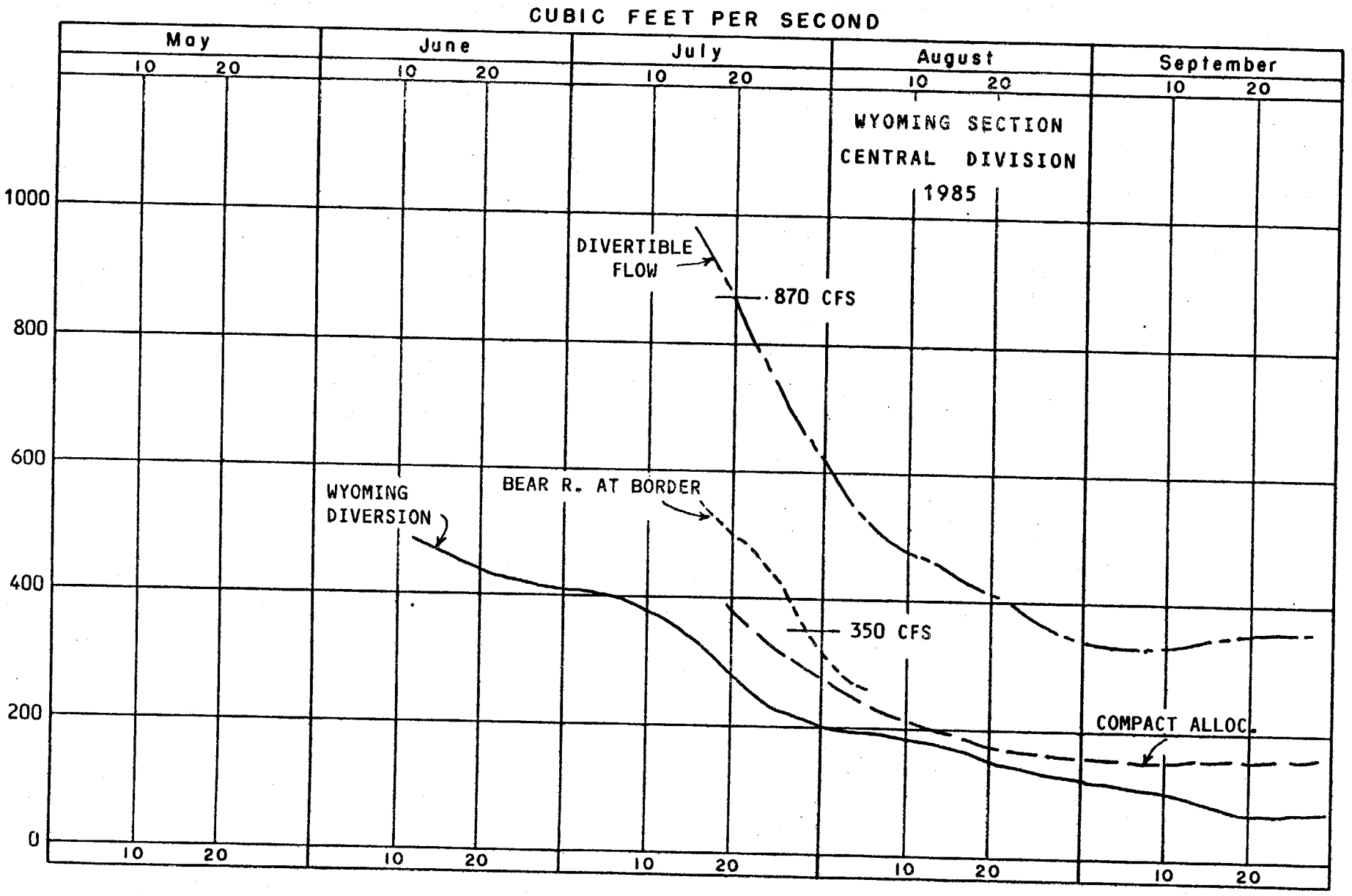
CONTENTS IN THOUSANDS OF ACRE-FEET
Spillway Crest
1985
HYDROGRAPH OF
WOODRUFF NARROWS
RESERVOIR
Holdover and inactive storage


CUBIC FEET PER SECOND
May
June
July
August
September
10
20
1000
800
600
400
200
0
WYOMING SECTION
CENTRAL DIVISION
1985
DIVERTIBLE
FLOW
870 CFS
WYOMING
DIVERSION
BEAR R. AT BORDER
350 CFS
COMPACT ALLOC.

APPLICATIONS TO APPROPRIATE WATER
BEAR RIVER DRAINAGE
STATE OF UTAH
04/01/85 to 11/05/85

Presented To Commission: Nov. 25, 1985

WUC No.	Filing Date	Applicant	Source	Uses	Location	cfs Quantity	Statu
23-3679	05/30/85	Hansen, John K. (& Sons)	Well	IDS	15 13N 6E	0.5 cfs	APP
23-3681	07/31/85	USA Bureau of Land Management	Well	S	14 9N 6E	0.1	UNAP
25-8667	04/17/85	C.A. Ernstrom Family Partnership	Well	IS	13 12N 1W	0.5	UNAP
25-8668	04/18/85	Merrill, Glacus	Well	IS	32 12N 1E	0.25	UNAP
25-8672	05/06/85	Maughan, Duane	Surface Run-off	ISOt	6 10N 1E	0.1	APP
25-8681	06/18/85	Wilson, George E.	Weston Creek Irr. Co. overflow	I	4 14N 1W	0.5	UNAP
25-8685	06/21/85	Jones, John C. (Limited Family Partnership)	Well	IS	28 12N 1E	0.5	APP
25-8687	06/24/85	Reese, W. Lee	Well	IDSOt	6 12N 1E	0.5	APP
25-8691	07/25/85	Osmond Black-Bear Ranch c/o Mac Adamson	Well	D	10 9N 1E	0.35	UNAP
25-8693	08/16/85	Cooper, Lyle	Well	I	29 12N 1W	1.0	UNAP
25-8701	08/15/85	Hardware Ranch Associates	Blacksmith Fork River	Hy	7 10N 2E	140.0	UNAP
25-8702	08/21/85	Lindquist, Kenneth R.	Well	Ot	28 12N 1E	0.25	UNAP
25-8704	08/22/85	Worley, William	Well	IS	6 11N 1E	0.1	UNAP
25-8706	09/05/85	Providence City Corporation	Underground Water Well	Mu	11 11N 1E	4.5	UNAP
25-8707	09/10/85	Hancock, William N.	Underground Water Drain	IS	17 11N 1W	0.1	UNAP
29-3040	04/01/85	Plymouth Town (c/o Arnold Lamb, Mayor)	Unnamed Spring	Mu	31 14N 2W	0.5	APP
29-3041	04/01/85	Lamb, Arnold	Well	Ot	9 13N 3W	0.117	APP
29-3103	05/03/85	Allred, Gale	Well	IDSOt	10 10N 2W	1.0	UNAP
29-3105	05/16/85	Thompson, Arnold R. (Etal)	Well	IS	23 9N 2W	0.5	APP
29-3107	06/03/85	Thorpe, Thomas C.	Unnamed Surface Drain	IS	22 10N 2W	0.25	APP
29-3108	06/04/85	Hardy, John M.	Overflow Hammond West Branch C	IS	20 10N 2W	0.25	APP
29-3109	06/06/85	Tremonton City Corporation	City Springs (South Spring)	Mu	31 12N 2W	3.0	APP
29-3111	06/06/85	Deweyville Town Corporation	Unnamed Springs (Overflow)	Mu	4 11N 2W	0.3	UNAP
29-3112	06/24/85	East Garland Cemetary District	Well	I	19 12N 2W	0.1	APP
29-3115	08/13/85	Walker, Marilyn M.	Corrine City Overflow	IS	26 10N 2W	0.5	UNAP
29-3116	08/28/85	Gordon, Jack	Underground Water Well	IS	2 7N 2W	0.2	UNAP
29-3120	09/30/85	Christiansen, Sammy A.	Well	IDS	2 13N 3W	0.25	UNAP

Total Surface Water, Utah: Approved, 4.1 cfs...Pending, 141.4 cfs.

Total Ground Water, Utah: Approved, 2.22 cfs..Pending, 8.5 cfs.

Presented to Commission: NOV. 25, 1985

Applic. Number	Date of Filing	Name	Source	Use	Location	Amount (cfs)	Act'n
			STATE OF IDAHO				
11-7355	5/31/85	Arden D. Smith	Ground Water	Irrig.	S22T13SR43E Bear L.	0.90 cfs	App
13-7428	4/25/85	Arlo M. Larsen	Trib. to Worm Cr	Recreat.	S19T15SR40E Franklin	40.0 AcF	App
13-7429	9/12/85	Gary T. Garner	Ground Water	Irrig.	S21T14SR38E Franklin	2.92 cfs	Pend

Total Surface Water, Idaho: Approved 40.0 AcFt. Pending 00
Total Ground Water, Idaho: Approved 0.90 cfs.. Pending 2.92 cfs

Change in Status, Past Six Months, of Previously Reported Applications

Pending to Approved: 12.10 cfs Ground Water and 00 Surface Water.
Approved to Cancelled, Lapsed, etc.: 7.98 cfs Ground Water and 8.00 cfs Surface Water (1.0 AcFt Storage)

			STATE OF WYOMING				
UW 70170	4/2/85	Evanston Airport Bd	Ground Water	Misc.	S13T15NR121W Uinta	0.10 cfs	App
UW 69864	4/3/85	Rocky Mtn Energy Co	Ground Water	Misc	S17T15NR120W Uinta	0.04 cfs	App
UW 70424	5/22/85	Chevron/BLM	Ground Water	Indust.	S29T16NR119W Uinta	0.33 cfs	App
UW 70425	5/22/85	Chevron/BLM	Ground Water	Indust.	S30T16NR119W Uinta	0.33 cfs	App
UW 18-7-253	6/17/85	Meadow Park Village	Ground Water	Munic.	S36T15NR121W Uinta	0.12 cfs	Pend
" 18-10-259	6/27/85	Kilburn Porter	Ground Water	Misc	S11T16NR121W Uinta	0.09 cfs	Pend
UW 71371	9/10/85	Evanston Alliance	Ground Water	Misc	S25T15NR121W Uinta	0.02 cfs	App
" 18-12-335	9/30/85	Amoco Production Co	Ground Water	Indust.	S32T16NR119W Uinta	0.04 cfs	Pend
28969	4/22/85	Exxon USA	Bench Spring	Indust.	S23T21NR119W Lincoln	1.00 cfs	App
28970	4/22/85	Exxon USA	Control DRaw	Indust.	S27T21NR119W Lincoln	1.00 cfs	App
29115	8/22/85	Sunset Transportation	Spring Creek	Indust.	S10T19NR120W Lincoln	0.44 cfs	App
29160	8/23/85	Exxon USA	Spring Creek	Indust.	S10T19NR120W Lincoln	0.44 cfs	App
29225	10/15/85	Seale Oilfield Consul	Yellow Creek	Indust.	S36T15NR121W Uinta	0.44 cfs	App
9015R	6/27/85	Amoco Production Co	Cutoff Draw	Indust.	S32T16NR119W Uinta	6.2 AcFt	App
9018R	7/2/80	J.R. Broadbent Co.	Bones Hollow	Irrig	S31T13NR118W Uinta	505.04 "	App

Total Surface Water, Wyoming: Approved, 511.24 AcFt and 3.32 cfs...Pending, 00
Total Ground Water, Wyoming: Approved, 0.82 cfs...Pending, 0.25 cfs

Change in Status, Past Six Months, of Previously Reported Applications

Pending to Approved: 0.61 cfs Ground Water and 00 Surface Water
Approved to Cancelled: 3.33 cfs Surface Water and 0.89 cfs Ground Water
Adjudicated, 5/1/85 to 10/31/85: 0.24 cfs Ground Water and 8.56 AcFt Surface Water

BEAR RIVER COMMISSION

STATEMENT OF INCOME AND EXPENDITURES

FOR THE PERIOD OF JULY 1, 1984 TO JUNE 30, 1985

Income	Cash On hand	Interest Income	From States	Total Revenue
Cash Balance 07/01/84	$115,591.65	$----------	$----------	$115,591.65
State of Wyoming	----------	----------	29,000.00	29,000.00
State of Idaho	----------	----------	29,000.00	29,000.00
State of Utah	----------	----------	29,000.00	29,000.00
Interest on Savings and Other Income	----------	10.687.06	----------	10,687.06
TOTAL INCOME TO June 30, 1985	$115,591.65	$ 10,687.06	$ 87,000.00	$213,278.71

DEDUCT OPERATION EXPENSE

EXPENDED THROUGH U.S.G.S		APPROVED BUDGET	UNEXPENDED BALANCE	TOTAL EXPENDITURES
Stream Gaging		$ 62,240.00	$ 2,400.00	$ 59,840.00
	SUBTOTAL	$ 62,240.00	$ 2,400.00	$ 59,840.00
EXPENDED THROUGH COMMISSION				
Personal Services		8,600.00	1,132.41	7,467.59
Travel		400.00	400.00	.00
Office Expenses and Supplies		200.00	168.00	32.00
Treasurer Bond and Audit		500.00	56.50CR	556.50
Printing and Reproduction		2,300.00	1,351.00	949.00
Legal Consultant		500.00	8.00CR	508.00
Contract-Universities		$ 36,120.00	$ 9,030.00CR	$ 45,150.00
	SUBTOTAL	$ 48,620.00	$ 6,043.09CR	$ 54,663.09
TOTAL		$110,860.00	$ 3,643.09CR	$114,503.09
UNEXPENDED CASH BALANCE AS OF 6-30-85				$ 98,775.62

BEAR RIVER COMMISSION

DETAILS OF EXPENDITURES

FOR PERIOD ENDING JUNE 30, 1985

108	Utah State University	$ 9,030.00
109	Wally Jibson	1,323.93
110	US Geological Survey	59,840.00
111	Van Cott, Bagley	58.00
112	Wally Jibson	867.87
113	Utah State ~~University~~ Treasurer	30,000.00
114	Wallace Jibson	560.00
115	Van Cott Bagley	450.00
116	Wally Jibson	1,325.38
117	Utah State University	18,060.00
118	Gilchrist & Co.	505.00
119	Utah State University	9,030.00
120	Utah State University	9,030.00
121	Postmaster	22.00
122	Wally Jibson	3,390.41
123	Rose Printing	949.00
124	Fenton Insurance Co.	51.50
--	Bank Charge	10.00
		$144,503.09
	Less Savings	30,000.00
	Total Expense	$114,503.09

BANK RECONCILIATION

June 30, 1985

Cash in Bank per Statement 6-01-85	$ 1,294.82
Plus: Deposits In Transit	13,500.00
Less: Outstanding Checks	13,452.91
Total Cash in Bank	$ 1,341.91
Plus: Savings Accounts - Utah State Treasurer	97,433.71
TOTAL CASH IN SAVINGS AND IN CHECKING ACCOUNT	$ 98,775.62

BEAR RIVER COMMISSION

STATEMENT OF INCOME AND EXPENDITURES

FOR THE PERIOD OF JULY 1, 1985 TO OCTOBER 31, 1985

Income	Cash On hand	Interest Income	From States	Total Revenue
Cash Balance 07/01/85	$ 98,775.62	$----------	$----------	$ 98,775.62
State of Wyoming	----------	----------	42,000.00	42,000.00
State of Idaho	----------	----------	42,000.00	42,000.00
State of Utah	----------	----------	42,000.00	42,000.00
Interest on Savings and other income	----------	2,926.25	----------	2,926.25
TOTAL INCOME TO October 31, 1985	$ 98,775.62	$ 2,926.25	$126,000.00	$227,701.87

DEDUCT OPERATION EXPENSE

EXPENDED THROUGH U.S.G.S		APPROVED BUDGET	UNEXPENDED BALANCE	TOTAL EXPENDITURES
Stream Gaging		$ 62,240.00	$ -0-	$ 62,240.00
	SUBTOTAL	$ 62,240.00	$ -0-	$ 62,240.00
EXPENDED THROUGH COMMISSION				
Personal Services		8,600.00	6,746.24	1,853.76
Travel		400.00	400.00	.00
Office Expenses and Supplies		200.00	200.00	.00
Treasurer Bond and Audit		500.00	500.00	.00
Printing and Reproduction		2,300.00	105.00	2,195.00
Legal Consultant		500.00	.00	500.00
Contract-Universities		$ 36,120.00	$ 36,120.00	$ .00
	SUBTOTAL	$ 48,620.00	$ 44,071.24	$ 4,548.76
TOTAL		$110,860.00	$ 44,071.24	$ 66,788.76
UNEXPENDED CASH BALANCE AS OF 10-31-85				$160,913.11

BEAR RIVER COMMISSION

DETAILS OF EXPENDITURES

FOR PERIOD ENDING OCTOBER 31, 1985

125	VanCott, Bagley, et al	$ 500.00
126	Void	-0-
127	Wally Jibson	1,181.97
128	Rose Printing	2,195.00
129	Wally Jibson	671.79
130	USGS	62,240.00
	Total Expense	$ 66,788.76

BANK RECONCILIATION

October 31, 1985

Cash in Bank per Statement 11-01-85	$ 60,553.15
Less: Outstanding Checks	-0-
Total Cash in Bank	$ 60,553.15
Plus: Savings Accounts - Utah State Treasurer	100,359.96
TOTAL CASH IN SAVINGS AND IN CHECKING ACCOUNT	$160,913.11

UTAH STATE UNIVERSITY·LOGAN, UTAH 84322

College of Engineering
Department of Agricultural
and Irrigation Engineering
UMC 41

November 22, 1985

Mr. Wallace N. Jibson, Engineer
Bear River Commission
880 River Heights Blvd.
Logan, UT 84321

Dear Wally:

Attached please find a progress report for the 1985 summer season for the project entilted, "Duty of Water in the Bear River Basin - Field Verification of Empirical Methods."

We appreciate the opportunity to work with the Bear River Commission on this study. We would be pleased to respond to any questions you may have.

Sincerely,

Robert W. Hill

Robert W. Hill
Project Coordinator

RWH/lj

Attachments

November 22, 1985

DUTY OF WATER UNDER BEAR RIVER COMPACT: FIELD VERIFICATION OF EMPIRICAL METHODS

A Three State Cooperative Project Sponsored by the Bear River Commission

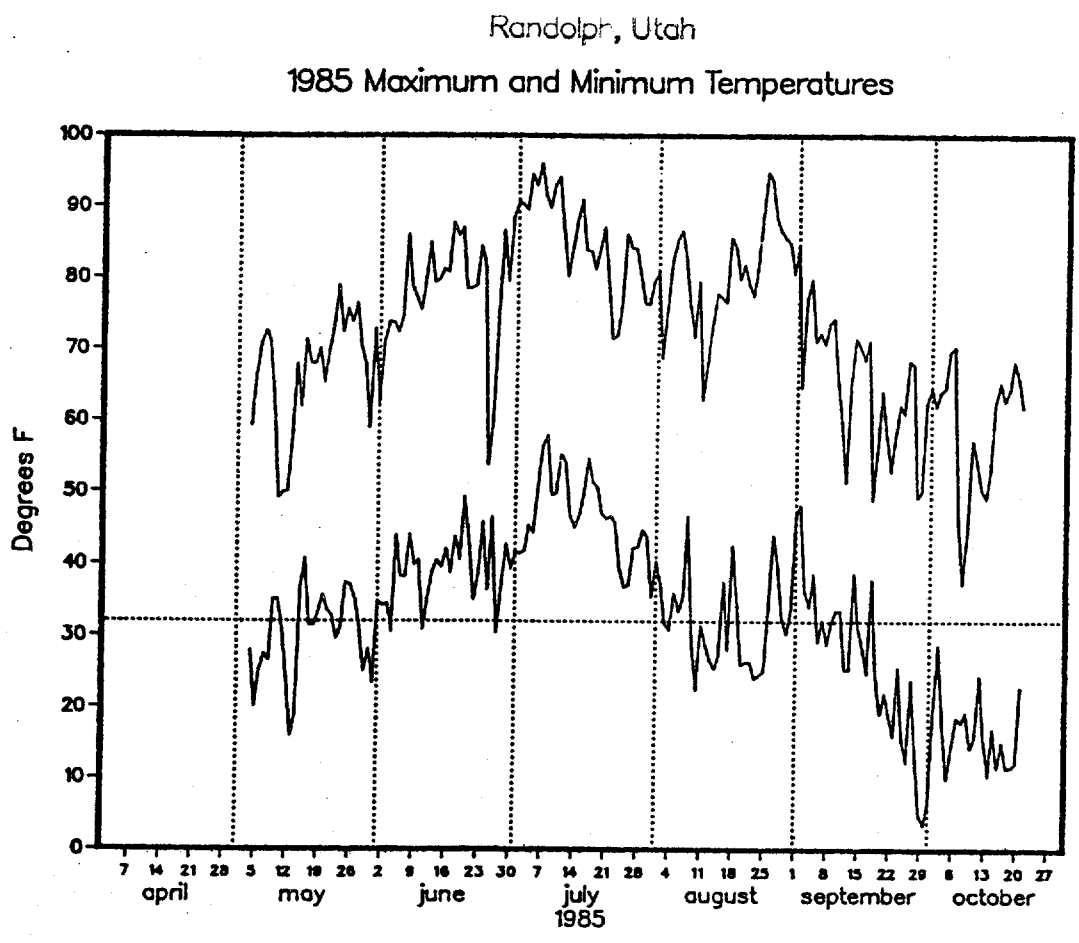
University of Idaho	Utah State University	University of Wyoming
Ag. Engineering	Ag. & Irrig. Engineering	Ag. Engineering
C.E. Brockway	R.W. Hill	R.D. Burman
R.G. Allen	(Project Coordinator)	

Progress Report, Summer 1985

Automated remote weather data stations were established during April and May at Preston (Swan Lake), Talmadge and Montpelier, Idaho, Randolph, Utah and Hilliard Flats, Wyoming. These sites were visited weekly beginning in May and continuing through mid October. Example weather data is shown in Figures 1 and 2 for Randolph and Hilliard Flats.

The measurement of water use by meadow in the non-weighing lysimeters at Montpelier, Randolph and Hilliard Flats was continued from May through mid October, 1985. The preliminary analysis indicates that 1985 seasonal water use (ET) was higher than the previous years at Randolph and Hilliard Flats but not at Montpelier. This is shown in Figure 3. The variation in measured seasonal ET from 1983, 1984 and 1985 was greater than the variation in calculated ET by the SCS Blaney-Criddle equation (Figure 4) for the same period. Thus, a universal seasonal coefficient may not be appropriate. Monthly crop water use for each of the three lysimeter sites during June - September of 1983, 1984 and 1985 are presented in Figure 5, 6 and 7. Water use for June 1985 was much higher than previous years at Randolph and Hilliard Flats but not at Montpelier. Whereas the July 1985 values at Randolph and Hilliard Flats were relatively lower than expected. Again, Montpelier was different. The reasons for these site and month differences are not now apparent.

Soil moisture contents were determined in a few alfalfa fields using the neutron probe on a weekly basis. These data have not been analyzed as of this date.



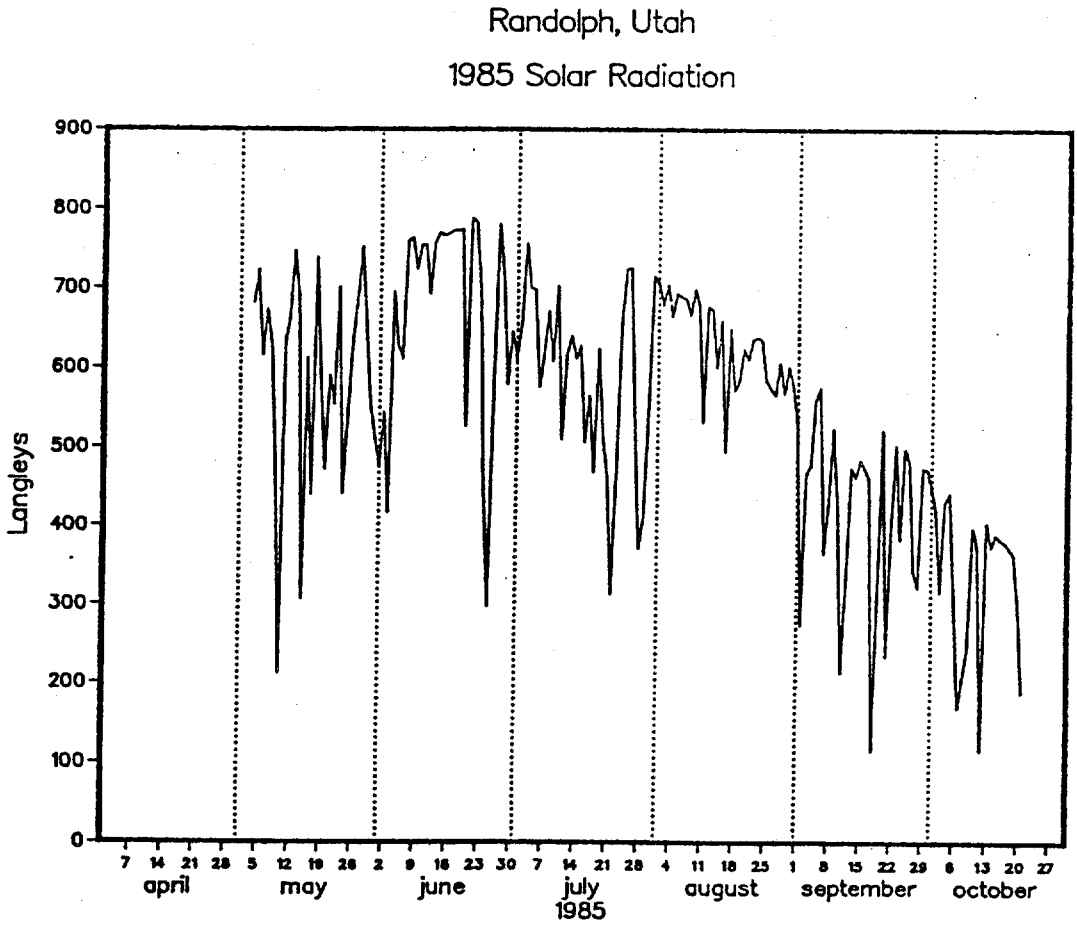
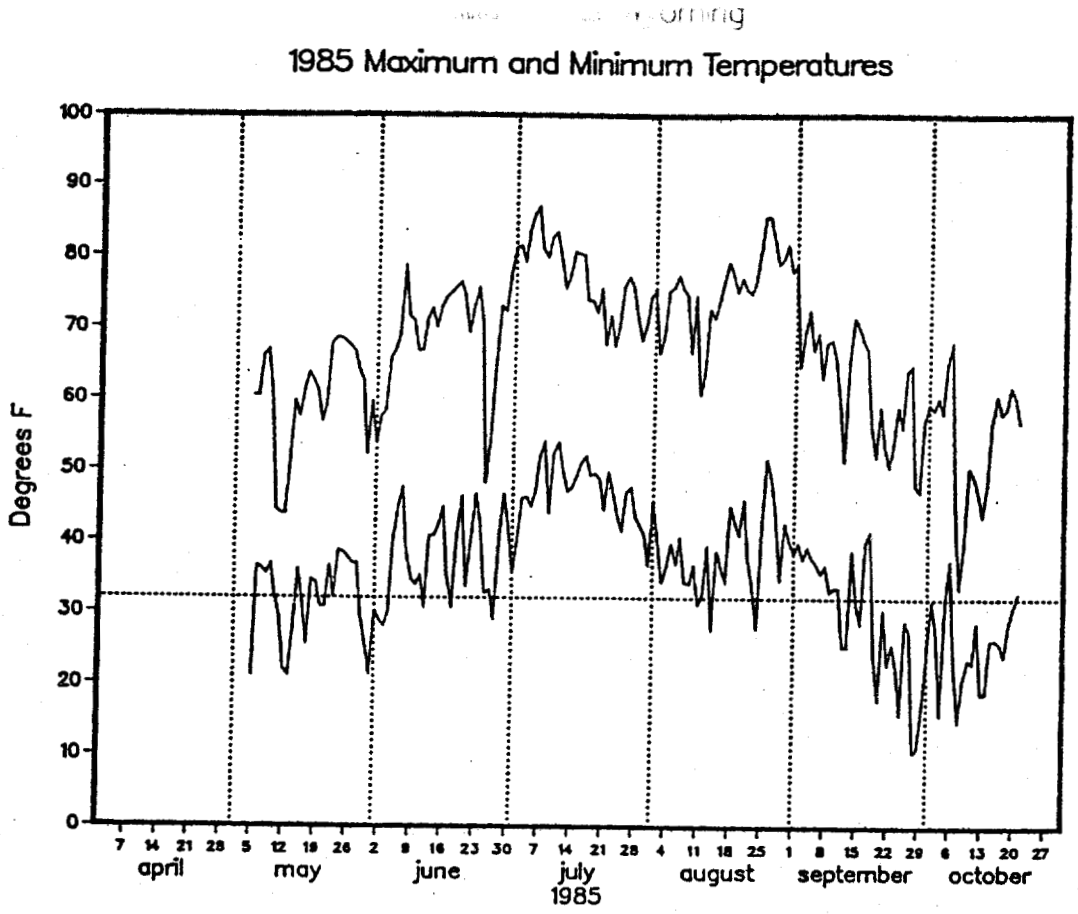


Figure 1. Daily Temperatures and Solar Radiation for Randolph, UT, 1985.



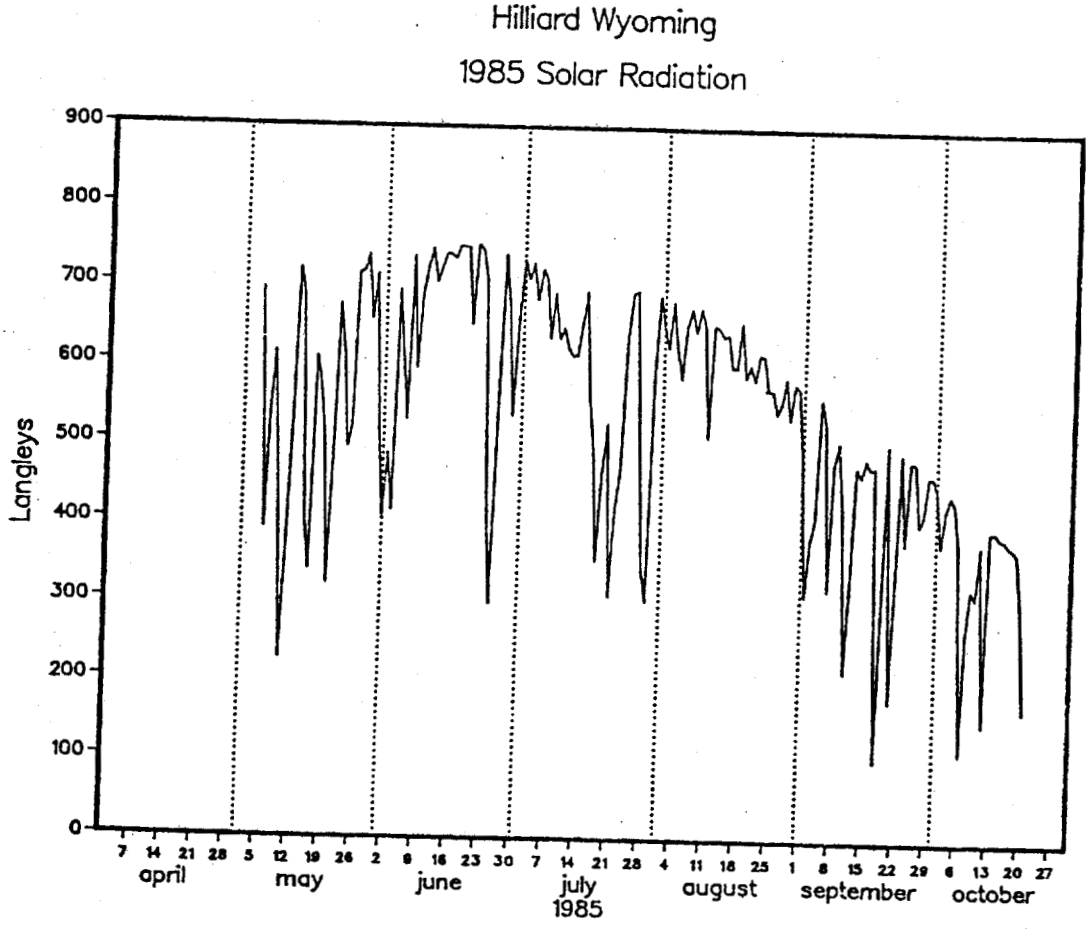
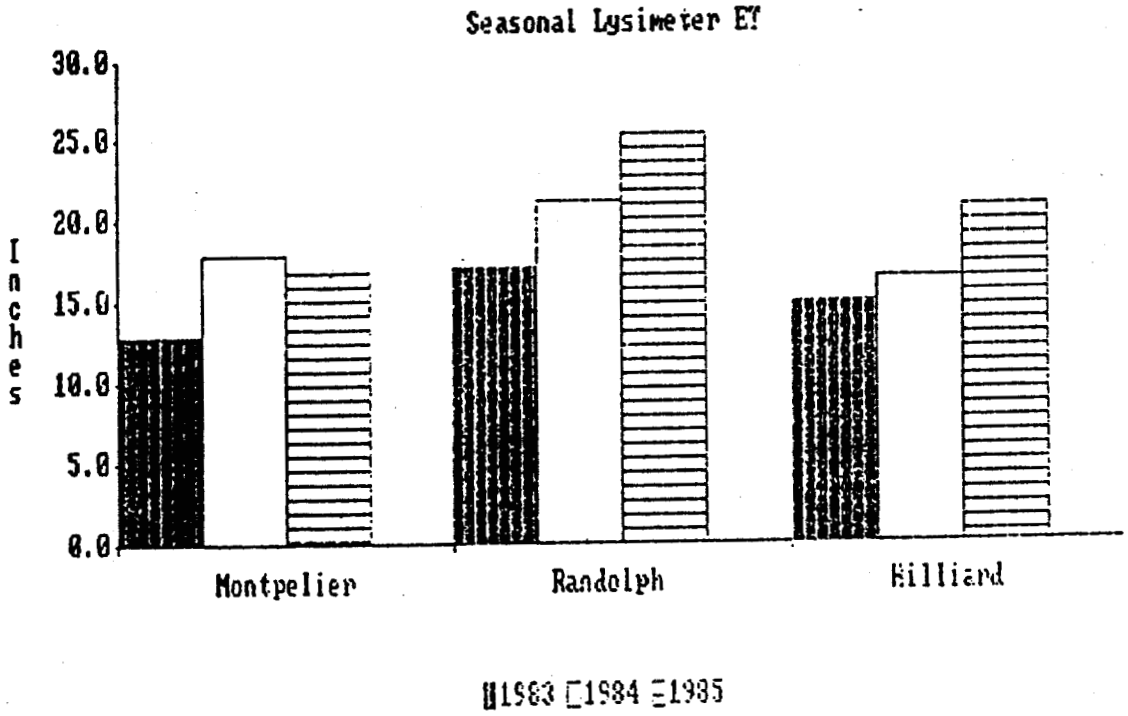
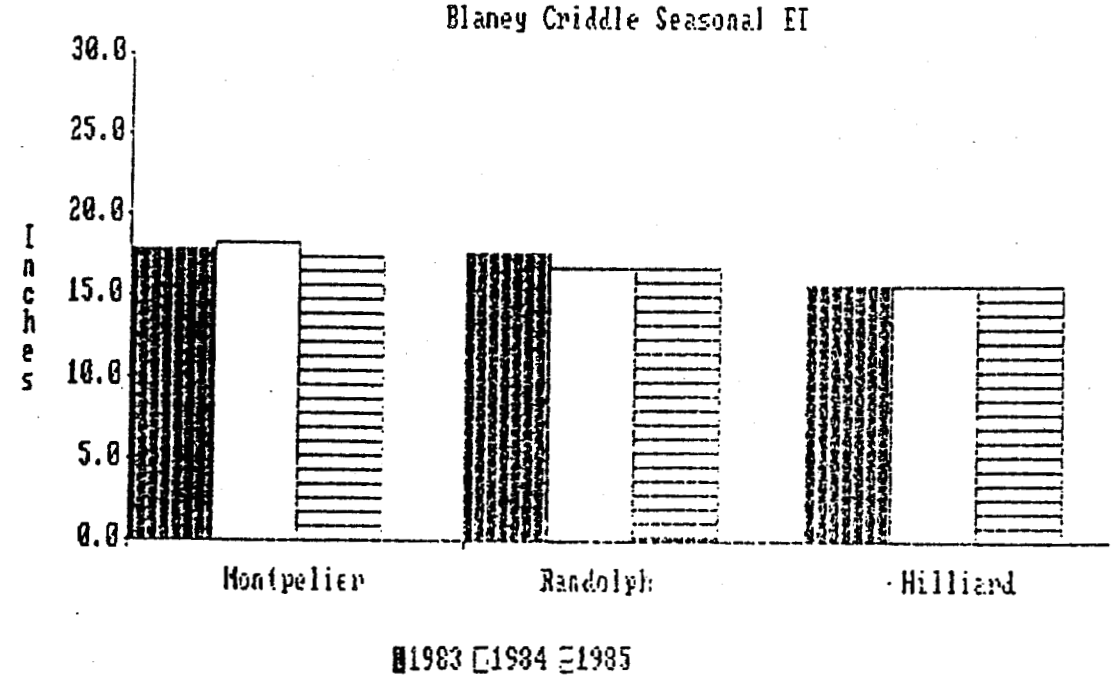


Figure 2. Daily Temperatures and Solar Radiation for Hilliard, WY, 1985.



Note: 1983 Seasonal ET From Mid June to October 15.
1984-1985 Seasonal ET From May 15 to October 15.

Figure 3. Seasonal Meadow Grass Water Requirements Measured From Lysimeters For Montpelier, ID, Randolph, UT and Hilliard, WY in 1983, 1984, and 1985.



Note: SCS Blaney-Criddle Formula Using $k_c = 1$.
Estimates From May 15 to October 15 Each Year.

Figure 4. Seasonal Calculated Consumptive Use Using SCS Blaney-Criddle Method With $k_c = 1$, for 1983-1985 at Montpelier, ID, Randolph, UT and Hilliard, WY.

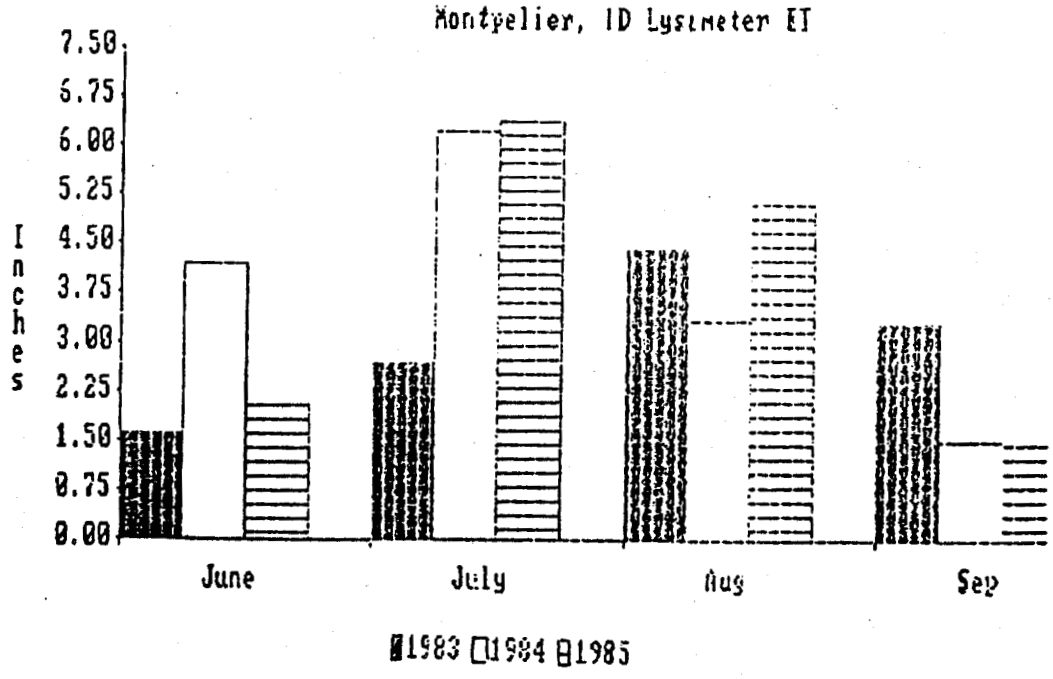


Figure 5. Meadow Water Requirement From Lysimeter for Montpelier, ID 1983-1985.

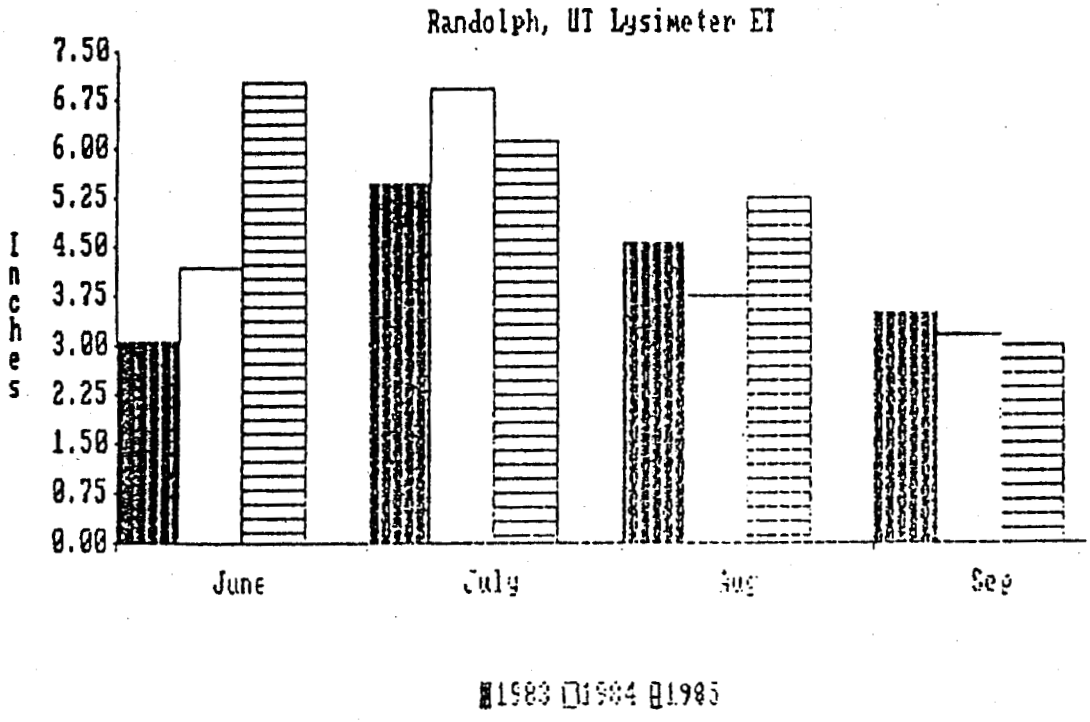


Figure 6. Meadow Water Requirements From Lysimeter Measurements for Randolph, UT 1983-1985.

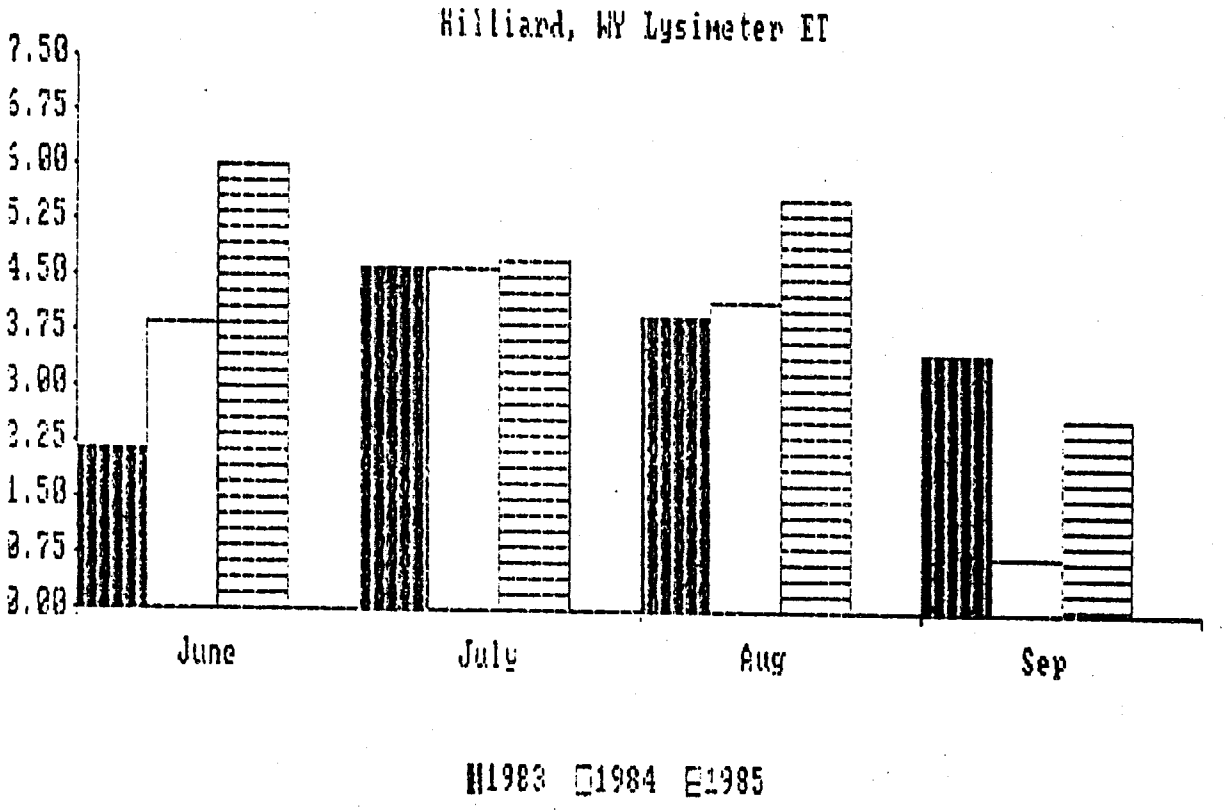


Figure 7. Meadow Water Requirements From Lysimeter Measurements for Hilliard, WY 1983-1985.

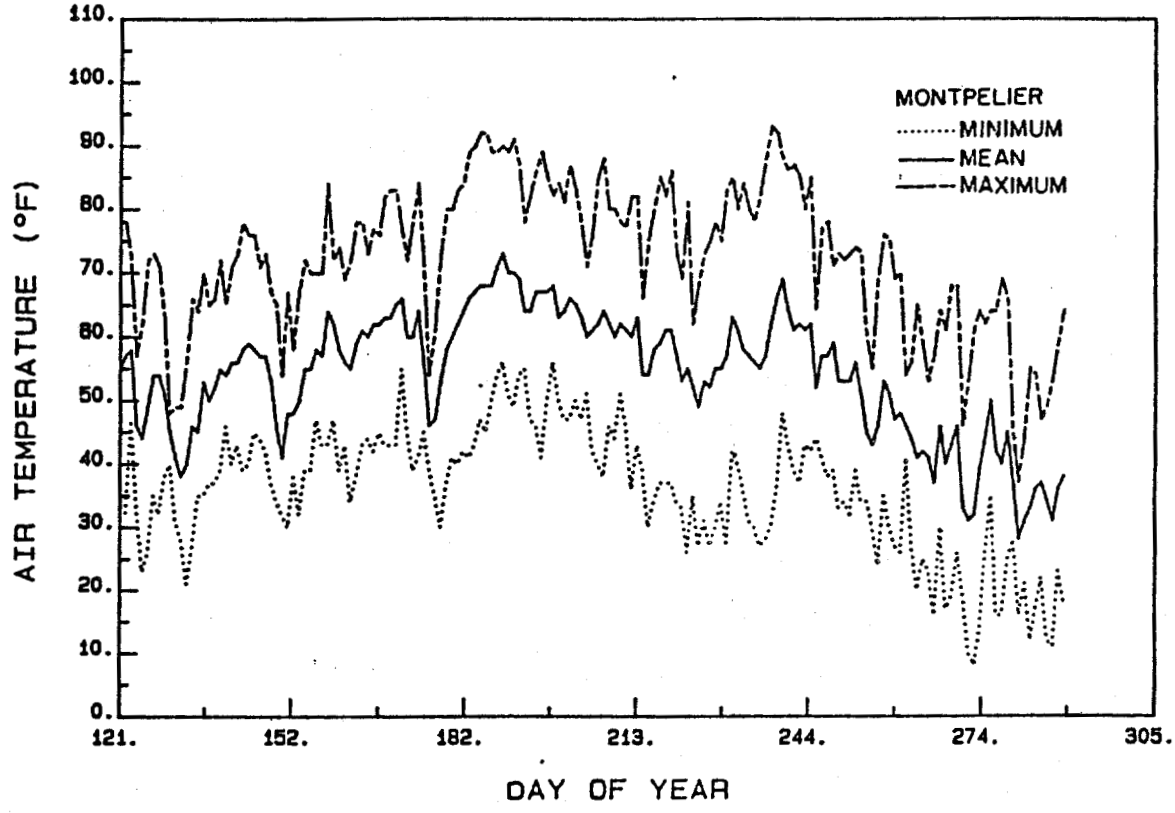


Figure 10. Daily minimum, mean, and maximum air temperatures recorded at the Montpelier location during 1985.

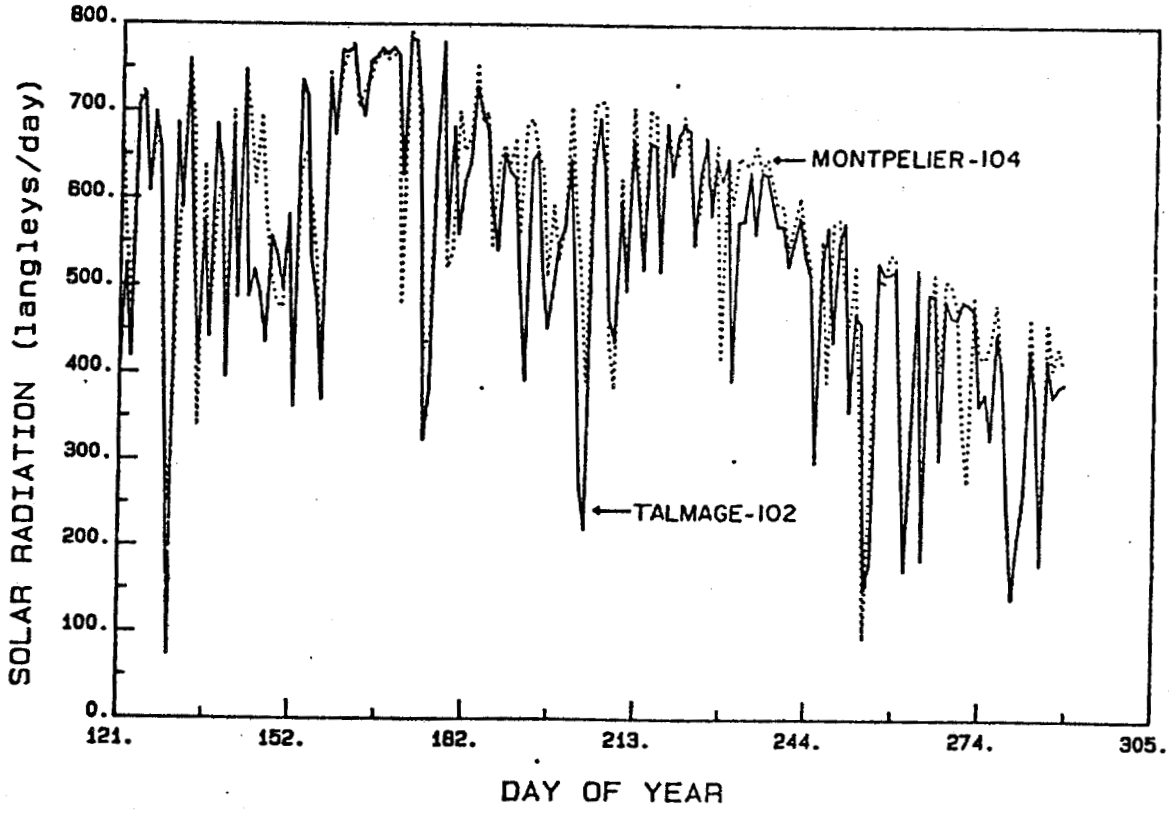


Figure 9. Daily solar radiation recorded at Talmage and Montpelier locations during 1985.

Preliminary

Economic Feasibility Report

for the

Smith's Fork Project

in

Wyoming

November 1985

BACKGROUND

Following completion of Wyoming Water Development Commission's level two feasibility investigation of the Smith Fork Project, a decision was made to create a working group to further define the Economic feasibility. This was on April 15, 1985 during a meeting of State Agency personnel from Utah, Wyoming, and Idaho, and representatives of Utah Power & Light, Bear River Commission, Wyoming Board of Control, and the Wyoming Water Development Commission.

On June 25, 1985 a team consisting of Frank Davis, President of Energy National Inc., a wholly owned subsidiary of Utah Power and Light Co., Carley Burton Hydrologist of UP & L, Michael O'Grady of the Wyoming Water Development Commission, and Lyle Summers, Economist of Utah Division of Water Resources, met to discuss completed level two reports and determine data needed for completing the economic feasibility. Robert Hahne of the US Army Corps of Engineers attended also to discuss flood related issues.

Assignments for gathering data and carrying out needed analyses were agreed upon and a tentative deadline for preparing a draft report was set for September 1, 1985.

On September 19, 1985 the Economic Feasibility Work Group met in Cokeville Wyoming. The Preliminary draft report was discussed by Work Group members, irrigation representatives from Wyoming and Idaho and Staff of the USDA's SCS and the Bear Lake Regional Commission. It was decided that the discount rate to be used for economic analysis would be 8 percent and that indirect benefits will not be included in calculating the Benefit/Cost ratio. Agricultural people from Idaho requested that 25,000 acres of irrigated lands in the Dingle area be included in the feasibility analysis. The work group agreed this would be appropriate in spite of potential difficulties with the Bear River Compact. Approaches used in evaluating recreation, flood control and water quality benefits were approved. The search for data on water quality benefits will be continued however on the opinion of some participants that impacts to recreation on private and Forest Service lands have not been adequately identified.

A deadline of November 31, 1985 was agreed upon for completion of the final report. This date is critical to Wyoming and Utah in preparing for their legislative sessions in 1986.

Project Description

The proposed Smith's Fork Project consists of a dam and reservoir with maximum capacity of 125,000 Af and a minimum conservation pool of 25,000 Af. It will be designed to provide supplemental irrigation water to 16,300 acres in Wyoming and enhance the water supply to 21,000 Idaho acres in the Dingle area. An improvement in water quality at Bear Lake is expected due to reduced phosphorous deposition. Flat water recreation provided at the reservoir and flood damage reduction in the upper Bear River Basin will be additional benefits. Increased hydrolelectric power generation potential will be provided both at the reservoir and at existing Utah Power and Light Co. facilities along the Bear River. The preliminary cost estimate for the Smith's Fork Project with the power plant is approximatly $60,000,000.

Summary and Conclusions

It is apparent from information shown in table 1 that the Smith's Fork project, as presently conceived is not economically feasible. The present worth of future benefits is $33,590,100 and the B/C Ratio is .56:1. It may be useful however to undertake additional engineering cost studies to develop a curve showing project costs for various dam and reservoir sizes and water yields. From this an incremental benefit analysis can be carried out to determine if there is a feasible project. The following benefits were calculated with an 8% discount rate and useful project life of 100 years.

TABLE 1
Summary of Benefits

Purpose	Average Annual Benefit	Present Worth Equivalent
Water Quality at Bear Lake	$480,600	$6,005,000
Irrigation in		
Wyoming	294,000	3,673,000
Idaho	450,000	5,622,000
Recreation on Smith's Fork Reservoir	325,400	4,066,000
Hydropower @ Smith's Fork Dam	883,000	10,800,000
Hydropower @ Existing UP&L facilities	60,500	755,900
Flood Control	179,100	2,237,000
Total Benefit	$2,725,200	33,158,900
Benefit/Cost Ratio is:		.56

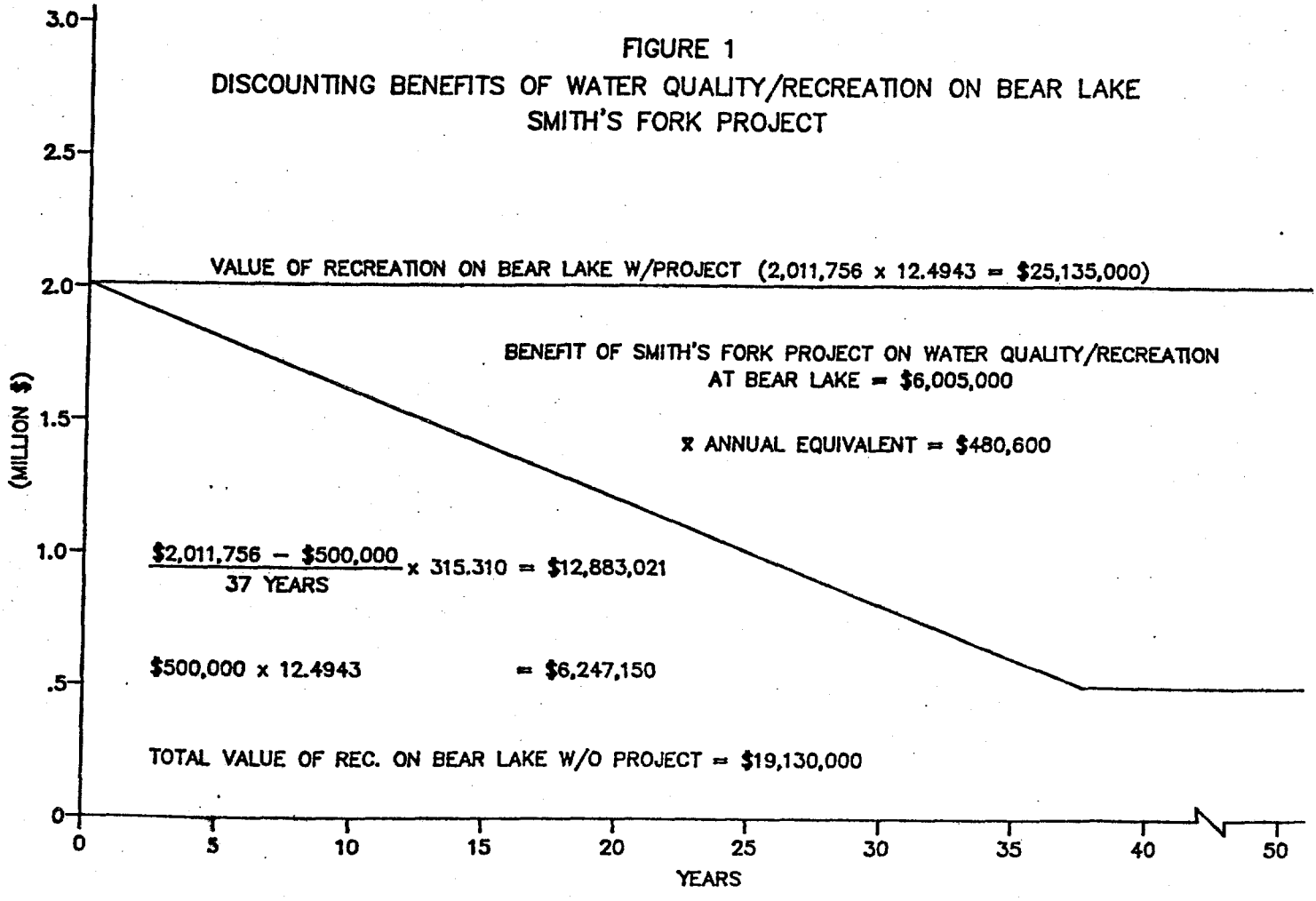
Benefits of the Smith's Fork Project

Water Quality

This category of benefits is based upon data provided by Ecosystem Research Institute (ERI) and the Bear Lake Regional Commission in the report: "Environmental Evaluation Smith's Fork Reservoir Project January 15, 1985.

Figure 1 shows the discounting procedure used to calculate water quality/recreation benefits. The value per visitor day is $15. The total annual recreation value (total value less operational costs) was treated as a level annuity for 50 yrs. As shown in figure 1, this is the amount of value accruing to recreation on Bear Lake if the Smith's Fork Project is constructed. The downward sloping line represents the value of recreation that would accrue without the project. The value of water quality/recreation benefits on Bear Lake is the difference between value of recreation occurring with and without the Smith's Fork project which is $6,005,000.

FIGURE 1
DISCOUNTING BENEFITS OF WATER QUALITY/RECREATION ON BEAR LAKE
SMITH'S FORK PROJECT



Irrigation

The Table on the following page shows the calculation of irrigation benefits. It is comprised of data provided by irrigatiors at the Cokeville meeting. Hycon has not been used because Craig hasn't finished the hydrology simulation yet.

point out that assumptions on all alfalfa lands being watered with pumped well water

and water being the only limiting factor for meadow hay production may be over simplified

Smith's Fork Irrigation Benefit Analysis

Crops Grown

Crops	% of Total	Wyoming	Idaho	Total
Alfalfa (AC)	60	9,787	15,000	24,787
Barley (AC)	10	1,163	2,500	4,131
Meadow Hay (AC)	30	4,893	7,500	12,393
Total	100	16,311	25,000	41,311

Increased Net Income

Reduced Pumping Cost

Alfalfa Acreage Only @ $21.00/ac	$206,052	$315,000	$521,052

Increased Net Income From Meadow Hay

Wyoming $18000* X 4,893 ac.	$88,074		
Idaho $18.00 X 7,500 ac		$135,000	$233,074
Total Increased Net Income	$294,126	$450,000	$744,126
Present Worth			$9,297,346

* Increased Net Income/ac From Meadow Hay

% of Time Short	Production (ton/ac)	Net Income/ac. @ $55/ton	Weighted Average Net Income
50	.75	$18.00	$9.00
20	.50	12.00	2.40
30	1.75	42.00	12.60
100			$24.00

Recreation At Smith's Fork Reservoir

To estimate the project's contribution to the supply of recreation opportunities in the basin, use rates were calculated for all Bureau of Reclamation Projects in the three states. The three state average use per acre of water surface was multiplied by the average surface area (May through September) of the project reservoir, 1061 acres, resulting in an estimate of 23,692 visitor day opportunities annually. The value of this supply was estimated by applying Utah's current value of $15 per visitor day. This results in a capitalized value of recreation benefits of $4,066,000 as shown in Table 2.

TABLE 2

Recreation Evaluation Summary[1/]

State	Visits	Water Acres	Visits/
Wyoming	4,261,254	138,685	30.73
Idaho	686,311	137,592	4.99
Utah	2,994,245	79,386	37.72
Total	7,941,810	355,663	22.33

Smith Fork Recreation Supply = (1061) x (22.33)

= 23,692 Visits

Value @ $15/Visitor day = 355,382

Less OM & R = 30,000

Annual Recreation Benefits = 325,382

PW = $4,066,000

1/Source: USDI Bureau of Reclamation "1982 Summary Statistics, Water, Land, and Related Data. Denver, Colorado.

Data shown in Table 3 suggest that new recreation opportunities provided by the Smith's Fork project will be in demand and utilized by the Basin population which has increased by 1,474,600 since 1970. Meek's Cabin Reservoir is the only new flatwater recreation facility to be built and is receiving heavy use according to Wyoming recreation specialists.

TABLE 3

Recreation

Demand Change

1970-1980

Bear River Basin

Increase In Demand

(1970 Basin population 99,540)[1/] x (25) participation rate [1/]	=	2,488,500
(1980 Basin population 158,524) x (25)	=	3,963,100
Increased demand (visits)		1,474,600

[1/]Source: Recreation Working Paper, Bear River Basin Cooperative Study February 1978.

Hydropower at Smith's Fork Dam

This category of benefits was evaluated based on the following data provided by Energy National Incorporated, subsidiary of Utah Power and Light Co.

~~Total project cost (power plant, transmission line, equipment)~~ ~~$5,825,000~~

Net project capacity		5,000 kw
Project life		50 yrs.
Energy sales	$305,000	13,863,620 kwh/yr
Energy price		22 mills
Capacity sale	$433,000	$226/kw/yr(31mills)
Energy price escalation rate		5%
O & M cost escalation rate		5%
Capacity factor		31.7%

do we agree w/ mills use ?

Operation, maintenance, replacement, insurance	$65,000
Property tax & working capital	$67,000

Based on the above information, the hydropower benefit is $10,800,000, calculated as follows:

Item	PW Calculation		Present Worth
Energy Sales =	305,000 x 26.440*	=	$ 8,064,200
Capacity Sales =	433,000 x 12.233484**	=	5,297,100
Total Revenue	738,000		$13,361,300
Less: O & M Insurance & Replacement	65,000 x 26.440		$ 1,718,600
Less Property Tax & Working Capital	67,000 x 12.233484		819,643
Hydroelectric Benefit			$10,823,057

*Present worth factor when Escalation Rate = 5%
Discount Rate = 8%
Useful Life = 50 yrs

**Present worth factor at 8% for 50 yrs

Hydropower at Existing UP&L Plants

Utah Power & Light Company checked monthly spill records at Soda, Grace, Cove, Oneida and Cutler plants and compared spill volume with releases from the outlet canal at Bear Lake. It was found that 16,200 acre feet of water can be utilized at the five power plants to generate electricity on the average year. Based on 22 mills/kwh, increased average annual energy revenues will be $61,500 or $755,900 present worth. Information submitted by UP & L follow in Table 4.

TABLE 4

Summary Of Spills And Energy
Credits Due To Smith's Fork Operation

	Soda	Grace	Cove	Oneida	Cutler
1. No. Years Spill Occurred	3	11	11	5	24
2. Total Volume of Spill (A. F.)	124,260	1,170,000	1,370,000	136.878	1,730,201
3. Credit for Smith's Fork Savings (A.F.)	106,620	208,000	175,000	103,000	283,100
4. Average Annual Spill Credit (A.F.)	2,000	4,000	3,000	2,000	5,200
5. Energy Credit in MWH	130	1,660	207	220	535
6. $ Value Based on 22 mills/KWH	$2,600 2,860	$33,200 36,520	$4,100 4,554	$4,400 4,840	$10,700 11,770

worth a lot more ?

TOTAL MWH Credit = 2752 MWH/Yr.
TOTAL ANNUAL VALUE = $60,500
PRESENT WORTH = $755,900

CRITERIA USED IN THE SMITH'S FORK PROJECT STUDY OF BENEFITS OF EXISTING HYDROELECTRIC PLANTS

1. Monthly record of spills past Soda, Grace, Cove, Oneida, and Cutler for the period of record 1931 through 1984.

2. Comparison of monthly spill volume with outlet canal release volume.

3. Maximum storage of 60,000 AF/Yr. allowed in Smith's Fork in lieu of storage in Bear Lake.

4. Smith's Fork storage credit only allowed during the runoff period April through July each year.

5. A comparison was made of individual plant spills, outlet canal releases and 60,000 AF storage in Smith's Fork. The smallest value of the three was used to determine credit for spill reduction each year for the period analyzed.

6. No credit given to spills past Grace and Cove for the period August 1982 through December 1984 because spill occurred the entire period. Reduction of spill volumes by storing in Smith's Fork during April - July in 1983 or 1984 would have caused increased spill volumes after July for 1984 and 1985, due to releases from Smith's Fork rather than Bear Lake.

Basin Flooding

It was assumed that average annual damages occuring in Utah's Hydrologic Unit II, Wyoming's Smith Fork Unit IV, and Idaho's Unit II would be prevented by the project. Damage data, when indexed up to a 1984 cost have shown annual benefits of $179,000 with present worth of $2,237,000. (See Table 5 and Figure 2)

TABLE 5

Estimated Average Annual Damage

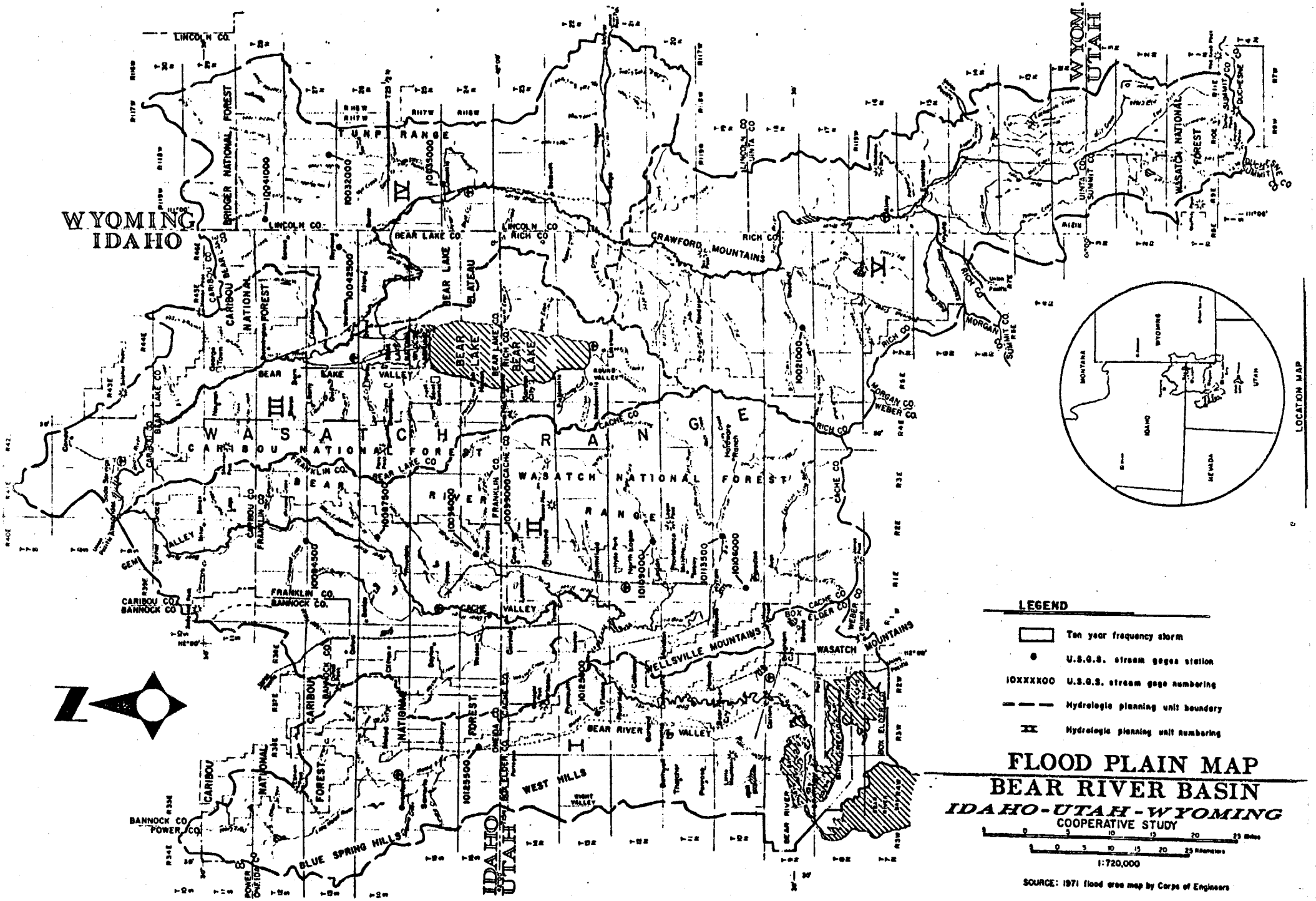
on Selected Drainages 1/

Drainage	Area Affected by 1% Chance Flood (Acres)	Average Annual Damage 1970 ($)
Utah Bear River Basin Unit II	5,200	25,750
Wyoming Smith's Fork Unit IV	3,150	21,770
Idaho Bear River Basin Unit II	7,900	22,460
Total	16,250	$69,960
Index 2/		x 2.56
1980 Damages		$179,100
Present Worth		$2,237,000

1/USDA "Floods Working Paper, Bear River Basin Cooperative Study"

2/ $\frac{\text{1984 CPI}}{\text{1970 CPI}} = \frac{311.1}{121.3} = 2.56$

Figure 2



FLOOD PLAIN MAP
BEAR RIVER BASIN
IDAHO-UTAH-WYOMING
COOPERATIVE STUDY

1:720,000

SOURCE: 1971 flood area map by Corps of Engineers

U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

FIGURE 1

References

1. GBR Consultants Group Inc. "Smith's Fork Project Level II Study Final Report" for Wyo. Water Development Commission February 15, 1985. w/Appendix

2. Bear Lake Regional Commission & Ecosystem Research Institute "Bear Lake Preservation Project" Preliminary Draft Report, Nov. 15, 1984 w/update pages.

3. USBR "Summary Statistics Water, Land and Related Data 1984.

4. USDA "Recreation Working Paper, Bear River Basin Cooperative Study" Feb. 1978
   "Floods Working Paper, Bear River Basin Cooperative Study" Apr. 1977.
   "Irrigation Conveyance Systems Working Paper, Bear River Basin Type IV Study" Apr. 1978

5. Burton, C.B. "Criteria Used in the Smith's Fork Project Study" UP&L SLC, September 1985.

6. Energy National Inc. "Cash Flow Model Smith's Fork Project", 1985.

BEAR RIVER COMMISSION
ENGINEERING COMMITTEE
Article V Paragraph No. "C"

DEPLETIONS

Introduction

Since the Amended Compact was unanimously approved by the duly appointed commissioners of the States of Idaho, Utah and Wyoming, there has been a need to quantify the water use by each state prior to January 1, 1976.

The commission has invested time and monies into two of the most important elements of this quantification, one being the "Base Map" of water use (Irrigated Acreage in the Bear River Basin as of the 1975 Growing Season) and the other being a Study of Crop Consumptive Use in the Bear River Basin.

Methodology to Finalize Base Map

The study "Duty of Water Under Bear River Compact", which is nearing completion, will give definitive data to the commission on water requirements for major crop types in different regions of the Bear River Basin, therefore, the engineering committee would recommend that the commission adopt a resolution to move as rapidly as possible to finalize the "Base Map" necessary to utilize the consumptive use data.

Three alternatives for completing a "Base Map" have been discussed by the engineering committee, and are listed in order of preference by the committee.

I) Geographic Information System (GIS) Approach using LandSat Satellite Data
(using 1975 growing season data tapes)

II) Geographic Information System (GSI) Approach using Landsat Satellite Data
(using 1980 growing season data tapes. Implementing data to work back to a 1976 base map.)

III) Manual Mapping
(using maps obtained by Commission for study done by Center of R.S.& C., University of Utah)

Implementation

The resources that are available to the commission to develop foundation data for calculation of depletion post January, 1976 are:

1) one state would be appointed as the central data processing organization. Individual states would work with the lead state to generate the data needed by the data processing state. Each state would be responsible for basic data production, but may not do any actual processing.

2) the individual states of Idaho, Utah and Wyoming could follow an adopted set of standards and accomplish their individual mapping and tabular data development. These data would then be joined either by one or more states or the data sets delivered to a contractor for final preparation.

3) The entire project could be contracted.

4) Any combination of the above alternatives may be used.

Figures 1 & 2 are a summary of these options with approximate costs and time table to complete the studies to provide the commission with operational data. Appendix 1 is a letter from the University of Utah Research Institute outlining one possibility under Alternative 3 with an explanation of Methods 1 & 3. The engineering committee would recommend that at a minimum the following uses be included and evaluated as described, in the final report prepared for the Commission.

1. Bear River Basin Boundary.
   a) recommend that the map of the Bear River Basin as established by the three states for the Bear River Basin Type IV Study, be used with some modification as needed.
      (Scaled to 1:100,000)
   b) outline 1976 corporate boundaries of municipalities and their service areas from which all expansions will be depleting on a per capita basis.
   c) all pre January 1, 1976 legal irrigated acreage will be displayed from which all new acreage can be computed.
2. Delineate all reservoirs and calculate surface area.

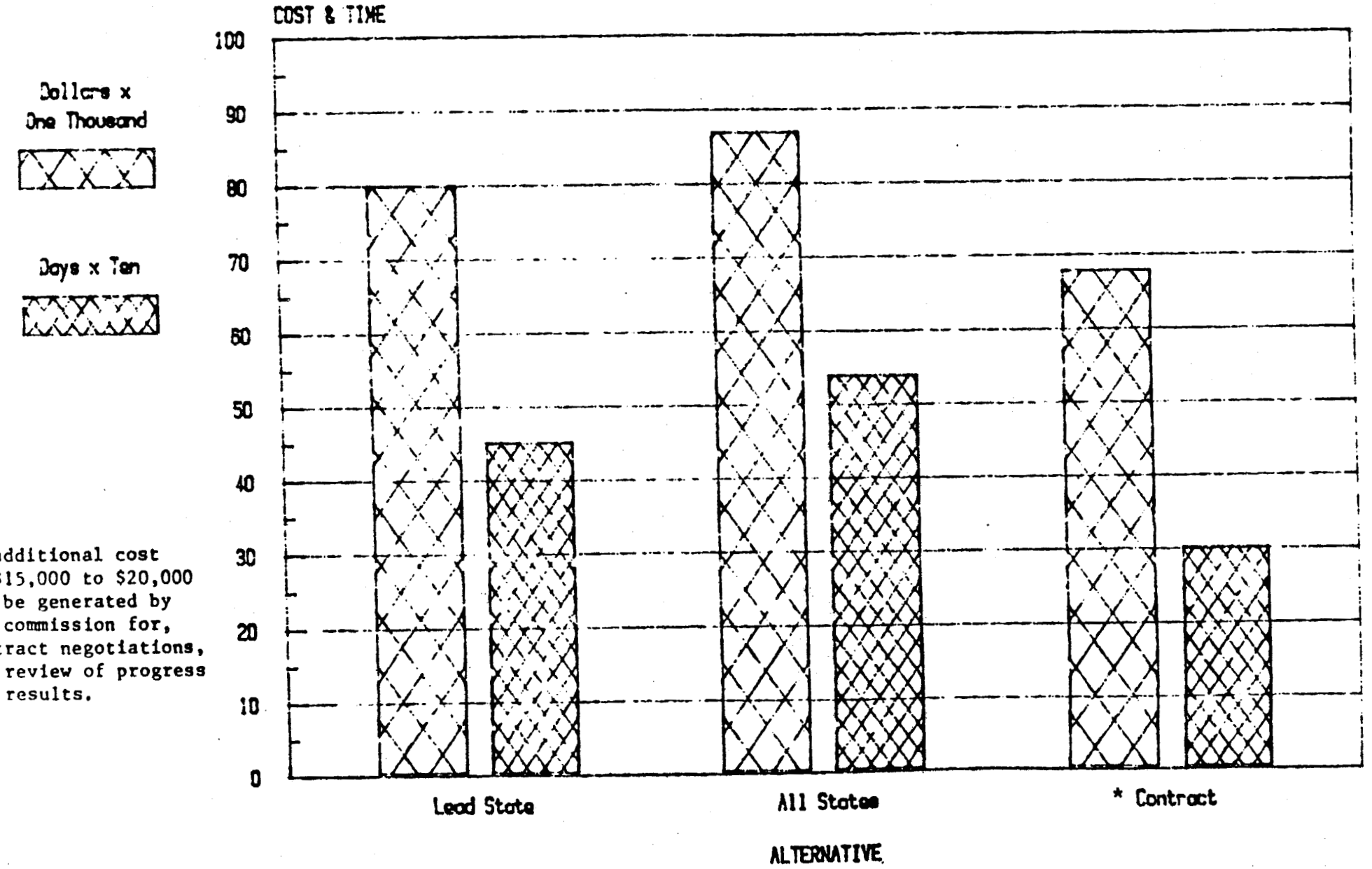
Discussion

The alternative chosen, to implement the methodology aready determined by the commission, should hinge closely on the accessibility of the data produced. The more comprehensive the data gathered and digitized, the more costly the study will be under any of the methods and alternatives chosen.

The engineering committee would recommend that the commission decide what the base map report must contain and send an RFP (request for prices) to the three states and other entities for exact prices; or to move ahead more quickly by choosing the method and alternative that is most reasonable in this report which would move the depletion study toward completion more rapidly.

Base Map Production Methods 1 & 2

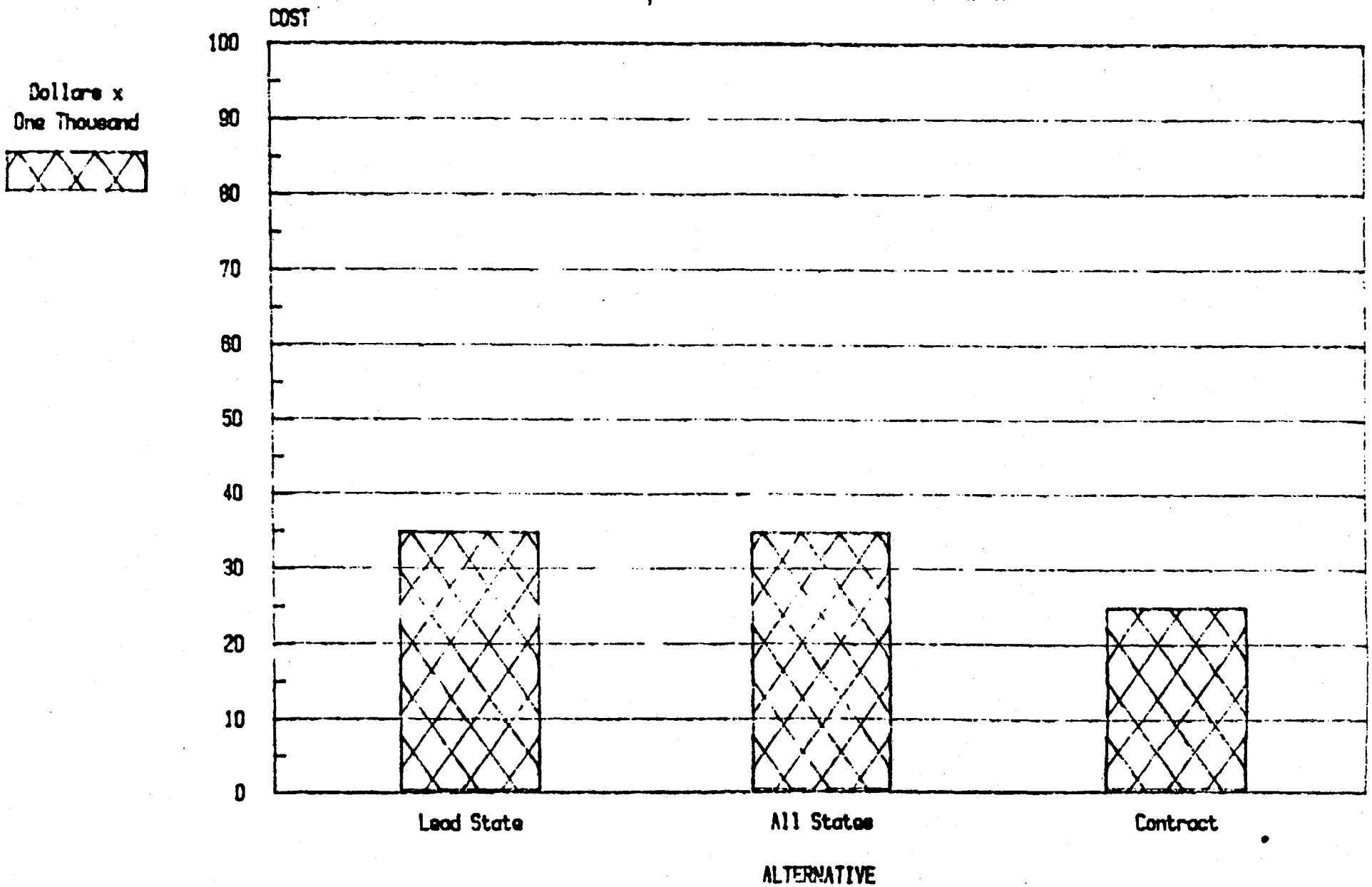
Comparison of Alternatives (FIGURE 1)



*An additional cost of $15,000 to $20,000 may be generated by the commission for, contract negotiations, and review of progress and results.

Base Map Production Method 3

Comparison of Alternatives (FIGURE 1)



APPENDIX 1

Letter from University of Utah Research Institute
Center for Remote Sensing and Cartography

UNIVERSITY OF UTAH RESEARCH INSTITUTE

UURI

CENTER FOR REMOTE SENSING AND CARTOGRAPHY
391 CHIPETA WAY, SUITE D
SALT LAKE CITY, UTAH 84108-1295
TELEPHONE: 801-524-3456

October 31, 1985

Robert M. Fotheringham
55 East 100 North
Logan, Utah 84321

Dear Bob:

Pursuant to our meeting on October 8, I have reviewed the circumstances of the Bear River Basin project and data needs with our staff. We are well aware of the importance of the information needed and the reliability of its accuracy. The first project we prepared at CRSC was based totally upon visual (manual) interpretation of Landsat images. We feel it was a solid first step. We carefully selected and analyzed three dates of imagery to assure "catching" all fields irrigated during the 1975 growing season. We delineated all irrigation delivery systems with the assistance of the respective conservation officers. We used available photography (color infrared) for backup. We field verified in so far as time and budget allowed. We are very familiar with the basin and very much aware of the problem areas.

We feel that three things could be added to assure greater accuracy and confidence: (1) higher quality imagery (as mentioned in the final report), (2) further field verification of questionable areas, and (3) digital satellite data use. Actually, we would recommend a combination of the three be invoked, if the Commission is desirous of investing in greater accuracy and confidence.

Basically, it comes down to two alternative approaches: (1) strictly visual/manual interpretation, or (2) digital interpretation, backed up by visual/manual. In either case, further field verification is recommended. And in either case, the first step, already completed, is a substantial foundation. All the images, all the work sheets, all the delivery system information, and all the field experience provide a solid base. Furthermore, the improved images mentioned in the report have been obtained and are in the CRSC laboratory. (These are the higher quality images processed here in Salt Lake City after EROS Data Center asserted that the ones they provided were as good as could be expected.) All of these things are in hand and will serve either alternative substantially.

Alternative 1: Manual/Visual Method. The procedure would be to access all the information from our laboratory as mentioned above, review the images, tables, and maps, and identify the problem areas, and spend the necessary field time to refine the interpretations and increase the accuracy. New tables would be prepared by township and section per county. New accuracy statements would be provided. The cost would be on the order of $25,000.

Alternative 2: Digital Interpretation Method. Two dates of computer tapes of Landsat data would be obtained over the basin. (One date would be risky because a crop may be in stubble and appear as non-irrigated on a given date. Three dates of digital data would add a few points of accuracy and confidence, but would run costs of data acquisition and processing up, probably unreasonably. The elevational range of the basin's irrigation patterns require at least two dates.) The digital data would be ordered, processed, and verified much as in the manual process, but with increased confidence from the digital data. Digital processing permits many enhancement opportunities within the computer, improving the simple visual interpretation of images. Still, the earlier interpretations and the imagery purchased in the first project (and especially the refined imagery obtained from Salt Lake City ASCS) all serve as workable backup, and extension of ground truth. The cost would be on the order of $65,000 to $70,000.

Sincerely,

Merrill K. Ridd

Merrill K. Ridd
Director

MKR:slb