[LR174 LR177 LR198]

SENATOR LOUDEN: (Recorder malfunction)...on this interim study for LR198, LR174, and LR177. The first one will be on LR198, this morning. First of all, I would like to make some introductions and some thank-yous. I wanted to thank Tom Gorman and his staff, and, of course, North Platte Community College, for allowing us to use its facility, and it's a very nice facility. I appreciate it. The senators in attendance today are Senator Norm Wallman, from Cortland, to my far right; Senator Annette Dubas from Fullerton; Senator Tom Carlson from Holdrege; Senator Gail Kopplin from Gretna; myself, Senator LeRoy Louden, from Ellsworth; and Senator Carol Hudkins, Vice Chairman, from Malcolm; to my left, Senator Deb Fischer from Valentine; Senator Mark Christensen from Imperial; and Senator John Wightman from Lexington is the senator from the area. We have Committee Clerk Barb Koehlmoos on the end down there, and sitting at the table to get ready to go is Legal Counsel Jody Gittins. Some of the rules: I would like to have you either turn your cell phones off or put them on silent so as not to have any disturbance in the hearing today. Those wishing to testify on a resolution should come to the front of the room when that resolution is to be heard. As someone finishes testifying, the next person should move immediately into the chair at the table. The green sign-in sheets for testifiers are on the testifier's table and need to be completed by all people wishing to testify, including senators and staff introducing resolutions. If you are testifying on more than one resolution, you need to submit a form for each resolution. Please complete the form prior to coming up to testify. When you come up to testify, place the form in the box on the witness table. Do not turn the form in before you actually testify. Please print, and it is important to complete the form in its entirety. If our transcribers have questions about your testimony, they use this information to contact you. If you do not wish to testify but would like your name entered into the official record as being present at the hearing, please raise your hand and we will circulate a sheet for you to sign. This list will be a part of the official record of the hearing. As you being your testimony, state your name and spell it for the record, even if it is an easy name. Please keep your testimony concise and try not to repeat what someone else has covered. If

there are large numbers of people to testify, it may be necessary to place time limits on testimony. If you have handout material, give it to the staff and they will circulate it to the committee. If you do not choose to testify, you may submit comments in writing and have them read into the official record. No vocal display of support or opposition to a resolution will be tolerated, and please relax and try not to be nervous. With that, legal counsel...okay, what? Oh, I've got to read this. We'll start in on LR198 as the fist resolution that will be heard, and Legal Counsel Jody Gittins will summarize it for us. [LR198]

JODY GITTINS: Good morning, Senators. My name is Jody Gittins, J-o-d-y G-i-t-t-i-n-s, committee counsel for the Natural Resources Committee, and introducing LR198 on behalf of Senator Louden. In developing the resolution, Senator Louden expressed concern that if we are to take a proactive approach, which is under LB962, in managing our river basins, that perhaps what we ought to do is examine what flow meters would produce in terms of good data in determining how much water is actually being used in each of our river basins prior to them becoming either declared overappropriated or fully appropriated, and right now there is no mandate that that be done. And in this resolution what we hope to hear is information regarding how flow meters could benefit all the river basins or if there are other methods available to the NRDs to gather the information necessary to determine their own water usage so that they're better prepared and don't have to be declared fully appropriated before they can take an action. And if there are additional tools that NRDs need in order to get this mission accomplished, we hope that they will come forward and present this information to the committee. That's the purpose of the resolution. And I'd be happy to answer any questions, but I think we have a room full of NRD managers who are going to tell us what they think about this proposition. [LR198]

SENATOR LOUDEN: Questions for Jody? Okay, thank you. I guess we're ready for the first testifier. [LR198]

JOHN TURNBULL: (Exhibits 1, 2, 3) I'll try to catch up on the green sheet here. I'm John Turnbull, T-u-r-n-b-u-l-l, general manager of the Upper Big Blue Natural Resource District at York, Nebraska, here today testifying on LR198, and I have a couple of handouts, Jody, when you get a chance. I'm passing out two things to you. One is a summary of what the natural resource district has done in the way of ground water regulations since 1977. And the other one is a newsletter that I don't expect you to thumb through today but you can take it with you and look at it. It's a little more comprehensive listing of things dealing with ground water management in our particular district. On the history sheet, which is a single sheet of paper, and you'll notice that the district established a ground water management area in December 1977, and that was with the approval of the Department of Water Resources at that time. We wrote several drafts of ground water regulations and went through 13 drafts before the board adopted a set. Those were put into place in March 1979, and have been in effect since then. We've amended those regulations nine times since they were initially adopted, and the last amendment was at the June board meeting. So about every three years we'll go back, when we need to, and take a look at the regulations, and make changes, as appropriate, to deal with the current situations. In our regulations, we do not require water meters at the current time, except on new and replacement wells. So when an individual applies for a well permit, that's a condition of the permit that that new well has to be metered. Our regulations go on to say that if the ground water level declines to a certain point, then meters and allocation are required. That's already in the regulations. The decision has been made and the debate is over. It's not a matter of trying to wrestle around to set up a set of regulations; they are already in place. So when the ground water reaches a certain level, the board passes a motion instructing staff to carry out the regulations, and we proceed. If you'll turn that history sheet over, on the back there is a chart that shows the ground water changes in our district since 1962 up to the spring of 2007. And some of you who were are the Water Task Force meeting yesterday, you probably heard my same explanation on that chart. But 1962 was before most irrigation wells were drilled in our district, and that's what that line going across from one side to the other is zero. That's sort of what we call the predevelopment line.

And the ground water level changed from downward from then until about 1981. The average rate of decline was about a half-foot a year. Then we ran into some wet years. We had an increase in ground water levels, and then a little bit of a dry period, and another increase, and it peeked in the spring of 2000. And you'll notice in the year 2000, that that was about 7 feet about the levels in 1962, and that is based on about 500 individual wells scattered through the district that we measure once each year, in the spring. You'll also on that chart that there are two lines below that zero line, and those are trigger points in our regulations. The first one, which is about 3 feet below the zero line, we hit last year's reading, the spring of 2006. According to our regulations, that required us then to begin the certification process for all irrigated acres in our district, and we now have that almost complete. We have 95 percent of the irrigated acres reported to us, and the board has certified about 84 percent of those. The rest are in process by the staff as we're doing the crosschecks. That's a total of about 1,150,000 irrigated acres, which is 15 percent of the state's total. So it's a huge part of the irrigated area of the state of Nebraska that we're dealing with. When it hit that line last spring, in addition to certifying acres, then that set into motion the part of the regulations that requires water use reports by all water users for the calendar year of 2007. So December 31, of this year, then we require all ag users to report to us their water use, which I think is one of the questions that the committee has raised, is what is the pumping that is going on? Now, we don't require meters for that water use report and there is not an allocation with it, but we want the individual farmers to, if they don't have a meter, to estimate what their water use is. If they do have the meter, then we want to know the meter, the model, the serial number, and what the readings are, because we need to know how many meters are in place, and we don't have a good handle on that yet. So those water use reports are no in effect for this calendar year. Then if that water level drops about another foot and a half from where it is today, it hits that bottom line, which I think is a series of diamonds across your chart. That is the point then where we require meters on all wells and we require allocation for all water users. And each year it depends on what the situation is with the weather as to whether we're going to hit that particular point or not. We just had some nice rains in our area in the last two or three

days. I expect that most of the irrigation is probably finished for this irrigation season, so I would be surprised if we hit that allocation trigger because of this year's pumping. If it would have stayed dry through August, I don't know. But we do know that that ground water aquifer will recharge if we give it a chance and if we manage it during dry times. As far as the meters go, we have been encouraging meters for a long time. I've been the manager of that district since 1978. Meters have been a very politically sensitive subject. There has been a lot of resistance to meters over the years because people have been afraid that if we put meters on, then there would be a water tax based on the amount of water they pumped. So there was a lot of pressure on the board for a great number of years not to talk about meters, not to require meters in our regulations. Then about four years ago we made it very plain in the regulations that meters are going to be there at a certain point and a certain time. The attitude of the public has changed quite a bit in the last four or five years on the use of meters and water regulations, and I think it has to do with these statewide discussions on water policy, drought conditions, and we've had a whole generation change in the last 25 years. So we've got a much different attitude that we're working with now than when I first started there. We tried a cost-share program on meters four or five years ago, and set aside $100,000 of our own funds to try to get some out there. We had two people apply for meters; that was it. Then when all the discussion statewide started about water and water shortages, we applied for an Environmental Trust grant. We were awarded that grant, and last year that's a $900,000 grant and that is strictly for cost-share on water meters. And that $900,000, we are using a third of it each year, so it's for the year we just finished, the current year we're in, and for the next fiscal year. All that money is spoken for now. Which is kind of interesting because five years ago we couldn't give it away, and now we don't have enough money to get them out there. We're cost-sharing $500 a meter, one per landowner. So that will fund about 1,800 water meters. We have 12,000 wells in the district, so that's maybe 20 percent of the total. Others have been put out there through other funding mechanisms, such as EQIP, Nebraska Soil and Water Conservation fund, cost-sharing, and our own NRD cost-sharing programs, plus folks have been putting some out on their own. So again I don't know how many we've got in

place, but by this time next year we should have a pretty good handle on that. We have required water use reports for certain cost-share practices in our district. Those water use reports are required for the Nebraska Soil and Water Conservation program, and that began in 1994. That was a requirement of the Natural Resource Commission, and that was in place until 2001, until some folks around the state were not turning those reports in, and the department and the commission shied away from enforcement procedures and enforcement actions, and so it dropped that requirement. We kept the requirement in place. We still require those people to turn in water use reports if they receive cost-share funds on irrigation practices, and we've had to enforce a few in order to get those reports in. The best enforcement is that we require them to come to the board of directors and explain why they didn't fill out that single sheet of paper, and almost all of them get filled out prior to the board meeting. It works pretty well. From that data, with that 200-some cost-share applications or more, we found, I think, a reasonable handle on how much water is being pumped, and it's less than what we had anticipated, and I thin it's a pretty good change from some prior years. Those water use numbers are, as an example, in our area, for gravity irrigation on soybeans, irrigation water applied for a five-year period was about 11 inches a year. Our average rainfall is about 28, if you need that for comparison. The pivot on beans was about 8 1/4 inches based on those water use reports. And then gravity irrigation for corn was about 15 1/3 inches; pivot for corn is about 9 inches, and that's through a five-year period. It changes a little bit from year to year, but we're seeing a lot of center pivots are able to operate easily on 8-10 inches of water. So that's what we've found out so far with the few water use reports that we've received. Now, those reports or the requirement for that has been dropped because now we're requiring all operators to do it, so we're not doing it through the cost-share program anymore, but through our ground water regulations. And I think that's most of what I need to tell. I think that as far as a statewide requirement for water meters, I'm not so sure that's the best way to go. I think that needs to be left up to the local areas to decide how it fits with their regulations. Some districts are requiring meters, as you know, and some of those other managers talk about that. Some are not. We're all set up to require them over a period of time as the conditions warrant. So

that's going to be an interesting discussion whether you should it do it statewide or not. [LR198]

SENATOR LOUDEN: Any questions for John? Tom. [LR198]

SENATOR CARLSON: Senator Louden. John, a couple of questions, and from talking to you and what I have listened to, I'm impressed with the organization and the manner in which you seem to go about doing thing. In that water use report, what is asked? [LR198]

JOHN TURNBULL: We're asking them, their water use, by field, by type of irrigation system. In other words, is it a gravity field? Is it a pivot field? And how much water was applied during the season? [LR198]

SENATOR CARLSON: So with the percentage of meters that you have, that's got to be an estimate, doesn't it? [LR198]

JOHN TURNBULL: The other folks are going to have to estimate it. And we have sent out a letter advising them as to how they can make those estimates. And folks who have resisted meters for years are now calling in, saying, that's a lot of work to do it that way; wouldn't it be easier if we put a meter on? We said, yeah, it sure would be. Do you have cost-share? No, it's all spoken for. So...but, yes, there are going to be some estimates. But I think even the estimates help, because it gets people used to thinking about how much water they're pumping. [LR198]

SENATOR CARLSON: Well, and as I'm asking you these questions, I'm going to embarrass myself because on our pumps we don't have meters yet, and yet I'll go up to somebody and ask them how much water you use, and I expect an answer. And then I think, if you can't answer me, what's wrong with you? Well, they would have to turn around to me; I'd have to say, I don't know. I hope we're using less than what we used

to. But when you go to, if the allocation is triggered, again without ever being metered, that becomes an estimate, doesn't it? [LR198]

JOHN TURNBULL: Well, but in our rules and regulations, when we go to allocation, meters are required, so then it will be metered at that point. And our rules say that if you don't have a meter, you won't get an allocation. [LR198]

SENATOR CARLSON: Thank you. [LR198]

SENATOR LOUDEN: Other questions? Senator Dubas. [LR198]

SENATOR DUBAS: Thank you, Senator Louden. Thank you, John, and I think maybe you gave us this information and I missed it: How many wells are metered right now? [LR198]

JOHN TURNBULL: It's strictly an estimate. I would say probably about a fourth or a third, but I'm not sure of the total. [LR198]

SENATOR DUBAS: Okay, so if you hit this allocation point and you're going to require everybody, are they going to be able to get those meters in, in a timely manner, so they can get their allocation? [LR198]

JOHN TURNBULL: Well, we hope so, because we've been advertising this fact for some time, that they're going to be required at that point, and we continue to encourage people to get them out there, and we make it known that if you don't have the meter, there won't be that allocation to them. So we're trying to give them the help to get them; we're trying to get the courage to get them; we're trying to use education procedures of how the meters can help them, in addition to just meeting the regulation requirement. It's a multipronged effort to get this done. [LR198]

SENATOR DUBAS: And what's the cost of a meter? [LR198]

JOHN TURNBULL: Most of them are running $1,000 to $1,300 for the meter. The ones that are running into some difficulties where they'll have a buried line coming off of the well going out to, say, a center pivot, and they haven't allowed enough space between the well and where the Z goes underground and so they're going to modify that at some expense to get a meter in, we have approved some meters that will work in a much shorter distance of pipe. They are electronic meters. They are much more expensive but it's easier for the installation side. We do require that before a meter is sold in our district, that it meets the board's approval and is approved according to our regulations. They have to meet certain accuracy requirements and so on. [LR198]

SENATOR DUBAS: So is there any possibility of not being able to get a meter? I mean, if (inaudible) a demand for meters, is there any possibility of a shortage? [LR198]

JOHN TURNBULL: Sure, there's that possibility, particularly if you mandate a statewide requirement and then we hit our allocation point. So it's a matter of timing, how do we get this done in the districts that are going with meters. [LR198]

SENATOR DUBAS: Thank you. [LR198]

SENATOR LOUDEN: Other questions? Senator Wightman. [LR198]

SENATOR WIGHTMAN: I don't know if I'm entitled to ask questions because I'm not a member of this committee, but... [LR198]

SENATOR LOUDEN: Oh, you're entitled to ask questions. [LR198]

SENATOR WIGHTMAN: I listened to the debate yesterday about meters, and can you tell me what the accuracy of meters would be as opposed to just determining the hours

of your well operation times the pumping capacity of your well? [LR198]

JOHN TURNBULL: Well, we think they are more accurate. We require them to be, the accuracy to be plus or minus 2 percent, and that's the manufacturers have met those requirements. We find a lot of wells in our district where the pumping rate of that well will change throughout the season. We have a third or a half of our district that is artesian aquifers, confined aquifers. And as the pumping begins in the spring, the well capacities will be relatively high, 700-1,000 gallons a minute, and by mid-August those capacities in some of the more critical areas are down to 300 gallons a minute. So which rate is the individual going to use to work with his hour-meter on the engine or the electric meter? [LR198]

SENATOR WIGHTMAN: We also heard discussion yesterday about consumptive use as opposed to actual pumping,... [LR198]

JOHN TURNBULL: Yes. [LR198]

SENATOR WIGHTMAN: ...the gallons actually pumped. Can you fill me a little bit on the consumptive use and how accurate a figure that is? [LR198]

JOHN TURNBULL: I'm not a consumptive use fan, as most of my partners in this room realize. They haven't made a consumptive use meter. How do we explain to a landowner or to a farmer that he's going to get 8 inches of consumptive use during the years, and he's pumping 15. So how do you compute the difference? How do we know what he's doing? If you don't go with allocation, then the other approach is to use an acres reduction to control water use. Our boards chose to go with allocation rather than reducing the number of acres. So that's a difficult one. There is, in the work that the department has done, the Department of Natural Resources, with the fully appropriated basin determinations and that criteria, has come up with a map that goes statewide that shows general crop needs or consumptive use, say, like for corn production. In our area

it's about 8 inches, I think--7 or 8 inches. But again, it's a calculation, unless you use ET gauges and amp meters and those kind of systems, it's hard to determine. [LR198]

SENATOR WIGHTMAN: One other question, John. You talked about getting a grant that you use during the course of the year. Then do you make an estimate of how many people are going to apply, and determine the percentage that you're going to pay, and then when the money runs out, there's no more, or...? [LR198]

JOHN TURNBULL: Actually we set that cost-share rate and the percentage at the time we received the grant, right when we got it. We said we would go 50 percent, not to exceed $500, and a restriction of one per landowner, just to get a good distribution across the district. [LR198]

SENATOR WIGHTMAN: One per landowner. [LR198]

JOHN TURNBULL: One per landowner. [LR198]

SENATOR WIGHTMAN: So if you had six wells, you would only get one. [LR198]

JOHN TURNBULL: That's correct. Because we have 12,000 and about 5,000 operators, so we can't cost-share on all those wells, and the Environmental Trust rules are that if there is something that is required, then the grant does not apply. So when we go to allocation, if there is any of that money left that hasn't been spent, that no longer can be used. And that's okay because we need to encourage people to get those things done prior to the regulatory point. If they wait until the last minute, then I guess the cost is on them. [LR198]

SENATOR WIGHTMAN: Thank you. [LR198]

SENATOR LOUDEN: Other questions for John? I would ask a question or two. Well, I

think, yeah, I think you're doing quite well with the management of your district. I guess some of the questions I would wonder, the way it looks like we understand your graph then, when your level has dropped 7 feet below the 1961 level, then you will be triggered to do something. And you're down about 5 feet now, is that pretty close to correct? [LR198]

JOHN TURNBULL: Yes, that's pretty close. And the board's goal, an objective and regulations, is that is says have a sustainable production of the aquifer. So it's not to let it get worse than it was in 1978. [LR198]

SENATOR LOUDEN: Yeah, and that was the worst it had ever been... [LR198]

JOHN TURNBULL: That's correct. [LR198]

SENATOR LOUDEN: ...and that's what you're using as a guideline now. In 1978, did that dry up the creeks when it was down to that level? Or what happened on any surface water? You have surface water in your area... [LR198]

JOHN TURNBULL: There's a little bit of surface irrigation by individual pumpers out at some of the rivers or reservoirs. It's less than 30,000 acres out of the 1,150,000, so it's a very small part. And most parts of our district, the ground water and the streams are not connected. The aquifer is much deeper than the bed of those rivers or streams. [LR198]

SENATOR LOUDEN: How deep do you drill your wells? [LR198]

JOHN TURNBULL: Well, we've got about 80-100 feet of windblown loess material before we get to the top of the aquifer, in most cases. And then that aquifer varies in depth from 50 to 400 feet. [LR198]

SENATOR LOUDEN: By that 80 feet of loess material, then that what seals your surface water from your aquifer, is that what you're telling me? [LR198]

JOHN TURNBULL: Well, and there's also silt layers in those riverbeds that's been washed in over time, and has fairly well sealed then off in most places. We're doing a detailed study of the Blue Basin, with the Lower Big Blue and the Little Blue NRDs, and part of that study is we hired the conservation and survey division of the university to come out and do actual drilling in those riverbeds and stream beds to test the connection between the surface water and ground water. And in the western part of the district, the western half, there just isn't a connection. [LR198]

SENATOR LOUDEN: I guess my concern was, is if you let it get down to that 7 feet below the 1978 level, if you're streams will still be running, I guess. But you seem to think there is no connection, so it should... [LR198]

JOHN TURNBULL: Not in most parts of the district. Some places, it is connected, but most it is not. [LR198]

SENATOR LOUDEN: Okay. Then, I think you answered most of my questions on your meters, how you are setting it up. Do people nowadays then, you said 5 years ago you couldn't hardly give them away, and now all the money is gone. Has there been a different mood change on how water should be handled in your district as far as the average farmer out there? [LR198]

JOHN TURNBULL: Well, I think most of them are trying to figure out how to use less water. And the main thing that's driving that is the price of fuel. [LR198]

SENATOR LOUDEN: That was my next question: What is driving that thinking now? [LR198]

JOHN TURNBULL: It's fuel cost. Fuel costs is probably the overriding thing. [LR198]

SENATOR LOUDEN: Okay. [LR198]

JOHN TURNBULL: But there are more and more of them that are looking hard at how much water do they need to get a good yield and at what point can they cut off irrigation and ensure themselves of a good crop. And we're doing demonstration project where we just water in the month of July. We wait until the first of July to start irrigating--that's the gravity systems--and we cut it off the first of August, and our yields are very comparable to what the local folks are getting. [LR198]

SENATOR LOUDEN: Now, as I look at your graph, there's kind of a steep decline for the last five years in the lowering of your water level. When will you measure here for this year to fine out if that's leveling off or is that still taking a nosedive? [LR198]

JOHN TURNBULL: We'll measure those wells starting in March, and finish them up in April. And we measure...we try to measure each well within two or three days on the calendar of the previous year's measurement. And those water levels, once the pumping stops in a cycle, let's say the first part of September, then that water level generally will increase through the winter months, and it reaches its peak about May, about the time that some folks start to water some corn to get it up, and that's why we measure at that point. If we measure during the summer season, particularly in those confined aquifers, we see a real change in the pressure head. In other words, when they start pumping we get a reach sharp draw-down in those wells in those artesian conditions. As soon as they shut the wells off, we get a real sharp increase in that head pressure, and so we don't get an accurate measurement of the actual water level itself. All we are doing is measuring the local draw-down curve at the wellhead itself. [LR198]

SENATOR LOUDEN: Now, when you are talking about artesian recovery or whatever, that was going to be one of my questions, is how does that recharge in your area when

you say it comes up in the wintertime, where does that recharge come from, if the surface water isn't connected? [LR198]

JOHN TURNBULL: Well, it's not connected in the riverbeds because of the silt layers in the riverbed, but we think there is a fair amount of recharge coming through those windblown loess materials out through the fields. [LR198]

SENATOR LOUDEN: Okay. [LR198]

JOHN TURNBULL: We don't have real good answers. [LR198]

SENATOR LOUDEN: In other words, you don't know where your recharge is coming from, for sure, because you probably pumped a lot more water than what was rained or snowed. Would that be a...? [LR198]

JOHN TURNBULL: I don't think so. [LR198]

SENATOR LOUDEN: You think it rains and snows enough to recharge your...? [LR198]

JOHN TURNBULL: I think so because what we did several years ago is we took a look at five weather stations throughout the district, at Aurora, York, Seward, Geneva, and Osceola, and we look at the long-term rainfall at those gauges from the 1940s up till about 2003 when we did the work, and compared the change in the rainfall. If the average is 28 inches a year, and let's say it rains 25, then we took the chart down three inches. And if the next year, if it rains 28, then that was a level line. If it rained 31, and it went up 3 inches, back to the point at the beginning. So we did a change in rainfall chart to match that chart you have in front of you which is a change in ground water levels, and the two graphs lay right over the top of each other. It's a pretty close match. [LR198]

SENATOR LOUDEN: Have you checked the age of the water that you are pumping in these irrigation wells? [LR198]

JOHN TURNBULL: No, we have not. [LR198]

SENATOR LOUDEN: Because if it's rainfall, it would be fairly new water then. [LR198]

JOHN TURNBULL: Could be. [LR198]

SENATOR LOUDEN: Do you intend to do any testing for the age of the water down in your aquifer that you pump? [LR198]

JOHN TURNBULL: I don't...no, we don't have any plans right now. [LR198]

SENATOR LOUDEN: Is that hard to do? [LR198]

JOHN TURNBULL: Well, it's expensive. USGS would love us to do it because they would like a grant to do the work. [LR198]

SENATOR LOUDEN: Okay. It's that expensive? [LR198]

JOHN TURNBULL: Yes, very expensive. [LR198]

SENATOR LOUDEN: Because I know in our area, why, there is a lot of that water, they have to find out the age of the water to find out where our recharge is coming from. And some of it... [LR198]

JOHN TURNBULL: Well, those are good questions and we don't have good answers. All we're doing is setting our regulations to try to control that decline and try to manage it so we can recover in good times. And I think that's what we need to concentrate on in

the short run. [LR198]

SENATOR LOUDEN: Okay. Any others? Thank you, John. Any other questions? Senator Kopplin. [LR198]

SENATOR KOPPLIN: Thank you. Do you recall who at the university did your connection studies? [LR198]

JOHN TURNBULL: Xun-Hong Chen at the conservation and survey division. [LR198]

SENATOR KOPPLIN: I didn't catch that. [LR198]

JOHN TURNBULL: Xun-Hong Chen, and I can't spell that. [LR198]

SENATOR KOPPLIN: That's all right. (Inaudible.) Thank you very much. [LR198]

JOHN TURNBULL: Ann Bleed knows how to spell it. I don't. He's been there quite awhile and has worked with a lot of ground water studies. [LR198]

SENATOR LOUDEN: Any other questions for John? [LR198]

JOHN TURNBULL: I just have one other document I'll leave with your staff, and it is a complete set of our regulations. And I'm not going to pass that out to all of you because it's good bedtime reading, but at least you will have it for your records in case somebody needs to know something specific. [LR198]

SENATOR LOUDEN: Okay. Any questions then? Thank you, John. Thank you for your testimony. [LR198]

JOHN TURNBULL: Thank you. [LR198]

SENATOR LOUDEN: At this time I would like to make note that Senator Tom Hansen from North Platte has joined us here at the table, and also that we do have some agency people here today: Ann Bleed, the director of Natural Resources; Ron Theis, the attorney for the director of Natural Resources; John Erickson from the Governor's Office; and Nate Donovan from Game and Parks. We welcome them here today. Thank you for coming. And our next testifier. [LR198]

RON BISHOP: (Exhibit 4) Senator, members of the committee, my name is Ron Bishop and I'm general manager for the Central Platte Natural Resource District. I had a chance to visit with some of you yesterday, and so I don't want to repeat what I said yesterday. There are some other things that I would like to bring to your attention. Across the state when we talk about regulating ground water for supply, there are more than one approach. You just heard John talk about allocation program and when that comes into place they'll need meters in order to carry out that allocation program. If you were to tour down in the Republican Basin, they also have an allocation program where operators are granted so many inches of water per acres per year. The other approach, the approach that we used in the Central Platte Natural Resource District and some of the other districts use, is by regulating acreage. You cut down on the water by reducing the number of irrigated acres. In our natural resource district, the Central Platte, we have about a million acres that are under irrigation. We have about between 17,000 and 18,000 irrigation wells. And we have chosen to go, since back in 1988, with an acreage reduction program once we get ground water declines that hit trigger levels. Then we would initiate a program where we reduce (inaudible) every operator's irrigated acres by a uniform percent. It might be 5 percent, might be 10 percent. And we have chosen to manage that way, first of all, because we feel that's more equitable among the irrigators, and secondly, because of the costs. If we were to go to an allocation program, initially we would have to spend $19 million just in our natural resource district to put meters on those 17,000-18,000 irrigation wells. Additionally, the meters aren't going to do any good unless you have somebody to read them. And so to read them, we have

calculated that we would have to hire 17 additional people to read those 17,000 meters across the district every year. And meters have a tendency to wear out and break down and become nonfunctional, and so you have to have some kind of a maintenance program. The best programs that the districts that have meters and have allocation programs have found is that if they do it themselves to make sure that they're done right and done in a timely manner, and so that would require us to hire also another probably 5 or 6, perhaps 7, additional people just to maintain those 17,000 meters. We can do the management program by cutting down on acres much easier, much cheaper, and we feel that's the appropriate way to handle it within our natural resource district. And I think there are several of the other districts across the state that are either adopting or have adopted a similar type program, going to managing access instead of allocating inches of water per year. We do have a program where we meter the amount of water pumped, and that is a useful program for water quality in our district. We, however, have chosen another route other than flow meters to do that. We have about 700,000 acres within our district that is high in nitrates. And that ground water is high in nitrates and provides part of the nitrogen needs for the crops, so it's important to know how much is applied to every field; not how much is consumed, but how much is applied, because you're applying nitrogen along with that water. And so we require, on that 700,000 acres, that they know how much they pump each year, and that's part of an annual report that they all submit to us. And so we have annual pumpage records already on some 700,000 acres across the district, but instead of the meters, we have acquired, as a district, we've acquired ultrasonic flow meters. We go out and measure the capacity, and across most of our district those well capacities stay pretty uniform. But in the middle of the season, not when they first start or not when they're ending but in the middle of the season, we go out and measure the capacity of those wells, and then require them to keep track of how much time those wells are running. We've checked these meters out with the university, and they check out less than 1 percent difference from the testing material that the university, or testing equipment that the University of Nebraska uses to test them. So they are extremely accurate. On the wells across our district, probably close to 70 percent are electric wells, and so we have worked with the

power companies, and they provide, at the end of the season, the number of hours that those individual wells run. And so by combining the capacity in gallons per minute with the hours that they run, they can calculate how much is pumped. That is useful information for them and it's useful information for us, because in that case total amount pumped is important. On the water quantity side of it though, we've opted to go another way, and regulate by acres because we don't feel that the amount pumped gives us the information we need for managing ground water supply. The important thing in ground water supply is, of that amount pumped, how much was consumed by the crop, how much evaporated from the fields, and how much ran off. We already have those critical answers based upon studies that the university has done, and part of our COHYST ground water model. That information is available for every type of soil across our natural resource district. And so the total amount pumped from a quantity management standpoint doesn't do us any good. Most of the water pumped that isn't consumed by the crop, ends up back in the aquifer, and so it doesn't have an impact on the overall, long-term water supply. The critical thing is the consumed amount, for us. In our district, we're a little different than many of the other districts. You heard John talk about 80 feet to water, and then water being 50-400 feet deep from there. In the bulk of our district where our irrigation is, it's anywhere from 3 to about 28 feet to water. And then our aquifer is below that. And so there are a lot of differences across the state of Nebraska between ground water aquifers, ground water supplies, irrigation techniques, and what is needed to properly manage those different situations. And so I would urge you to leave the law as it is that allows those districts where flow meters are necessary, where flow meters are needed for an allocation program, I think we should leave that alone. But don't impose flow meters on every irrigation well, every high-capacity well across the state, because it's a burdensome expense. Just in our district, $19 million just to get us set up. With that $19 million, we could spray, chemically control, invasive species on the Platte River every other year for the next 75 years. That's the kind of benefit we could get out of spending that kind of money on something that will really have an impact on our water supply. With $19 million, we can go out and acquire water rights from individual owners that will move our district from overappropriated back to fully

appropriated. That's a much better use, a better, wiser use, of $19 million in the Central Platte area. So I hope you will take that into consideration when you discuss whether or not to introduce legislation that would require those kinds of flow meters all across the state. I do thank you for your time, and I'll be glad to try to answer any questions that any of you might have. [LR198]

SENATOR LOUDEN: Questions for Ron? Senator Wallman. [LR198]

SENATOR WALLMAN: Thank you, Chairman Louden. I guess regarding consumptive water to recharge the aquifer, how long do you think that takes? [LR198]

RON BISHOP: It depends. Across our district we do have studies where we have seen, for example, spikes in water levels, spikes in chemical constituents of the water after a rain, that show up within three or four days in some parts of our natural resource district. So we're a lot different than John where he has got 80-100 feet to water. We're a lot different than some of the Republican areas where they've got a lot more distance to water. Our water table is up fairly close, and so if we get heavy rains or we get overapplication of irrigation supplies, we see the impact within a matter of days, in some locations; weeks, to months, in other locations. Certainly a lot less than many other areas across the state. [LR198]

SENATOR WALLMAN: But then also do also, in regards to water quality, I live in the Nemaha and Blue (inaudible). [LR198]

RON BISHOP: Yes. [LR198]

SENATOR WALLMAN: And I know in my...I think there's two places where (inaudible) Lower Big Blue (inaudible) from (inaudible), around the gravel pits, and stuff. But is the nitrate level stabilizing or getting higher? [LR198]

RON BISHOP: With our program, we've had a water quality program since 1988. When we started, that area that's high in nitrates had an average nitrate level of 19 parts per million--a little over 19 parts per million. Since we initiated our program, and at that time, at '88, it was going up a half a part per million per year. So it was on the increase. Since we've initiated that program, we've turned that around, and the trend now is going downward, and we're down somewhere between 15 and 16 parts per million, nitrate levels. We're not down below the 10 where we need to be but at least we've stopped that upward trend and we're going down and the program is working. So we think it's been successful. [LR198]

SENATOR WALLMAN: I know we have the same problem in the Nemaha, you know, like one of the villages (inaudible) had to put in a nitrogen treatment plant. [LR198]

RON BISHOP: Right. [LR198]

SENATOR WALLMAN: And they're not very happy with the farmers (inaudible) that. [LR198]

RON BISHOP: Yeah. [LR198]

SENATOR WALLMAN: Thank you. [LR198]

SENATOR LOUDEN: Senator Kopplin. [LR198]

SENATOR KOPPLIN: Thank you. Do you have any idea how much you are spending now on spraying on the Platte and buying back water rights? [LR198]

RON BISHOP: Yes. We've...this is really the first year, Senator, that we've started the program. We've got $30,000 in our budget to do some cooperative research work, working with Game and Parks and some other groups on seeing how that can be

controlled in the Dawson County area this year. We hope to expand that program, and through the task force that has been established, the Legislature established, I hope we can see some other things going on our in the area. But it's just in the infant stage. As far as acquiring water rights, this... [LR198]

SENATOR KOPPLIN: Well, I was referring, and I might have heard you wrong, you were referring to if you didn't have to spend $19 million for meters, how much you could put into these others. And I was just curious. [LR198]

RON BISHOP: We're putting $1.5 million in this year in acquiring water rights, because based upon LB962 and subsequent legislation, we have to get our district back from overappropriated to fully appropriated. And then we also have to offset all of the new depletions caused by expansion in municipalities, whether it be population or industry or commerce or whatever it is. And so we're going to have to acquire some water rights in order to offset those depletions, and so we're starting this year with $1.5 million. [LR198]

SENATOR KOPPLIN: Okay. Thank you. [LR198]

SENATOR LOUDEN: Senator Fischer. [LR198]

SENATOR FISCHER: Thank you, Senator Louden. Thank you, Mr. Bishop, for being here today. You mentioned that annual reports are required. Is that on all of the acres, 700,000 acres that are irrigated within your NRD? [LR198]

RON BISHOP: We require annual reports on every acre that is within a phase, what we call a phase 2 or phase 3, which is the higher nitrate level areas. Yes. So every farmer has to submit a report to us every year that contains information on how much water he applied per acre on every field, how much fertilizer was applied, what his...he has to take soil tests, he has to take water tests, how much nitrate was in the soil, how much nitrate was in the irrigation water that he applied, those types of things. [LR198]

SENATOR FISCHER: On your 17,000-18,000 wells, how many of those irrigators make these reports? [LR198]

RON BISHOP: Of the 17,000-18,000 well, we're probably...that are is probably looking at probably a little over half of those. [LR198]

SENATOR FISCHER: Also, you were saying that you felt it was better to manage acres instead of allocating the water, so that in your NRD you felt the way to manage this would be to cut back on acres rather than to put meters on water. Is that correct? [LR198]

RON BISHOP: That's correct, in our district. [LR198]

SENATOR FISCHER: In your statement, you talk about the different soil types in your districts, and you say, all of which are capable of raising 220 bushels, or more, of corn, but their use of water differs. You have one example where four inches returns to the aquifer; another example where 12 inches would filter back into the aquifer. If you're managing acres in order to manage your water resource, how do you determine, then, which acres are going to be cut back? Are you going to cut back on the acres that only four inches returns to the aquifer or are you going to cut back on acres where 12 inches returns? [LR198]

RON BISHOP: Both. [LR198]

SENATOR FISCHER: How do you determine that? [LR198]

RON BISHOP: We try to treat everybody the same, equitably and equally, so that if all of you were farming within our natural district, and we needed to reduce consumption, we would start perhaps at 5 percent, and say, all right, everybody who farms reduces 5

percent of your irrigated acres. And that would be regardless of what type of soil, because in the end it's how much the corn consumes, how much of that water is consumed. So by cutting back 5 percent, we should reduce consumption by about 5 percent. [LR198]

SENATOR FISCHER: Okay. And one last question. The previous gentleman that was up said that wells and streams, for the most part, were not connected within his NRD. I have parts of seven NRDs in my legislative district, yours being one. Do you believe that wells and streams are connected or not connected in your NRD? [LR198]

RON BISHOP: We have both cases, where some of the streams are connected with the aquifer, and so as we pump water we can tend to dry up streams. Other areas, the stream sits up above the aquifer and so it's not connected, and so pumping doesn't necessarily impact the flow in the stream. [LR198]

SENATOR FISCHER: Do you know what percentage that would be where ground water irrigation pumping does not affect stream slow, what percentage that would be in your district? [LR198]

RON BISHOP: Well, to a certain extent most all of the pumping in our district has some. Sometimes it's pretty miniscule, but has some impact on the Platte River even though there might be a stream close to the well that isn't impacted, but that pumping, nevertheless, over time, will likely have some impact on the Platte River itself. So it depends upon what stream you're talking about and what location. But generally speaking, most all of the wells in our district will, over time, have some impact on the Platte. But... [LR198]

SENATOR FISCHER: Can you say what...for certainty, do you have any data on what kind of impact that would have, or is that just the accepted knowledge that it will have some impact, over time, although you don't know what the impact is and you don't know

how long a period of time? [LR198]

RON BISHOP: We do have that information. [LR198]

SENATOR FISCHER: If you could get that to me, I would appreciate it. [LR198]

RON BISHOP: Absolutely. [LR198]

SENATOR FISCHER: Thank you. [LR198]

RON BISHOP: We've got the COHYST study that we and the state and the other districts and power districts have spent about eight years and about $8 million on, that, to answer that specific question. [LR198]

SENATOR FISCHER: And you would like somebody to read it, right? [LR198]

RON BISHOP: Yeah. [LR198]

SENATOR FISCHER: So, okay. Thank you very much. [LR198]

RON BISHOP: Sure. [LR198]

SENATOR LOUDEN: Senator Christensen. [LR198]

SENATOR CHRISTENSEN: Thank you, Chairman Louden. You said about 70 percent of your wells are electric. So with your ultrasound and your power records, you could basically pretty much fill out an amount of water pumped, then couldn't you? [LR198]

RON BISHOP: Yes. Yes, we could [LR198]

SENATOR CHRISTENSEN: So that would be one way of reporting that would work well for you. [LR198]

RON BISHOP: Yes. [LR198]

SENATOR CHRISTENSEN: Okay. Also on that, I guess I'm thinking from the farmer end of things, I look at if you had an allocation instead of acres reduction, if you are a very good manager, you could reduce the water across every acre and irrigate every acre and probably come out better a lot of years that reducing your acreage, having some dryland and some irrigated, and managing it that direction, having it unlimited over there. Aren't you...have you thought about allowing farmers to have a choice? Or I guess I just think they could better manage their own operation that way. Have you thought of using the power records and your ultrasound measurements and allowing them to have an allocation if they chose to go that direction, instead of reduction? [LR198]

RON BISHOP: We have thought about it, Senator, but we have chosen to go with the acreage reduction instead. We do work into that acreage reduction program, some management options for the farmers to use. For example, if we impose, say, a straight 5 percent reduction on all of you, as farmers within our natural resource district, that 5 percent reduction is based upon producing corn. If you choose to, instead of raising all corn, raise a combination of corn, soybeans, and wheat, we can adjust that and you may be able to irrigate 100 percent of your acres based upon the consumptive use of corn and soybeans and wheat, and comparing it to all corn. If the total consumption is the same whether you raise 1,000 acres of those crops, or 900 acres of corn, that's fine; you have that option. [LR198]

SENATOR CHRISTENSEN: So they have great flexibility there. [LR198]

RON BISHOP: Yes. [LR198]

SENATOR CHRISTENSEN: What do you use for consumptive use numbers on corn, beans, and wheat, then? [LR198]

RON BISHOP: It varies across the district depending upon the location and upon the soil type. For example, in the eastern part of our district, average annual rainfall is probably about 25-26 inches. As we get out to the western part of our district, that drops down to maybe 21 or 22. And so there is a variance just from rainfall across the district. And then there is some difference based upon soil type, too. But we have all of that catalogues all across our district for every field, every section of land within our district, what the consumption is for corn and for soybeans and for wheat and for other crops. [LR198]

SENATOR CHRISTENSEN: Now, consumptive use wouldn't vary according to soil type, would it? The amount that you need to apply might, but the plant is still going to use so much for a certain yield level, correct? [LR198]

RON BISHOP: Generally speaking, that's true, but there is some slight variation based upon soil types, and I don't...don't ask me to explain because I can't explain why, but we do find that there is some slight difference in the same location based upon soil types. [LR198]

SENATOR CHRISTENSEN: I guess I hadn't heard that before. I can see a plant should use about the same for... [LR198]

RON BISHOP: That's generally true, Senator. [LR198]

SENATOR CHRISTENSEN: Equal amount of production. It's just... [LR198]

RON BISHOP: That's generally true, but not always 100 percent. [LR198]

SENATOR CHRISTENSEN: Soil capacity hopefully would be different, so. All right. Thank you. [LR198]

SENATOR LOUDEN: Questions? Senator Hansen. [LR198]

SENATOR HANSEN: Thank you, Senator Louden. Ron, just to follow-up on Senator Christensen's question, corn is not all corn. We have popcorn, field corn, silage corn, late-planted corn, all kinds of corn. How does an infrared picture going to show what type of corn that is? And does the consumptive use differ on different varieties, or types of corn that was planted? [LR198]

RON BISHOP: Yes, it does. It does vary. When I was talking about corn, I was talking about just generally basic field corn. We do know what that is and what the consumptive use is for that. We still need to do some more ET studies, and it isn't done from infrared necessarily. We actually go out and, working with the university, do some specific studies on the evapotranspiration of various crops, whether it's grasses, whether it's tress along the river, whether it's corn or other crops. We do need to do a little more work on things like seed corn and popcorn to see how that compares with the information that we already have on regular field corn. [LR198]

SENATOR HANSEN: Thank you. [LR198]

SENATOR LOUDEN: Senator Carlson. [LR198]

SENATOR CARLSON: Senator Louden. Ron, again to follow-up a little bit, and I want you to help me understand the example that you gave here on consumptive use appears to the same for heavy soil to sandy soil. (Inaudible) started this program of reducing irrigated acres in 1988? When did you...? [LR198]

RON BISHOP: We adopted the program that set up trigger levels that if ground water levels dropped to a certain trigger level, then we cut everybody back by a percentage of their irrigated cropland. Yes. [LR198]

SENATOR CARLSON: And when did that start? [LR198]

RON BISHOP: We started that in '88. We have not hit the triggers yet, so we have not had to cut back on anybody at this point. [LR198]

SENATOR CARLSON: So over that 19-year period, you've got a program in place but you've not...it's not been implemented. [LR198]

RON BISHOP: That's right. We have not had to implement it. [LR198]

SENATOR CARLSON: Now, I've got a question. This is where I need some help understanding it. If it was true and you reduced 5 percent across the board, and let's just use a figure, so on my land I've been planting 30,000 seeds, you reduce me by 5 percent so I go up to 31,500, and we don't have allocation, so I get enough water on there to make it work, have I saved water? [LR198]

RON BISHOP: Good question, Senator. I can't answer that. If you didn't... [LR198]

SENATOR CARLSON: I don't think I have, but I... [LR198]

RON BISHOP: If you didn't save water, then next year you and your neighbors would be at 10 percent instead 5. [LR198]

SENATOR CARLSON: Yeah, I wonder if that isn't...wouldn't happen if it was triggered. Another thing is, and this isn't any criticism, I'm still hoping that somehow across the board we can have an incentive to save water that is a little bit above and beyond just

the cost of funding. And I'm not really seeing that anyplace. I hope that's something that we can work on. I'm not aiming at you. Thank you. [LR198]

RON BISHOP: You bet. [LR198]

SENATOR LOUDEN: Any other questions for Ron? Senator Wightman. [LR198]

SENATOR WIGHTMAN: Thank you, Senator Louden. Ron, thank you for being here and for a good testimony. Is Central Platte still in the expansion mode as far as total number of acres, 17,000 to 18,000? You said you hadn't reached the trigger point yet, but how does your acreage compare over the last five or ten years? [LR198]

RON BISHOP: Static. We imposed, back in 2003, before LB962 ever passed, we imposed a moratorium on new wells across a big part of our natural resource district, basically anything within about eight or ten miles of the Platte River. And then when LB962 was passed, the state came in and expanded...they imposed their own stay on new wells, but they also imposed a stay on new irrigated acres within that same area. That was in '04. Then in '05, our district came in and went out to our outside boundary and imposed a moratorium on new wells and new irrigated acres all across the district. So for the past three years, we have not had any new irrigated acres or any new irrigated acres that were allowed within the district, had to offset their depletion effect to the Platte River. And we've had no new wells unless they were... [LR198]

SENATOR WIGHTMAN: Replacement? [LR198]

RON BISHOP: Yeah. [LR198]

SENATOR WIGHTMAN: Another thing that factors in, in our area, in the Central Platte, is alfalfa, which in some areas doesn't go down and tap the water table. But in much of the Central Platte it does, is that correct? [LR198]

RON BISHOP: Absolutely. [LR198]

SENATOR WIGHTMAN: I assume we've seen quite a bit of land go out of alfalfa production in the last year or two with the higher price of corn through the ethanol use. Is that correct? [LR198]

RON BISHOP: Well, we saw the big drop in the number of alfalfa acres probably 10 or 15 years ago when the DHI plants pretty much phased out. There are still a few of them around but nothing like what we used to have. [LR198]

SENATOR WIGHTMAN: You sometimes consider those irrigated acres or (inaudible) irrigated acres, don't you, if they're...? [LR198]

RON BISHOP: Yes. A lot of those alfalfa acres were irrigated acres, and then as part of the rotation they just went into subirrigated alfalfa, and so we've certified irrigated acres across the district, and many of those alfalfa acres are certified as irrigated because they are, in fact, using more ground water than irrigated corn. [LR198]

SENATOR WIGHTMAN: I was going to ask that. Do they use more than corn? [LR198]

RON BISHOP: Close to twice. [LR198]

SENATOR WIGHTMAN: Thank you. [LR198]

SENATOR LOUDEN: I got questions, Ron, I guess. When you reduce that by 5 percent, this is where I struggle, and you talked about your percentage of your wells that were electric pumps, when you go out there and tell somebody you reduce his irrigated acres on that field by 5 percent, then does he just turn his pump on 95 percent, or how do you pump less water then? I mean, they can...sure they can reduce it, but they'll turn that

pump and they'll pump the same amount of water whether they're doing the whole field or three-fourths of it, won't they? [LR198]

RON BISHOP: No, they shouldn't, Senator. Generally, most of the farmers in the Central Platte Valley will farm anywhere from 600-3,000 acres, and so they will generally, what we would expect them to do, is pick out their poorest field and just stop irrigating those fields. It isn't 5 percent of every field. It's 5 percent of their irrigated operation within that management area. Now, I should point out that we do have our district broken down into about 22 or 23 separate management areas. And so when we would impose a acreage reduction on irrigated acres, it would be on that management area, and we would look at the ground water levels and whether the trigger were hit within that management area. And so if we get into some bad times and heavy use, we may have two or three or four of those 20 management areas that might hit the trigger. And so we would have acreage reductions, not across the entire district, but in those two or three or four management subareas. [LR198]

SENATOR LOUDEN: And you feel by acreage reduction you can control the use of less water, that's what you're telling me? [LR198]

RON BISHOP: Yes. [LR198]

SENATOR LOUDEN: By just having less acres. [LR198]

RON BISHOP: Yes. [LR198]

SENATOR LOUDEN: On your handout here, you talked about the amount of water that would infiltrate to the aquifer and how close you are and that sort of thing. Is that part of the reason you have such a nitrate problem? I mean, your NRD district, that Central Platte, probably has the biggest nitrate problem in the state of Nebraska, I guess. I have not looked them all over but there... [LR198]

RON BISHOP: We have the largest nitrate problem, yes. [LR198]

SENATOR LOUDEN: Yes. And... [LR198]

RON BISHOP: It may not be the most severe but it's the largest. [LR198]

SENATOR LOUDEN: Is that...? [LR198]

RON BISHOP: That's part of the problem. Yes. [LR198]

SENATOR LOUDEN: And can that be because they are pumping too much water and leaching too much of it down into the aquifer? [LR198]

RON BISHOP: That's because they were, yes, and that's why we require, in those areas, that they keep track of how much they apply to every field, every year. Because there, knowing the total amount pumped, is an important component of controlling how much water and nitrogen leaches back down into the aquifer. [LR198]

SENATOR LOUDEN: Now, do you...? Okay, then, what you're saying is, instead of using flow meters, you're using other methods to find out exactly how much water is being pumped. Now, and that is very accurate measurements. You say you've used devices that have been tested by the university, or something like that. [LR198]

RON BISHOP: Yes. [LR198]

SENATOR LOUDEN: Then, do you...? How do you control that or what kind of hammer do you use on those farmers? Do you use it by whether or not the nitrate level is going up or down, or do you tell them they can only pump a certain amount for that year, the next year, or what? Because everything you do is after the fact, isn't it? [LR198]

RON BISHOP: Yes, it is. We don't tell them how much they can pump. We tell them how they should pump based upon how much was in the water and how much is already in their soil. We tell them how much they should apply as far as commercial nitrogen fertilizer, and then we tell them how much they should pump, but we don't tell them what they can pump. We do tell them, however, that if they don't control it, they're going to move up into the next level, the next phase. And that next phase, there are more restrictions, more reporting that's got to be done, more requirements of them. And if they get to the final phase 4, in those cases we do tell them how water they can pump. We do tell them how much nitrogen fertilizer they can put on, and we do tell them a whole lot of things. And if they don't comply with that, then we take them to court and they're subject to a penalty, a fine by the court system that can be as much as $5,000 a day. [LR198]

SENATOR LOUDEN: In those areas where--your critical areas, I guess you would call it--have any of those owners put flow meters on their irrigation systems to see what they're doing, rather than using your method? Have they went...? [LR198]

RON BISHOP: Yes, there's a few that have. Especially when cost-share is available, there are a few that have acquired flow meters. I would say 5 percent. Maybe 5 percent of them. [LR198]

SENATOR LOUDEN: Do you have a cost-share program for flow meters in your...? [LR198]

RON BISHOP: Yes. [LR198]

SENATOR LOUDEN: How much money do you budget every year for that? [LR198]

RON BISHOP: I could only guess, Senator. [LR198]

SENATOR LOUDEN: I mean, is it a significant amount, or is it...? [LR198]

RON BISHOP: No, it isn't a significant amount because there hasn't been a significant demand. I would guess it's less than $50,000 a year. [LR198]

SENATOR LOUDEN: Okay. That's what I'm wondering, if you budgeted...if more money was available in grant funding, if more people would be willing to put them in when you have these hoops like you're talking about that they have to jump through? If that would be a labor saving or is it easier to do what you're recommending for them to do? [LR198]

RON BISHOP: It's easier for us to go out and do that, and then the power company keep track of the hours they pump. Or they buy a little $35 hour-meter, wrap a wire around the spark plug, and keep track that way, how much that pump ran. [LR198]

SENATOR LOUDEN: And at best, though, that's...I mean, it's an estimate, at best, usually, isn't it? [LR198]

RON BISHOP: No, I wouldn't classify it as a... [LR198]

SENATOR LOUDEN: You would be 98 percent accurate with your system? [LR198]

RON BISHOP: Yes, I think so. [LR198]

SENATOR LOUDEN: Okay. [LR198]

RON BISHOP: Ninety-five, or better. [LR198]

SENATOR LOUDEN: When you talked about...and I think Senator Kopplin asked about

if it costs you $19 million...the reason you say the $19 million, that's because you've got 17,000 or 18,000 wells. [LR198]

RON BISHOP: Right. [LR198]

SENATOR LOUDEN: It wouldn't cost you any more per well to put a meter on than it would up in the Upper Niobrara White or anybody else. I mean, the cost of the well is all the same, so when you say $19 million, this is just a way of, what, a big cowboy telling how many cattle he's got, is that right? I mean, it won't cost you any more per meter than anybody else, or any farmer on any other irrigation well. [LR198]

RON BISHOP: It's going to cost, either the natural resource district or the operators within Central Platte Natural Resource District, $19 million, if a law is passed that requires flow meters on every well. [LR198]

SENATOR LOUDEN: Now, let me ask you a question when you use that example. What's it going to cost those guys to put new bowls on their irrigation wells next year? I mean, the cost of the meter compared to the cost...and this a sidebar, I might say...but the cost of the meter compared to the cost of an irrigation well installation, the well, if they've got pivots, or whatever, is really an insignificant item compared to some of the other costs that have to be maintained on an irrigation well. Do you agree or disagree? [LR198]

RON BISHOP: Well, I wouldn't call $1,100 or $1,200, plus then annual maintenance, insignificant. Our wells don't cost as much as perhaps wells in your area because we don't have, you know, 100, 150, 200 feet to water. Our wells are a lot shallower, and so we can drill a well a lot cheaper than a lot of other places across the state. But, granted, it isn't nearly as much as drilling a new well. It isn't...if you have to go in and rehab the whole well, the cost of a meter is a lot less than rehabbing the whole well. But you don't have to do that every year either. So I just...in our district, we just don't see what we

would gain from having that information. There is more valuable information to us in managing the ground water supplies than knowing what the total amount pumped is. And if we want to know what the total amount pumped is, we can do it other ways other than requiring flow meters on every well. We can come up with that total amount pumped much easier and much cheaper than spending $1,100 or $1,200 for each one of those 17,000 or 18,000 wells that we've got. And so we would prefer to see that money used in a, what we think would be a more constructive way, a more beneficial way, for saving water, or getting us back into from overappropriated to fully appropriated, or cleaning up the invasive species out of the streams, and reducing the consumption. [LR198]

SENATOR LOUDEN: Then if you're saving all that money, are you going to go ahead and budget it then to do that, to use that money that you're saving? [LR198]

RON BISHOP: We're starting to. We're starting to budget money for $1.5 million this year for acquiring water rights to start moving us back to the fully appropriated out of overappropriated. We've only got 30,000 in there for spraying work, but that's because this is a pilot project here. I anticipate that we'll budget more money next year for both of those things than what we're budgeting this year. [LR198]

SENATOR LOUDEN: Okay. Thank you, Ron. Other questions? Senator Dubas. [LR198]

SENATOR DUBAS: Thank you, Senator Louden; thank you, Mr. Bishop. You said you haven't reached any of the trigger points yet to cause you to put some acreage reduction into place. [LR198]

RON BISHOP: That's correct. [LR198]

SENATOR DUBAS: Because you are overappropriated, has the moratorium helped you move towards being fully appropriated? [LR198]

RON BISHOP: No, actually we're overappropriated because of the impacts on the Platte River. We're not overappropriated because of ground water declines. We've had enough ground water use that it has impacted the Platte River and some of the water rights on the Platte River that has thrown us into the overappropriated status. But as far as ground water levels out there in Dawson County where we're overappropriated, ground water levels are probably the same as they were 20 years ago. [LR198]

SENATOR DUBAS: So by doing any acreage reduction, that wouldn't have an impact on the Platte River flow. That would only have an impact on the (inaudible). [LR198]

RON BISHOP: No. I'm sorry, I misunderstood your question. Yes, Senator, if we were to...well, and if we can't acquire enough water rights to offset the depletions to get us from overappropriated back to fully appropriated, our only other alternative is to impose restrictions and go in and cut everybody back 10 percent or 15 percent or whatever it takes to make up that shortage to the river. So it would have an impact, yes. [LR198]

SENATOR DUBAS: All right, thank you. [LR198]

SENATOR LOUDEN: Other questions? Senator Hudkins. [LR198]

SENATOR HUDKINS: Thank you. Ron, if you would get to the point where you would have to do the allocations, when would the farmer be informed of that? [LR198]

RON BISHOP: If we did the regulation and cut back on acres? [LR198]

SENATOR HUDKINS: Yes. [LR198]

RON BISHOP: We would inform them well ahead of the planting season. It would probably like late fall, early winter, so that they have an opportunity to make their

adjustments for the next planting season and the next cropping year. [LR198]

SENATOR HUDKINS: All right. Thank you. And also then, if you're going to buy back the surface water rights, how would that happen? [LR198]

RON BISHOP: Well, for example, we've started our water banking program and that's what the $1.5 million is for this year. One of the things that we're targeting is that as center pivots go in there's four corners on every center pivot that potentially is available to acquire and they would convert that back to permanent dryland operation. And so what we were proposing is to acquire a perpetual conservation easement on one, two, three, or four of those corners to convert it back to permanent dryland operation, no irrigation and no subirrigation allowed, and then we would pay them a fee for that perpetual conservation easement. [LR198]

SENATOR HUDKINS: A one-time fee? [LR198]

RON BISHOP: A one-time fee. [LR198]

SENATOR HUDKINS: And then since that ground, which used to be irrigated, is now going to be permanently dryland, is there going to be a difference in property taxes at the assessor's office? [LR198]

RON BISHOP: Yes. Yes, I would expect that as we take that off the certified irrigated acreage base, we furnish that information to the county assessor. And I would expect the counties then to change that from irrigated acres to dryland acres. [LR198]

SENATOR HUDKINS: Thank you. [LR198]

SENATOR LOUDEN: Other questions for Ron? Seeing none, since you've got your drink, Ron, thank you. [LR198]

RON BISHOP: Thank you very much for the time, and I'm sorry I took so much of your time. [LR198]

KENT MILLER: Good morning, and welcome to North Platte. I am Kent Miller. I'm general manager of the Twin Platte Natural Resource District, and our offices are here in North Platte, so it's nice to have you here in North Platte. The Twin Platte Natural Resource District is overappropriated, like Ron testified the Central Platte is. Unfortunately, probably the larger percentage of the shortage, getting back to '97 and potentially getting back to fully appropriated in the Platte River Basin, is probably within the Twin Platte NRD with the best information we have at this point. The Twin Platte NRD stakeholders have been meeting since March 2005. They have been meeting for over two years now. They meet monthly. Their desire at this point, and where we're...I think they'll be moving towards a recommendation is not to use allocations and not to require flow meters. And I wanted to share with you some of their thoughts and why they are progressing that way and therefore urge you not to mandate flow meters in the state of Nebraska. Our stakeholders believe that flow meters do not necessarily save water. In the Twin Platte NRD, the majority of our district is light soils, sandy soils. And if a producer overpumps what a crop needs, that water is going to return to the aquifer. It's not going to be lost. And even though we're pumping from deeper depths than what the Central Platte NRD, because of our sandy soils and the closeness to the top of the Ogallala Aquifer, they return fairly quickly. So if a producer is overpumping, they're spending money on energy that they may not necessarily have to spend, but they're not wasting water. Our stakeholders are more focused on the desire to reduce consumptive use, because that's a true savings of water and a potential true savings of returning water to the Platte River. Like the Central Platte NRD, we have not seen ground water declines in our district to trigger management. In the last two or three years, we have seen some modest declines. But up until the whatever time the drought started and we...that we were not seeing any declines in our district. The overappropriated is because of the LB962 and the effect of ground water pumping on surface water flows.

What our stakeholders are looking at is options to provide the maximum flexibility for water users in the Twin Platte NRD to reduce consumptive use and have a true savings of water that would result in real water back to the Platte River. And as an example, I'm going to throw this percent out. Ron used the percentage of 5 percent. I'm going to use my example, 17 percent. I don't know what we need right now to reduce...to get back to our share of the shortage. You know, the figures that have been talked about to get back to 97 is somewhere between 29,000 and 39,000 acre-feet. And a percentage of that is from the Twin Platte NRD and probably a larger percent of that is from the Twin Platte NRD. But our stakeholders would like the producers to have the opportunity to choose how they want to reduce their consumptive use. You know, one option would be allocations, if they choose allocations that would require metering. But metering and a reduction of allocations would have to be based on deficit irrigation. In the last two to three years, I've had many, many producers ask me, when are you going to require flow meters in the Twin Platte NRD; why don't you require flow meters tomorrow; we think flow meters would be a good idea. I say, okay, you understand that if flow meters are required, it's going to be based on (inaudible) required a deficit amount for deficit irrigation. In other words, you're going to have to reduce the amount of your consumptive use. You're not going to be able to put that 31,000 plants per acre or whatever figure you have. You're going to have to reduce. You're not going to get the 15 inches that you may need for a full 220-acre yield. You're going to get a reduced amount of water that you're going to either have to reduce your acreages or you're going to have to reduce your plants per acre. You're going to have to save water. They say, no, no, that's not what we mean. We just want flow meters so that then we can continue to do as we've been doing. But when you start talking about that there's...it would be required deficit irrigating, then they want to start looking at other alternatives to flow meters. And that's what our stakeholders are discussing. They're discussing the exact same thing that Ron relayed to you, and that's either a reduction in irrigated acres or a changing of cropping use. An example of changing a cropping use, we've had producers and our stakeholders say, you know, they're irrigating 2,500 acres of corn right now. They say, we would like to be able to make a determination on our farm to

reduce acres or to reduce cropping; we want to determine what's going to be the best financial benefit to us in making that change to reduce consumptive use. We understand we've got to reduce consumptive use. We might choose to do it through reduction of acres and taking corners out and putting pivots in. We may choose it, though, by a different cropping mix. We might choose, instead of irrigating 2,500 acres of corn, we might choose to prefer to use...irrigate 2,000 acres of corn and put 500 acres into wheat. And that would be their best bottom line. That would be their best opportunity to maximize their earning power on their land, by having that flexibility. The question then becomes, how do we monitor, how do we enforce a reduction of acres, a reduction of...or monitoring cropping plans? We think that that best method is through the use of aerial photography. Ron did not spend a lot of time talking to you about the use of aerial photography, but their district, if you will, pioneered the use of aerial photography, using infrared, low-level photography. Initially it's being used in our district and in their district for certifying irrigated acres. But it can also be used to monitor how those acres are being used. There is a cost involved in that, but we don't think the cost is near as great as requiring meters and we think the benefit is the flexibility for the producer to best use their land and to manage their land. The question is, how do you determine consumptive use? As Ron talked about, there's a lot of good information out there today on consumptive use for different crops. And that varies across the state, it varies across the Twin Platte NRD because of rainfall, because of climate conditions. But there is...that information is there, you can determine factors for different crops at different locations. But we believe that there's an opportunity to get better information for that. We have joined with North Platte NRD, South Platte NRD in working with the University of Nebraska Panhandle Research and Extension Center on an ET study...or, I don't want to say a study; it's a project. There's a methodology that's been developed, it's called METRIC SEBAL methodology. It's developed at the University of Idaho. But it's an effective way to utilize Landsat satellite photography and to use GIS type of technology and determine precise ET for the cropping in an area. We have joined in that effort and we believe that we will have the ability to then have a more precise consumptive use or ET for the cropping in the Twin Platte NRD. One of the advantages

of this procedure is, not only will we be able to do it entirely with our own GIS personnel, but it's an opportunity to look at historical ET use--water budgets, if you will--as well as what's happening today and will be available tomorrow because it uses Landsat satellite imagery. And that imagery is available, it's something like eight to ten times an irrigation season. And that goes back in history a long time, as well as it's occurring today. The third question is, how do we know that real water...if we reduce consumptive use, how do we know that real water is actually going to get back to the river, is actually going to be available for surface water irrigation and/or habitat needs from the Platte River recovery program? Ron mentioned briefly the Cooperative Hydrology Study, the modeling effort that's been going on for eight years. It's probably the state-of-the-art modeling, the most sophisticated model anywhere in the United States right now. It's a very good tool for determining and managing ground water. But there's a missing component, and the missing component is the surface water component for the COHYST model. So that then you can route water, you can determine if you actually reduced your use, consumptive use of water, that that water is actually getting to the river and if it didn't, if it doesn't show up in actual flows--we don't want it just to be paper water--then you'll know it's because of climatic conditions or others. So we have, in that regard, joined again with the Central Platte NRD, with the Nebraska Public Power District, and the Department of Natural Resources in a project that will add a surface water component from Columbus to the west end of Lake McConaughy. So we believe that the tools are in place to allow the control of ground water to get us back to 97, to get us back to fully appropriated using consumptive use, using cropping, using reduction of irrigated acres, using ET. We believe that those tools are available and it can work. Now I just wanted to add one...a couple more minutes. We are not opposed to meters. Meters are a very useful tool. They're a necessary tool in some parts of the state. We don't believe that they're a necessary tool in the Twin Platte NRD for consumptive use. But they're a necessary tool in certain parts of the state, but they are also a useful tool in the Twin Platte NRD and we also have a service of an ultrasonic meter. It's a free service that any producer in our district who wants to know how much water that they are pumping, we will go out to their farm, put this ultrasonic meter on

any well that they have, calibrate it to an hour meter, calibrate it to an electric meter. And we believe, as Ron said, that they are very accurate and we believe that there are benefits for the producers in knowing how much water they pump. We don't want to get into a water quality problem. So they know how much water they're pumping, there's a potential of savings there. We think they have an opportunity to save money, to be more effective in the operation of their farm if they know how much water they're applying and they can save energy costs. They can see if they're actually getting water to their field. We had an example, we had a demonstration and this was actually on the farm of the then-chairman of the Twin Platte NRD board. We put the ultrasonic meter on his well. He did gravity irrigation (inaudible) pipe and he thought that the majority of the water he was pumping was getting to his field. We put the ultrasonic meter at his pump. We then went down a ways where he had pipe laid out to where he actually had the gated pipe along the edge of his field and put the ultrasonic meter on again. He was losing over 50 percent of what he was pumping in leakage. He had no idea he was losing that much. So meters, or knowing how much you're pumping, are necessary in some parts of the state and can be useful anywhere. But we believe that there are other ways to control consumptive use. It's a much better and effective use of either our dollars or the state dollars and gives the producer a lot more flexibility. So again, I urge you to not mandate meters across the state. Thank you, and I'd be happy to answer any questions. [LR198]

SENATOR LOUDEN: Questions for Kent? Senator Wightman. [LR198]

SENATOR WIGHTMAN: Thank you, Mr. Chairman. Kent, can you tell me what all infrared...I know we've talked about the infrared photography quite a bit yesterday and again today. What all does it tell you? Does it tell you whether the acres are irrigated? Does it tell you how much water is being used? What all does it show you? [LR198]

KENT MILLER: It'll tell you the acres that are irrigated, the crops that are used on those acres. It's not going to tell you how much water was pumped. But if you know the crop that was on those acres and you know the ET for that area, then you can determine the

consumptive use. [LR198]

SENATOR WIGHTMAN: So it's pretty useful in determining consumptive use, but not at all in how much water is being pumped. Is that basically the situation? [LR198]

KENT MILLER: That's correct. [LR198]

SENATOR WIGHTMAN: Now would alfalfa show bright red, just like irrigated acres on the... [LR198]

KENT MILLER: You can distinguish alfalfa from corn. You can distinguish different irrigated crops. [LR198]

SENATOR WIGHTMAN: But it's going to take probably more consumptive use than the corn, from what Ron testified. [LR198]

KENT MILLER: Oh, absolutely. And that's why, not only is there information available now, but that's why we wanted to partner with this project with the North Platte and South Platte NRD to better understand ET and to be able to calculate ET for any location in our district, for any crop in our district, at any point in time. [LR198]

SENATOR WIGHTMAN: Thank you. [LR198]

SENATOR LOUDEN: Other questions? Senator Fischer. [LR198]

SENATOR FISCHER: Thank you, Chairman Louden. Thank you, Mr. Miller, for being here today. You spoke of the sandy soils in your district and the amount of water that you believe returns to the aquifer. Can you give me a percentage? Do you have the data or would it be a guess to give me a percentage of the amount pumped and what of that does return to the aquifer because we have to live on a sponge in this area?

[LR198]

KENT MILLER: Well, you know, the water that you pump and apply to the land, you know, there's several things that can happen to it. One is it could be consumptive used by the plant that's on the land. There can be an evaporation component. There can be a runoff component and there can be a recharge component. We believe that the majority of the water that's pumped on land in our district does not run off. It's sandy, it goes back in the soil. There are tools out there to prevent runoff, you know, reuse pits, etcetera. The evaporation component, and I've learned some about that than I've known in years past, there's always been a belief that you save a lot of water if you use sprinklers versus gravity-type irrigation. I think we're finding that there's not that much difference, that if you've got water sitting on the ground or you're throwing it up in the air, the air can only hold so much water at any one point in time. So there's not probably a whole lot of difference in evaporation. I guess that's a long answer to believe, that we believe that the water that is not used by the crop and is not evaporated is going back down. We believe all of that is going back down. Now there's a question, is...some of it may not be available immediately. You know, in other words if you overpump and some of that water is...whatever is not used by the crop and was not evaporated, we believe all of that is going back into the soil profile. There's going to be a transition time for it to move from the ground's surface back towards, again, available for pumping. Some of that may laterally move to the river system. But it's, you know, the movement laterally is so very small. But...so we believe that the vast majority of it gets back to the aquifer and we believe it gets back there fairly quickly because we have such sandy soils. [LR198]

SENATOR FISCHER: If the crop was corn, how many inches are required for corn in your NRD? [LR198]

KENT MILLER: I don't know that I can give you a precise answer, because we've not looked into allocations. But my best assumption is it's approximately 15 applied irrigated water over and above what's available through the rainfall. [LR198]

SENATOR FISCHER: So you can't give me a percentage then of what you think is going into recharging the aquifer? If 15 inches is required for corn, do you know how much is pumped on that circle, say? [LR198]

KENT MILLER: It depends on how much the producer pumps. But if a producer pumps 20 inches and the crop requires 15, we believe that the majority of that 5 inches is going to go back. If a producer pumps 25, we would believe a majority of the 10 inches is going to go back to the aquifer. [LR198]

SENATOR FISCHER: And I would agree with you on that, too. You said that in this area you don't believe that you've seen a decline in ground water levels. And I would assume you have data to back that up. [LR198]

KENT MILLER: That's correct. We do spring and fall monitoring. We have for over 30 years. Until about three years ago, you know, other than some minimal seasonal declines, we have seen no declines. We've seen some minor declines of three or four feet in the last three or four years. [LR198]

SENATOR FISCHER: Do you believe that ground water pumping affects the streamflow of the Platte River? [LR198]

KENT MILLER: Yes. [LR198]

SENATOR FISCHER: Can you give me an idea to what extent it would affect the streamflow? [LR198]

KENT MILLER: That information is available through the COHYST model. To give you a percent, you know, it's going to vary the distance you're back from the river. I really hate to throw out a percent because I don't think there is any precise one. [LR198]

SENATOR FISCHER: Okay. Thank you very much. [LR198]

SENATOR LOUDEN: Other questions? Senator Carlson. [LR198]

SENATOR CARLSON: Senator Louden. Kent, you made a couple of statements and I wrote down some notes here. So just clear me up on it. You started out by saying that you...your NRD doesn't care for flow meters and then later on you made a statement that you're not opposed to meters. [LR198]

KENT MILLER: Okay. We're not opposed to meters in other districts as a management tool. If they're a useful management tool in other districts, and I'm sure they are in some districts, then we support meters in other districts. We do not believe that meters are a necessary, I might even say useful, tool in the Twin Platte NRD for saving water. We believe there's a benefit though to knowing how much water you pump for primarily energy savings, dollar savings of your operation. But not for saving water, we don't think they're a necessary tool to saving water. [LR198]

SENATOR CARLSON: Okay. So you do believe that it's important to know or be able to measure how much water you're applying? [LR198]

KENT MILLER: No, not from the standpoint of saving water, manage LB962. We believe that if that producer who needs 15 inches is pumping 20 and another producer is pumping 25, that there's an opportunity there for them to save some dollars because they don't have to spin that pump as much to irrigate their crop. But we don't believe that meters are necessary in our district for managing ground water for implementing LB962. [LR198]

SENATOR CARLSON: Okay, help me understand this. Because you're overappropriated because of stream...Platte River depletion, streamflow. [LR198]

KENT MILLER: That's right. [LR198]

SENATOR CARLSON: So if somebody is close to the river and in sandy soil and pumping 25 inches and they only need 12 or 15 for their crop, why wouldn't it be important that they only pump 12 or 15 rather than 25? You said the 25 ends up going back. It takes some time. [LR198]

KENT MILLER: Well, and if they're close to the river as you indicated, then the aquifer level, I mean, (inaudible) ten feet, it's going to get back there almost immediately. And so they've wasted a lot of energy but the water is not gone, it's back in the aquifer. [LR198]

SENATOR CARLSON: Okay. Well, that's fine. Thank you. [LR198]

SENATOR LOUDEN: Other questions? Senator Fischer. [LR198]

SENATOR FISCHER: Thank you, Senator Louden. Mr. Miller, you're talking about streamflows and your responses to Senator Carlson that you don't believe that ground water pumping, especially near the river, is depleting the streamflow. Did I... [LR198]

KENT MILLER: No, ground water pumping is impacting streamflow. There's no question about it. That 15 inches that was pumped and utilized by the crop does have an impact on streamflow. The additional...if they apply 15 inches and they pump 20, the impact to the streamflow is going to be based on the 15 inches that was consumptively used by the crop. Whatever was consumptively used by the crop is going to impact streamflow. [LR198]

SENATOR FISCHER: But you... [LR198]

KENT MILLER: But the excess they pumped I don't believe is going to impact streamflow. [LR198]

SENATOR FISCHER: The excess would not be an impact on the streamflow. [LR198]

KENT MILLER: Right. [LR198]

SENATOR FISCHER: Thank you. [LR198]

SENATOR LOUDEN: Other questions? Seeing none, thank you, Kent. [LR198]

KENT MILLER: Thank you. [LR198]

SENATOR LOUDEN: (Exhibits 5, 6) At this time, I'd read into the record. We have a letter of information from the Lower Republican Natural Resources District, submitted by Michael Clements, and from the Middle Republican Natural Resource District, submitted by Dan Smith. And they will be read into the record. Can I have a show of hands of how many more people want to testify? Three, four, five, six, seven. Well, it look like it will go for a little while yet past the lunch time, I guess. []

JOHN THORBURN: I'll do my best to help you along, Senator. I'll try to be as brief as I can. [LR198]

SENATOR LOUDEN: Okay, go ahead. Thank you. [LR198]

JOHN THORBURN: (Exhibits 7, 8) Good morning, Mr. Chairman and Senators. My name is John Thorburn, J-o-h-n T-h-o-r-b-u-r-n. I'm general manager of Tri-Basin Natural Resources District in Holdrege. I'd like to briefly relay my NRD's experience with administration of a flow meter data collection program in the Republican Basin portion of our district. Tri-Basin NRD established a water use data collection program in 2002 as a

part of our efforts to help Nebraska comply with the Republican River compact and the Kansas v. Nebraska lawsuit settlement. Flow meters were installed on all 1,600 Republican Basin irrigation wells in my NRD by the end of 2004. We also require flow meters on all conditional replacement wells drilled within our NRD. Unlike the other three Republican Basin NRDs, Tri-Basin NRD gathers flow meter data only for the purpose of improving the accuracy of district water use estimates, not to regulate water use. Because we have a restriction on development of additional irrigated acres and we have certified our existing irrigated acres, we know how many acres of irrigated land there are in my district with some precision. By combining irrigated acreage data with water use data from flow meters, we can provide the state and our constituents with average water use data on a per-acre basis and even provide comparisons of different irrigation systems, as shown in the latest issue of "Tri-Basin Topics," our district newsletter. And I have provided copies of that to you today. Tri-Basin NRD's flow meter program differs from other NRD flow meter programs in a couple respects. As I already mentioned, we don't use flow meters for regulatory purposes. We only use them to gather water use data. For this reason, we have farmers report their own flow meter readings. NRD personnel annually verify flow meter readings on one-fourth of the district's meters. We also require farmers to maintain their own flow meters, rather than have NRD personnel provide that service. I have no doubt that our irrigators have learned a lot about water management from the data that their flow meters provide. I think that flow meter data has persuaded many farmers to install center pivot systems on formerly gravity irrigated land in order to improve their irrigation efficiency. On the other hand, I think we had the good fortune to begin our flow meter program at the same time that the cost of diesel fuel, natural gas, and other irrigation well energy sources was climbing. High energy prices are a great motivator for conservation. Flow meter data helped irrigators to identify opportunities to improve their irrigation efficiency, reducing pumping costs. Flow meters are an important irrigation water management tool, but the data that they provide comes at significant cost. Flow meters have an initial cost between $600 and $2,000. Flow meter installation on existing irrigation wells can sometimes be problematic because most flow meters need to have several feet of

straight, unobstructed pipe to prevent turbulent water flow. Turbulence reduces the accuracy of a flow meter. Because of this requirement, the cost of flow meter installation on existing wells is often as much or more than the cost of the flow meters themselves. Flow meter data collection and archiving also puts a significant administrative burden on NRDs themselves. Even though our program is limited to only a portion of our NRD, even though farmers report their own flow meter readings and are responsible for maintenance of their own meters, NRD staff spend at least three man months a year verifying flow meter readings, checking new flow meters to ensure that they are properly installed, and entering flow meter data into our database. Tri-Basin NRD has had good cooperation from our landowners and irrigators as we have implemented our flow meter data collection program. We believe our irrigators have improved their irrigation efficiency and the financial bottom line as a result of having flow meters on their wells. In spite of our experience, we caution the Natural Resources Committee that a universal flow meter requirement for all irrigators will come at a significant cost to both landowners and government, will take years to implement, and will only provide useful data for NRDs and DNR if irrigated lands are accurately inventoried. Thank you. [LR198]

SENATOR LOUDEN: Questions for John? [LR198]

SENATOR FISCHER: (Inaudible.) [LR198]

SENATOR LOUDEN: I was going to say, what's going on here. Senator Fischer. [LR198]

SENATOR FISCHER: I can't wait to read that in the transcript. Thank you, Senator Louden. Thank you, Mr. Thorburn for being here today. You said in the part of your NRD that's in the Republican Basin, you have flow meters and you know how many acres are there. [LR198]

JOHN THORBURN: Yes, ma'am. [LR198]

SENATOR FISCHER: But in your closing you were concerned that it's going to take years to implement. Your NRD has a step up already though on this implementation if this would go forward. Would that be a correct statement? [LR198]

JOHN THORBURN: Yes, ma'am. We do have, as I said, fully metered our Republican Basin portion of our district. That's about 40 percent of the land area and about one-third of our irrigation wells. [LR198]

SENATOR FISCHER: Do you find that flow meters save water in your district? [LR198]

JOHN THORBURN: Well, I think certainly flow meters in many cases help farmers to more efficiently manage their irrigation water. To say it saves water is a little more problematic because there are so many other factors involved; the choice of crops and irrigation system and soil types, of course. [LR198]

SENATOR FISCHER: Mr. Miller, who testified previously to you, stated that he felt they did not save water in his district because of the soil type. Do you have similar soil types in Tri-Basin or are they different than the Twin Basin (sic) one? [LR198]

JOHN THORBURN: My district has a wide variety of soil types ranging from the very sandy soils in the Platte Valley and we have a range of sandhills just south of the Platte Valley. Then we get into the heavier soils, the Holdrege silt loam soils, which have a greater water holding capacity. So we have quite a full range of different soil conditions, different depths to water. [LR198]

SENATOR FISCHER: Do you have flow meters on wells in the areas that have sandy soil? Do you currently have flow... [LR198]

JOHN THORBURN: Relatively few, Senator, because that's mostly in the Platte Basin. [LR198]

SENATOR FISCHER: Would you think flow meters would save water in the sandy soil, using the reasoning that Mr. Miller previously gave us? [LR198]

JOHN THORBURN: Well, I think there are opportunities, as I said, for farmers to improve their irrigation water management. But they also have to consider their financial bottom line and their yield goals. And so given a certain yield goal and a certain efficiency of the irrigation system, and given that our soils do allow recharge to the aquifer, I think that in my district the actual savings of water is relatively small. Pumping reductions would be more significant, and that is important when you have a system that does not allow for ready recharge of the aquifer. [LR198]

SENATOR FISCHER: If legislation was introduced and passed to require flow meters on every irrigation well in the state, would you be in favor of that state mandate being paid for by the state rather than the burden put on local property taxpayers and irrigators or through a local NRD district? Do you want me to answer that for you? (Laughter) [LR198]

JOHN THORBURN: Certainly, Senator, we always appreciate any assistance we can get from state government, impose those mandates, yes. [LR198]

SENATOR FISCHER: Thank you. [LR198]

SENATOR LOUDEN: Other questions for John? Senator Dubas. [LR198]

SENATOR DUBAS: Thank you, Senator Louden. Thank you, John, for being here. How much of a connection in your district is there between surface and ground water? [LR198]

JOHN THORBURN: It varies considerably. As I was mentioning to Senator Fischer, in our sandy soil areas and the shallow water table areas of the Platte Valley, it's very definite. As you move further south into the rainwater basins and the Republican and Little Blue portions of my district, it's less complete and probably more variable and seasonal. [LR198]

SENATOR DUBAS: So if we were able to (inaudible) savings of ground water through flow meters, would that help us address the surface water (inaudible)? [LR198]

JOHN THORBURN: Yes, ma'am, I think it could help in a couple respects. One, by reducing pumping, you can affect the amount of head pressure within the aquifer, which affects the flow of springs regardless of the water table level. Certainly when irrigators become more efficient though, their runoff is reduced and that could be a negative effect on streamflows. So it could go in both directions, depending on the situation. [LR198]

SENATOR DUBAS: Thank you. [LR198]

SENATOR LOUDEN: Other questions for John? Seeing none, thank you, John. [LR198]

JOHN THORBURN: Thank you, Senator. [LR198]

BRIAN BARELS: Good morning, Chairman Louden and other senators that are here today. I'd like to start by thanking you for taking your time to come and hear and take input on this very valuable asset to the state of Nebraska, our water resources. And I note that most all of you were at the Water Policy Task Force meeting, so I again thank you for your commitment. My name is Brian Barels, that's B-r-i-a-n B-a-r-e-l-s, and I'm the water resources manager for Nebraska Public Power District. I'm here today to touch on many of the same things that the previous speakers have talked about and a couple of additional items. And I'll try to focus on those additional items. While we take a

look at ground water pumping, ground water pumping is a very important input to the models we are developing at various parts of the state. There's a Republican River model, there's a COHYST model for the Platte River, there's other models under development for the Loup and the Elkhorn Basin. To have the data on the amount of water pumped is a very important piece of information. Without that specific piece of information for all the variety of ground water or surface water uses, we have to use assumptions. So what I'm saying is, the data or the measurement of our use is very important to input into those tools, which are very critical tools for determining our management actions. So as such, I do support the collection of the data and measurement. But similar to the previous speakers, I think there's many different ways to collect that data and measurement. It can be done through meters, if that's the choice of the individuals, or it can be done through electric records or it can be done through just the monitoring of when a pump is on and off and by applying the flow meters you've heard about to those systems to collect that data. The data is essential as we move forward to manage our water resources, both ground water and surface water. I would like to touch just briefly on the conjunctive relationship of surface water and ground water. And in the net, when you pump extra ground water, it's very true. If there's a recharge component or there's a return to the river, the overall water balance is kept whole to a large degree. However, if you do pump extra water, there's likely additional consumption through evaporation. But the biggest change comes to the streamflow and the integrated management of surface water and ground water. You've changed the timing and, in many cases, potentially the location of that return flow to the river. So that also is important information when it comes to how we manage in the future for the sustainability of the surface water resources in the state. And as we move to get back to the 1997 level of sustainability, or as we move to try to get back to what's been termed "the fully appropriated state," the more information and data we have available, the better we're going to be able to manage those resources and achieve those goals. One last thing I'd like to just touch on briefly is that much of the surface water measurement in the nation and in Nebraska has been funded over the years by the federal government through the USGS. Many of you may be aware that over the past few years

that federal funding is dwindling. And so more of those gauging stations that are remaining are jointly funded by state agencies at DNR or even by private interests to maintain those surface water gauges. As the Legislature may consider providing funding or funding a request by the Department of Natural Resources, I think it's real important that, again as I said before, if we move forward to manage our water resources, we need those measuring devices. So as the Legislature may consider funding, I urge you to keep in mind surface water, whether it be streamflow measurement or surface water irrigation delivery use, that those funds, as they're made available, if they're also available to surface water, it will also provide additional data and increase our knowledge and understanding. So those are my comments generally. I appreciate your time again and be glad to answer any questions you might have. [LR198]

SENATOR LOUDEN: Any questions for Brian? Senator Fischer. [LR198]

SENATOR FISCHER: Thank you, Senator Louden. Thank you, Mr. Barels, for being here today. When you spoke about the surface water gauging stations, does NPPD have any of those gauging stations? [LR198]

BRIAN BARELS: We don't have any gauging stations in the river as such. But within the operation of our Platte River project, all the flows that are diverted from the river are measured, as well as inflows and outflows from our reservoirs. And also we have measuring devices at different locations along our canal. So we do measure our operations as such. As you may know, NPPD also operates three surface water irrigation canals and delivers storage water to four canals. All of those canals are measured where they divert water from the streams. There's various locations along surface water systems that we also take measurements. And those measurements can come from gates, they can come from flumes, they can come from various types of structures. In many cases, a flow meter is not the best way to get the information. There may be other ways in a surface water system to measure. But again, that data and the

measurement of that is very important. It doesn't necessarily need to be a meter to accomplish that data collection action. [LR198]

SENATOR FISCHER: Does NPPD have gauging stations or everything else you mentioned... [LR198]

BRIAN BARELS: On the river? [LR198]

SENATOR FISCHER: ...on other areas of surface water in the state besides the Platte? [LR198]

BRIAN BARELS: Definitely. We have a power plant on the Missouri River, as you're likely familiar. We do measure the water taken from the Missouri River and returned to the Missouri River. We have hydro facilities on the Niobrara River that you're familiar with, Senator. The measurement that's done there was, as I have discussed before, the gates and the intake to the power plant have been measured through monitoring studies. And so based on the elevation of the water going through that fixed opening, we have a way to measure the amount of water that either goes into a hydro plant or goes through a gate structure. [LR198]

SENATOR FISCHER: And how far back does your data go? [LR198]

BRIAN BARELS: Well, that of course varies by site and by the records that have been maintained. But in many cases, that data goes back quite a few years. [LR198]

SENATOR FISCHER: Is that available to the public? [LR198]

BRIAN BARELS: Absolutely. [LR198]

SENATOR FISCHER: Okay. Thank you. [LR198]

SENATOR LOUDEN: Other questions for Brian? Senator Kopplin. [LR198]

SENATOR KOPPLIN: Thank you. I'm just trying to understand something in my mind. I think I do, but I don't. When more water than is necessary is pumped in one area of the state, some of that will return to the aquifer. But when you're removing that excess water, the effect on the stream may happen miles and miles and miles away. Would that be correct? [LR198]

BRIAN BARELS: That can be the case. And again, unfortunately in Nebraska nothing is the same. So it's highly variable across the stream. But yeah, you may...the aquifer may be supplying water to the river 20 miles below where it's being pumped from, where if it's pumped it may actually go back to the river at that location. But that ground water may have shown up five or six or seven years at a further downstream location. And that's some of the variability that you get if you're pumping extra water. [LR198]

SENATOR KOPPLIN: Okay. Thank you. [LR198]

SENATOR LOUDEN: Other questions? Senator Fischer. [LR198]

SENATOR FISCHER: Thank you, Senator Louden. You just said that that happens if you're pumping next to water. How close to a streambed do you have to be to be pumping ground water to have that effect, or how far out can you be in a basin where it doesn't have that effect? [LR198]

BRIAN BARELS: Well, you can be probably far enough out that you could...your pumping could affect the stream 100 years from now. You can also be far enough out that the pumping would affect the stream the next day. Our geology is highly variable. We talk about 40 years and 50-year increments a lot of times when we talk about our management schemes. But it's highly variable--depending upon the amount of pumping,

the amount of recharge, and the geology--exactly what the effect, and the timing of the effect, to the stream is. [LR198]

SENATOR FISCHER: Thank you. [LR198]

SENATOR LOUDEN: Other questions? Seeing none, thank you, John...Brian. Okay. [LR198]

ANN BLEED: (Exhibit 9) Senator Louden, Natural Resources Committee members and others, I do really appreciate your interest in learning more about water. I think what you're hearing today and have heard in the past is that it's not a simple thing to study. It's very complex and that creates all sorts of problems for management. In terms of measuring water, better measurements, more data are always welcome for the reasons that you've already heard, and I won't go into those. Just so you know, DNR does have statutory authority to require measurement of water on diversions and we do have statutory authority to install gauges or actually to require stream gauges at the expense of an applicant. We do tend to require measuring devices in areas where we feel that the beneficial use of the measuring device justifies the cost. And that's a very important consideration because, as you've already heard, the cost of providing water measurements is not insignificant. We do have a lot of measuring devices throughout the state, some of them on streams in cooperation with USGS, but also a number of devices that are operated strictly by the Department of Natural Resources, both stream gauges and measuring devices on diversions. A lot of those measuring devices tend to be in the more semiarid portions of the state where we have water administration on a daily basis throughout the irrigation season. We interrogate those gauges on the North Platte, for example, daily using remote interrogation techniques and use that in our accounting program. You will see a map in the folder that was provided to you that shows in general not only where the department requires meters, but also where meters are required or some kind of regulation is required on ground water. The key areas where we require surface water meters, small area in the Lower Niobrara NRD, the

Keya Paha where we had significant water administration in the seventies, and also in the Upper Big Blue. That's primarily for the Blue River compact. And then in the Republican Basin where, as you've heard, we have requirements not only on surface water diversions but ground water wells, so that we can have the data that are needed for compliance with the Republican River compact and for supplying to the Republican River compact administration. The other areas are either meters on ground water wells or increased ground water management regulations will be maintained. We have also meters...not meters, but measuring devices, usually in the form of a flume or a weir on our canal diversions throughout the western portion of the North Platte Basin and in the Republican Basin, as well as our major irrigation districts in the Niobrara Basin. These are fairly large diversions and the state does require a measuring device. Within that canal system, in most cases--I think in all cases--the irrigation district itself maintains metering devices for the delivery of water at the field turnout. And that is really up to the canal operators, their management districts, and their contractors. I won't go into detail. You can read it if you want. But I do want to reiterate what has been said in the past about requirements of a good metering program or measurement program. It's a lot more than simply the cost of the meter. You do have to have to make sure the meter is installed correctly, it's operating correctly, which is an ongoing requirement, requires an ongoing maintenance schedule. You have to make sure the data is being read correctly. And finally, if you're using it for research, you need to make sure that it's properly input to a database that is properly maintained. And all of this takes a tremendous amount of work and funding. So when we look at requiring funding again, we look at whether the benefit that we will get from requiring that data justifies the cost of obtaining the data. We tend, in surface water side, to look at this primarily for water administration because that is our key focus. That is where irrigators, if they are not getting the water they're entitled to, will be most severely injured. And given that we have limited funds, we focus on water administration. I do not want to underestimate the value of good data for technical studies and for water management. Again, if there were to be a required measuring program--and I say measuring, not because, as you've already heard, meters are not necessarily the only or the best way of determining how much water is

being diverted. If the committee chose to go forward with some kind of a statewide mandated program, we would certainly stand willing to work with you to make sure that's the most beneficial and cost-effective program that there is. However, I think we do need to look very carefully at whether that is the best use of the money that is available for water funding because there are such tremendous demands for that money in other areas. If there are any questions, I'll be glad to try to answer them. [LR198]

SENATOR LOUDEN: Questions for Ann? Senator Wallman. [LR198]

SENATOR WALLMAN: Thank you, Senator Louden. Thank you, Ann. In regards to streamflow, (inaudible) Republican and the Blue River too, also; right? [LR198]

ANN BLEED: Um-hum. [LR198]

SENATOR WALLMAN: Are we pretty close? We still give pumping permits out of the Blue, don't we? [LR198]

ANN BLEED: The NRD, yes. The Blue is not considered to be fully appropriated or overappropriated except for a minor area in the upper part of the Upper Big Blue, which is connected to the Platte River. [LR198]

SENATOR WALLMAN: So are we pretty close on streamflows or do you have any idea? [LR198]

ANN BLEED: Well, in the Blue River, as Mr. Turnbull mentioned, one of the issues is that a lot of the wells are not connected or at least not very closely connected to the streamflow. In that regard, for the Blue River compact, we can require the management of irrigation wells in order to ensure that the Blue River compact state line flow requirements are being met. What our modeling to date has told us, however, is that

since those wells tend to be deep, except for some alluvial wells, but a lot of the wells in the basin tend to be deep. And by shutting those wells off, what happens is there's no depletion to the stream from the pumping. But the runoff, which of course is decreased over time with better management, but the runoff that you get from the wells on the surface that gets back to the stream actually helped us at the time when we needed water at the state line gauge--an example of how one size does not fit all in this state. [LR198]

SENATOR WALLMAN: And that's in regard to that, you know, that (inaudible) in Crete. So consumptive use would probably be relatively low and that goes into the river (inaudible). [LR198]

ANN BLEED: Well, again, you have to be careful. Given the specific situation that you're talking about and, as has been stated before, the biggest impact on either the aquifer and the stream is due to the consumptive use of water. And the water that is pumped and not consumed may or may not get back to the aquifer. Where you have a deep well, it may never get back to that aquifer or it will get back, but over a long period of time. If you've got a shallow aquifer and you're close to a stream, it's likely to get back to those aquifers or streams. But again, there can be a change in timing. And the other thing that's been mentioned and I'd like to reiterate is, you may have a stream that is not connected to the aquifer directly in the area of the stream and a well because of...the ground water table is quite a bit below the land's surface. But if that well is pumping from that aquifer and downstream, the aquifer is connected to the stream in the lower portion of the basin, it will have an impact. And the timing of the impact, the only way I know to really determine well the timing of impact of wells on streams as well as on aquifers is with a ground water model. [LR198]

SENATOR WALLMAN: Thank you. [LR198]

SENATOR LOUDEN: Questions? I guess I have a question, Ann. Do you feel there's

enough measuring devices on the Niobrara River? [LR198]

ANN BLEED: No. [LR198]

SENATOR LOUDEN: How many more do you need? [LR198]

ANN BLEED: At least a couple more. But again, it really depends on the questions you're asking, how much you need. Until recently, for water administration I would have said we needed probably two more in the upper part of the basin. If you want to do some ground water/surface water interaction studies, there are places where I'd like to add three or four more. And the trouble is, it's just like any other measuring device. Putting a stream gauge in does require not only the initial cost of the gauge but the ongoing maintenance of the gauge, measurement of the gauge to make sure it's measuring streamflow properly. So it's not an inexpensive proposition. [LR198]

SENATOR LOUDEN: Okay. Thank you. Other questions for Ann? Thank you, Ann. [LR198]

ANN BLEED: Thank you very much. [LR198]

TIM ANDERSON: Good morning, Chairman Louden. I'm Tim Anderson with the Central Nebraska Public Power and Irrigation District. Welcome to the committee members and other members of the Legislature that are here. We're happy to see you. Central owns and operates Lake McConaughy. And since 1941, we have either measured or metered every single turnout in our system, which includes the counties of Lincoln, Dawson, Gosper, Phelps, and Kearney Counties. So we've got a longtime experience with measuring and metering. We think it's critical. We think if you can't measure it or meter it, how can you manage it. All the other inputs to the crops are measured. The seed, herbicide, pesticide, fertilizer are all measured, and we think water needs to be measured. We think it's critical, we think it's very, very important. (Inaudible) I think it's

just no-brainer. I don't know how you can manage this water without metering it and I think that the state needs to move in that direction. And I'm not sure, there may be basins that it's not necessary right now. But I think we ought to be moving in that direction. Certainly in the Platte Basin, I think we need to be there in the next three or four years as we implement the cooperative agreement. I think it's going to be very, very important that the Platte Basin has meters. And water is a state resource. It belongs to the citizens of the state. I think those of us in agriculture should be accountable to the rest of the citizens to let them know how much water we are using. And I think in most cases, agriculture gets used, you know, gets accused of using a lot of water. And I think if you measure it, you're able to tell people you're not using as much as you think. That's been our experience. Most of the people find out they're using less water than they think. So I think it shouldn't castor oil. Meters shouldn't be thought of as a bad thing; they're a good thing. One of the comments was something about the maintenance. We do have a program of maintenance in our district. We take 40 meters every year, bring them in, replace parts if need be, check them for accuracy. It is very important that you do that. We think that...we've had very, very few problems with meters. I think probably our failure rate is less than a half a percent. Their quality is good, they are expensive. And as other testifiers have said, they're going to cost between $1,200 and $1,500 to put them in. But I think in the long run, if you amortize it over, you know, 25 or 30 years, it's a very, very cheap investment. You know, we've been in discussions with the North Platte NRD for almost a year now, talking about inflows into Lake McConaughy and about how the North Platte NRD may be able to do somethings that would increase flows into the lake. And one of the things that they continue to point to is, well, why should we do anything when you guys downstream aren't measuring anything in your water, all your water? We're required to do that. They're in the process of installing meters and I think have the next year or two to get that. And they've got a good point. You know, they've got a very good point. So I think we can't argue with them about that point. But I would encourage you to maybe look at areas of the state that they're important. There are probably, like I said, other areas that they're not important. But we believe that they're a good tool, a good management tool. And our experiences, our

farmers really like them. They use it...you know, we measure, look at our meters probably seven or eight times a year. In fact, we've been under an allocation the last three years. For an example, this year our irrigators are getting 6.7 inches. That's about 1.7 inches every two weeks on four runs, they get four runs. And so they have to know exactly how much water they put on every run. And so they watch that meter very closely. And if it looks like they're going to go over, they'll call us and have it turned off, particularly if it's wet. So we think it's a management tool that should not be ignored, could be very beneficial. And I would...these other methods, I think, are good. You know, the allocation, the consumptive use, you know, the well. Those are all good. I don't think, they're not exact. There are so many variables, I don't think they get you to where you need to go. I will take my 60 years of information to the courthouse. I'm going to go to court anytime. The other methods, I'm not sure you can get there. I can prove to you how much water I put on every field since 1941, and I think that's important. So I'd be happy to answer any questions. I don't want to get into the lunch hour here. [LR198]

SENATOR LOUDEN: Questions for Tim? Senator Carlson. [LR198]

SENATOR CARLSON: Senator Louden. Tim, I agree with you that it's really important to know how much water is being used. And of course, you're involved in surface water. But in your opinion, there isn't any differences there between meters that measure surface water and meters that measure ground water. [LR198]

TIM ANDERSON: No, it's one resource. [LR198]

SENATOR CARLSON: So in your opinion, it's not a good argument that... [LR198]

TIM ANDERSON: No. [LR198]

SENATOR CARLSON: ...there's a lot of air in these meters. [LR198]

TIM ANDERSON: No. [LR198]

SENATOR CARLSON: Thank you. [LR198]

SENATOR LOUDEN: Senator Hansen. [LR198]

SENATOR HANSEN: Thank you. Tim, what is the time period, the calendar days between a release of a gallon of water from Lake McConaughy and its reaching Phelps County? [LR198]

TIM ANDERSON: It's about nine days. [LR198]

SENATOR HANSEN: Nine days? [LR198]

TIM ANDERSON: Eight or nine days. [LR198]

SENATOR HANSEN: In order to get 6.7 inches to a field in Phelps County, what would be the release in inches from McConaughy? [LR198]

TIM ANDERSON: We lose about half, 50 percent in delivery. [LR198]

SENATOR HANSEN: And where does the rest of it go? [LR198]

TIM ANDERSON: It goes into the aquifer. It recharges. [LR198]

SENATOR HANSEN: Into the aquifer. [LR198]

TIM ANDERSON: We have a state water right that gives us credit for almost 300,000 acres of incidental recharge. [LR198]

SENATOR HANSEN: How much water is entering the Missouri River from the state of Nebraska? [LR198]

TIM ANDERSON: I can't answer that. I'd say it's 9,000,000 acre-feet. [LR198]

SENATOR HANSEN: Way more than comes in. [LR198]

TIM ANDERSON: Yes. [LR198]

SENATOR HANSEN: So we are creating an underground dam, an underground reservoir. [LR198]

TIM ANDERSON: Yeah, the mound that's created under Gosper, Phelps, and Kearney County is recognized as a mound, it's referred to as a mound. You know, in fact, the state of Nebraska got credit, I think, 12,000 or 14,000 acre-feet of water for the state with Kansas on the agreement. [LR198]

SENATOR HANSEN: So isn't an underground dam just as good as an aboveground dam, especially if you... [LR198]

TIM ANDERSON: Absolutely. You don't have the evaporation. [LR198]

SENATOR HANSEN: ...especially if you're losing half of it through a canal system and river system? [LR198]

TIM ANDERSON: What you have to remember, you know, somebody else's loss is somebody else's gain. [LR198]

SENATOR HANSEN: Right. [LR198]

TIM ANDERSON: So you know... [LR198]

SENATOR HANSEN: But is it a game to the state of Nebraska if we impound water either in an aboveground dam or belowground dam? [LR198]

TIM ANDERSON: Sure, I think it's a huge benefit. A benefit for agriculture, benefit for recreation, benefit for cooling for electric plants. [LR198]

SENATOR HANSEN: Now one other little complicated question. Is it...it's surface water that is doing that, is creating the mound. Does that water, underground water in the mound, belong to the people of the state of Nebraska? [LR198]

TIM ANDERSON: All the water in the state belongs to the citizens of the state, every drop of water. [LR198]

SENATOR HANSEN: Not all surface water does, though. [LR198]

TIM ANDERSON: Yes. Every drop of water belongs to the citizens of the state. We get a right to use it. [LR198]

SENATOR HANSEN: Can a surface water irrigator sell that water? [LR198]

TIM ANDERSON: That happened just recently to the state of Nebraska with the Frenchman-Cambridge and the Bostwick Irrigation District. [LR198]

SENATOR HANSEN: All right, thank you. [LR198]

SENATOR LOUDEN: Other questions for Tim? Seeing none, thank you, Tim. [LR198]

ROD HORN: (Exhibit 10) Senator Louden, good afternoon, Senators. Rod Horn, R-o-d

H-o-r-n, general manager with the South Platte Natural Resources District out of Sidney. Our district encompasses all of three counties--Kimball, Cheyenne, and Deuel. The information I'm passing out to you this afternoon, you know, I do not plan to cover all this but just hit some highlight points, is that as one of the management tools the district has chosen to install flow meters. This is direction and recommendations through a network of advisory, ground water advisory committees that we have setup in our district over the last roughly 20 years. Within our district, we've probably experienced and unprecedented dry period of time, especially in 2002. And through this process, we've amended our ground water management plan, rules and regulations. But I just want to focus a little bit for the period between 2002 and 2006. Keep in mind that we are using and will be using flow meters as a regulatory tool, but we're also looking at, and we've incorporated, acreage reduction as well, working with the Natural Resources conservation service in acre reduction. Just wanted to, you know, point out, in 2002 the South Platte NRD board of directors implemented a moratorium along Lodgepole Creek. And the map in the back, I just want to point out a little bit the, you know, as far as some of the features in our district. The area that's colored is Lodgepole Creek. Outside of that area, the gray or white area is the tableland areas. So we have a great variation in depth of water as well as the difference in some of our aquifers. And then in the southeast corner of Deuel County on the very right hand side is, we have a little bit of the South Platte River. That runs through our district. So a large portion of our district depends greatly on ground water and ground water supply. Lodgepole Creek is intermittent and over the number of years has probably decline...in service water could be contributed probably to a number of different things, namely, you know, possibly pumping of ground water. But there's other factors involved. As I mentioned, some of the background information, we've pretty much completed the certification of about 134,000 irrigated acres within our district and about 1,300 irrigation wells. So there's quite a difference you can see from the central part of the state versus...at least in our district. In 2004, flow meters required districtwide incrementally. And I'll try to explain that a little bit more. And in this last year, the district board adopted amendments to the districtwide ground water management area, not necessarily waiting for the integrated

management planning process, that kind of thing, to incorporate allocations, transfer, and pooling procedures. And the transfer issues are critical in that our entire district has a moratorium on irrigation wells and then there are stays as far as expansion of irrigated acres. So there has to be a way to move that water around. As far as the flow meter program schedule for installation of the flow meters, this year we entered in the Lodgepole Creek area that you see in the colored area. And as far as starting our three-year allocation period. The other area, the tableland areas, the South Platte River area that we have will not come into allocations until 2009. And so that's critical to keep that point in mind. We have 685 meters installed. We are continuing to develop and maintain a flow meter database so we can track those records as accurately as we can and enlarge that database for the information that we need. Again, emphasize the use of our ground water advisory committee members through a lot of this process. The flow meter cost share, and this is just for the cost of the flow meter on the NRD side, and we put some of those dollars contributed to the NSWCP program, and also Department of Interior, the Bureau of Reclamation. So at this point, you're looking at about $250,000. But you have to realize about equal that amount is what the producers are putting in. So when this program is all said and done, incrementally over a four-year period we're looking at roughly, you know, a million dollars within our district. Granted we only have about 1,300 wells. There's not going to be a meter on every single well because of our rules and regulations. But I'd like to echo what some of the others have indicated. We've had the increased staff, technicians to read the meters. Our district is about 130 miles wide, about 30 miles in Cheyenne County there north and south. Still, it's a lot of ground to cover, even though we're one of the smaller districts. Looking at maintenance programs, that's going to be very critical. It's very important to our board to try to allow the public sector...or I should say the private sector to work with us on that in maintenance programs, looking at cost-share dollars. So there's some dollars there. And so there are some other, you know, dollars that are involved with this in human resources, as well. And always at your disposal is a copy of our ground water management area rules and regulations. And if you would like to have a copy of that, I could sure get that to you. A little bit about the allocation; 2007, allocations began in the

Lodgepole Creek area. And that basically runs almost the entire district from the state of Wyoming and empties out south of Chappell into Ovid, Colorado, which connects with the South Platte River. We're looking at a three-year allocation program, which begins this year. And the allocation of the mound ranges from 48 inches to 54 over the three-year period. So you know, on what we call a base allocation of 16 inches or 18 inches, and you'll see that on the map there as well and it's subdivided in areas based on the geology. In 2009, we're looking at a four-year allocation with amounts ranging from 80 to 88 inches over a four-year period. And in 2003, trying to bring these areas together on a three-year allocation at that point. So the entire district is synchronized at that point. And again, the allocations here are synchronized as well, coincide with the installation of the meters. And so I guess, you know, I'll just stop there and entertain any questions that you might have. [LR198]

SENATOR LOUDEN: Any questions for Rod? Senator Carlson. [LR198]

SENATOR CARLSON: Senator Louden. Rod, what's been the reduction in ground water levels last several years in your area? [LR198]

ROD HORN: I appreciate that question because in our district we're really experiencing declines throughout our entire district on the tableland, you know, the declines looks like this. There are some pockets, you know, that are stabilized or maybe coming up a little bit. On the tablelands we're looking at anywhere from 200, 300 feet depth, maybe one-eighth to three-eighths on average recharge. All our precipitation in our district ranges from 14 inches to about 17, 18 inches. The decline sort of looks like this in the valley area where we have Brule formation where it's a very challenging aquifer, where it's only an aquifer where fractures or fissures are exposed, you know, might be a benchmark but it's a downward trend. Then our third alluvium would be the alluvium which overlies the Brule formation and actually helps recharge, you know, some of the Brule formation. You know, there again we're seeing a gradual decline throughout the district. Like I indicated, in the valley area there, the board instituted a moratorium in

2002. That's a process that started in the latter part of the '90s you might say. We have monitoring records for the last 30 years that we look at. But it's...you know, it hasn't been an easy process. In 2002, when probably the rainfall in our area--and you may recall seeing some of those drought monitors--we were in exceptional drought there for a number of years, and 2002 is probably the peak where maybe we had five or seven inches, you know, that year. So I think people out there have experienced pumping air and experienced what's happening, that it's not an infinite resource, that it's a finite resource. And this is a direction, like I indicated here, this is only a couple, you know, a tool that we're using to try to work through. And it's definitely in its infancy. It's not perfect. There's situations that we're working through. But we're making some pretty good gains, I believe. So hopefully that answers your question. [LR198]

SENATOR CARLSON: Let me ask another question. On the 2009 allocations here, four-year period, 80 to 88 inches. And then the next page you go into a ten-inch carryover. But on the...say 88 inches on four years, if you pump 14 inches each of the first three years, and that's 42, can you pump 46 then the fourth year? [LR198]

ROD HORN: You'll have the flexibility to pump whatever you want in those four years. [LR198]

SENATOR CARLSON: What's the ten-inch carryover? [LR198]

ROD HORN: That's...and that's a very good observation. That's, through this discussion process, you know, these regulations as a check, a balance mechanism that, okay, if 22 inches comes to fruition in '09--if it's not changed, for example--that after a four-year period, that they're not going to be allowed to carryover a lot of water. One of the things the board needs to look at is also putting a cap on that. But that was one check to restrict that, to see what happens. Some people up there on the tableland would be pressed, because we have beets, you know, there's alfalfa and corn, that's still an exorbitant amount of allocation. And that's in an area that's fully appropriated. Really

nothing had to be done, if you look in the LB962. There are some attitudes that have been changed. Look at the glass half full. Okay, let's look at the entire district, put some restrictions on that, realizing that over time those will probably have to come down. Did that help you with a... [LR198]

SENATOR CARLSON: Thank you. [LR198]

ROD HORN: And I think it's also with a transition. You know, this is a program that's in its infancy, in a transition to allow these individuals to move in and consider, you know, less water being used. [LR198]

SENATOR LOUDEN: Other questions for Rod? Senator Wightman. [LR198]

SENATOR WIGHTMAN: Thank you, Chairman Louden. Rod, as you move to the west and you have higher water requirements because of less rainfall, do you have a higher percentage of pivot irrigation than, say, some of the districts as you move east or do you know notice any substantial difference? [LR198]

ROD HORN: No, just the fact that, you know, we're looking at 134,000 irrigated acres roughly, certified irrigated acres. So if you get on the tableland areas, you're going to see pretty much all pivot. There's going to be maybe some flood. Down Lodgepole Valley in the South Platte, you're going to have a little bit more flood ground in the South Platte Valley there. We've used Environmental Trust Fund dollars for a pivot conversion program that...working with the...because of the water quality issue, high nitrates in that area. We were fortunate enough to receive substantial funding through the Environmental Trust to look at pivot conversion from flood. So there's a little bit of change in the landscape there as well. But that's, you know, addressing more of the water quality issues, even though now some of the corners are coming out and are not being irrigated. You know, so there are some contribution, I guess, back to the system probably there if they continue not to irrigate those corners. [LR198]

SENATOR WIGHTMAN: Would it be true that the pivot corners require more water use on average than almost any other tract just because of the irregular shapes of them or... [LR198]

ROD HORN: Well, the efficiency could be much less depending on the system that goes out and reaches those corners. We do not have a lot of those. We do have a lot of end guns. The efficiency is not that great with the end guns as it is further into the pivot. [LR198]

SENATOR WIGHTMAN: Thank you. [LR198]

SENATOR LOUDEN: Other questions for Rod? Seeing none, thanks, Rod. [LR198]

ROD HORN: Thank you very much for your time. [LR198]

SENATOR LOUDEN: At this time, we'll quit for lunch. Okay, we'll tie this up then. [LR198]

DEAN EDSON: (Exhibit 11) Senator Louden and members of the committee, I'm Dean Edson, that's spelled...and the last name is spelled E-d-s-o-n. I'm with the Nebraska Association of Resource Districts. I have a water management report for you that we did last year in the fall of 2006. I've only got three copies. We're going to redo this this fall after all the budges have been set. And when I get that completed, it's very similar to that one right there. And I will provide copies to the committee once we get that completed. Also want to say we'll work with you on developing meter programs if you want...want to pursue that. One thing I would urge you is don't forget about the individual surface water irrigators. There's a lot of irrigators that pump directly out of streams, that may or may not have meters. And so we don't want to leave them out of the loop. There's also some irrigators that pump from a canal or divert from a canal. And

when they do that, they may or may not be metered. And so if you want to get an accurate picture on everything, we'd better take a look at those as well. And I'll try to answer any questions you may have. [LR198]

SENATOR LOUDEN: Any questions for Dean? Okay. Seeing none, I guess you were quick, Dean. Thank you. [LR198]

DEAN EDSON: All right, thanks. [LR198]

SENATOR LOUDEN: And with that we'll close the hearing on...(Recorder malfunction.) We'll start the next hearings on the interim studies and this will be on LR174--are we going to do them together or do them separate--on LR174. And with that, legal counsel, Jody Gittins, will summarize it for us. [LR198 LR174]

JODY GITTINS: Good afternoon, members of the committee. My name is Jody Gittins, J-o-d-y G-i-t-t-i-n-s. I'm legal counsel for the Natural Resources Committee and I'm introducing LR174 on behalf of Senator Mark Christensen. The purpose of this resolution was to examine the coordination between natural resource districts and state agencies, as well as coordination between the state and federal government, with respect to surface water flows during times of great need or an emergency in Nebraska in order to use our water resources prudently. The study would include the administration, the legal, the physical barriers to diverting water to avoid and minimize unnecessary damage caused by flooding, logjams, and drought. I don't have any other information on this. This resolution was drafted by Senator Christensen's office. I'm only introducing it on his behalf. [LR174]

SENATOR LOUDEN: Questions for Jody? Seeing none, I guess we're ready for our first testifier. [LR174]

ANN BLEED: Thank you, Senator Louden, Natural Resources Committee. I appreciate

this opportunity to testify before you. My name is Ann Bleed, that's A-n-n B-l-e-e-d, and I'm the director of the Department of Natural Resources. I did get a list of questions that I will try to address on this resolution if that is what would be appropriate. In terms of legal obstacles in the way of developing water management systems through cooperation. I think you're all well aware of LB962, which I believe provides the legal framework to effectively manage hydrologically connected ground water and surface water in the state, and I think appropriately recognizes the responsibilities of the Department of Natural Resources and the local natural resources districts. When required as a result of determination by the Department of Natural Resources that a basin is fully or overappropriated, the DNR and the NRDs jointly work together to develop and integrated management plan. And these plans are developed with input from stakeholders. In the case of the overappropriated basin, it's a collaboration as well as a consultation with the stakeholders in the basin. And we jointly develop the plan and we implement the plan jointly with the natural resources districts in charge of ground water regulation and management and the surface water being administered by the Department of Natural Resources. And in many instances, we jointly work on other proposals and projects and programs to address the issue. There's fairly constant dialogue between the natural resources districts and the Department of Natural Resources on the development of these plans. As much as I would like? No, I think mainly because we're all busy and trying to find the time to have as many meetings as we probably should have is extremely difficult. But we do meet frequently and have frequent discussions. Another issue was involving interactions with the federal agencies. I can tell you that we have a fairly constant dialogue between the department and federal agencies. We work extremely closely with the Bureau of Reclamation in both the Republican, Platte, and Niobrara Basins, often communicating during irrigation season on a daily basis with staff of the Bureau of Reclamation. We also work very closely with the Army Corps of Engineers to deal with flood issues and ice floe issues, and with FEMA, the Federal Emergency Management Agency. The department's flood plain management programs and dam safety programs also work very closely with local governments and individual dam owners on their projects. And then we do work with the

Fish and Wildlife Service on items related primarily to the Endangered Species Act. That's been an ongoing discussion, both through the development of the Platte River implementation program as well as other programs in the Lower Platte to deal with the pallid sturgeon, for example. And we also, in working with the federal government and particularly the Bureau of Reclamation on water issues, one thing that does need to be kept in mind is the federal government, the Bureau of Reclamation does have contractual agreements with their constituents. The state is not a part of those contractual agreements. And sometimes those can be something that we have to work around. We usually work through the bureau to make sure that the individual contracts between an individual irrigator and the Bureau of Reclamation are adhered to appropriately in whatever kind of management activities we're doing. That, I believe, is the answer to one of the first questions. And maybe it would be helpful if I stopped, ask if there were any questions on that. [LR174]

SENATOR LOUDEN: Questions for Ann? Senator Carlson. [LR174]

SENATOR CARLSON: Senator Louden. Ann, who would be some of the constituents of the bureau? [LR174]

ANN BLEED: Well, they're contractors. The individual landowners on Nebraska Bostwick Irrigation District, for example. They have a contract with the district, which in turn has a contract with the bureau. The bureau takes very seriously their interactions with their landowners on the district. And that would be true for all the bureau canals. [LR174]

SENATOR LOUDEN: Other questions for Ann? You ready to proceed now for... [LR174]

ANN BLEED: Yeah, I'll go to the second question here that was asked. Is one obstacle more significant to address first compared to any of the other obstacles? As I said, I don't think there are any legal obstacles to effective communication other than the ones

I mention, particularly, you know, the contracts that we are not a part of, etcetera. We do try to work very closely with these agencies and try to overcome any other obstacles that may be there. The next question, I'll just go along unless I see somebody raise their hand, (inaudible) in the interest of time. Would the possibility of diverting excess water during emergencies be easier during a particular time of the year than another time of the year? And the answer is yes. We have surface water appropriators who are diverting water, actively diverting, for example, in the irrigation season. It is much more difficult to determine whether or not there's extra water and less likely to be extra water than during the nonirrigation season when we have fewer appropriators who are diverting water. It has been the department's policy in the past, and continues to be, that if there is floodwater and we can mitigate the impacts of floodwater on downstream users by diverting that water, we allow diversions, even in excess of the permitted amount as long as there's no surface water appropriator who's going to be adversely impacted by that. The summer of 1983, '84, and '86, for example, there were diversions in many canals along the North Platte to try to avoid as much as possible flooding downstream. Those flows were so high we did not avoid flooding. But I think it did help. Even when there's not a major flood situation, we have allowed diversions for emergency situations if there is no surface water appropriator who would be adversely impacted. We did allow diversions into Elwood Reservoir under those circumstances this year for a short period of time. So it does happen. The key is to make sure there's no adverse impact on surface water appropriators. With LB962, if there was going to be an impact on a well that is dependent on that water for their water supply, we would also take that into account. But that's a much less likely occurrence. The next question is, do you have suggestions or ideas on how Nebraska should begin to build a system of data and communication between agencies to lessen property damage, increase our potentiality for compliance with agreements and compacts, and to fill reservoirs by diverting excess water that would otherwise leave Nebraska instead of providing for a need in another part of the state? I would just reiterate there are a number of databases and communication systems, that are already in place, involving the department and a number of other agencies. COHYST, which you heard about this morning, the

Cooperative Hydrology Study, is a very good example where the department is cooperating with the Platte River natural resources districts, the irrigation and power districts, some irrigations districts, Game and Parks Commission, and some others to develop a database and a model for the North Platte and Platte Rivers that will allow us to have the information we need for better management of both surface water and ground water. That has been a major effort, 8 years and I believe it's $8 million, on down the road, and we're still going. I think that's an extremely cooperative effort. We don't always agree, but the important thing is we can talk about our disagreements and hopefully work them out, and so far we have, to move forward with the modeling. That type of effort is something that I would like to see replicated in other basins, particularly Senator Fischer's basin on the Niobrara, and we're also doing something similar on the Lower Platte. We work very closely with federal agencies, particularly, again, the Bureau of Reclamation, to exchange data and work out management programs and water administration programs with them during the summer. It's a daily exchange of data on the North Platte and Platte Rivers with the Bureau of Reclamation and the state of Wyoming as part of the North Platte Decree. There's a tremendous amount of data exchange that goes on among the NRDs and the DNR, as well as the state of Kansas and Colorado, on the Republican River as part of the Republican River Compact Administration. As we speak, my staff is down in Kansas, meeting with Colorado and Kansas engineering committee to talk about the administration on that river for compliance of the compact. And we also have a lot of databases that we're working on with the states of Colorado and Wyoming, the U.S. Fish and Wildlife Service, and the Bureau of Reclamation as part of the Platte River Recovery Implementation Program. Those databases are just getting started. I expect they will expand greatly and provide a lot of useful data to all the agencies involved there. And then finally I'll just mention the Nebraska Ice Reporting Network, which is coordinated by the Nebraska Emergency Management Agency. Again, we work very closely with NEMA and other flood control agencies to deal with potential ice problems on the rivers in the state. With that, there any questions or...? [LR174]

SENATOR LOUDEN: Any questions for Ann? Senator Christensen. [LR174]

SENATOR CHRISTENSEN: Thank you, Chairman Louden. Basically, I think you know my question. What spurred this was when we had ice jams at Ashland and we had flooding. We had flooding at Grand Island at the same time. And we're wasting a lot of water, as well as compacting the problem down there of the flooding issue, where we could be diverting water out into Johnson Lake, Elwood Lake (sic), or any of them above that. How can we better utilize the source? Because we've got about 8 million acre-feet of water flowing out the end of the state every year, and 1 coming in. It's a great resource that I just feel that could be better utilized. How do we better utilize this resource as well, especially in times of surplus like this where there's damage being occurring? We can lessen the damage by diverting it out. How can we quickly respond to start diverting that water and things this way? Because you have said there's multiple agencies here. Well, time you deal with them agencies, the surplus can be gone. So how could we set up a structure, or what can we do, so we can better utilize this resource? [LR174]

ANN BLEED: I think in some cases there is a structure in place and we can respond fairly quickly, and have responded very quickly, particularly in the case of NEMA and ice jams and so forth. One thing that needs to be looked at is where is the water coming from and where does the water need to be used before it hits, for example, an area where there's flooding. If there's flooding starting at the state line, for example, with Wyoming and is all down the system, that's one issue. If the flooding is in the lower part of the system but there's water that is needed for a surface water appropriator, which may be the in-stream flow rights for Game and Parks Commission, or the target flows that are...that we must honor for the Platte River Implementation Program, if water is needed, say, above Grand Island to meet either the in-stream flow permits or the target flows then we need to...DNR does not have the authority to say we aren't going to honor our commitment on the three-state agreement and divert water above that point. Again, if we're above those, as we were in the case of Elwood, when we diverted water into

Elwood this spring, we were above the Fish and Wildlife target flows, and we worked with Game and Parks and they worked with us to allow a certain amount of diversion into Elwood, in spite of the fact they could have called for some of that water for their in-stream flow permits. We got that done fairly quickly. The key there was being above the target flows for the endangered species, as required by the Fish and Wildlife Service and required by the Platte River program. [LR174]

SENATOR CHRISTENSEN: I guess the reason I asked this was we didn't...the time I'm thinking about, we didn't divert any water into Johnson and Elwood, and when I stopped at Grand Island, you got the Holiday Inn Express on the corner, and the Holiday Inn, there was water clear around them, running clear around and through a tube, back into the river there by the Arby's. It was 100 percent surrounding it. Water is being damaging and yet we weren't utilizing it. I guess that was my concern. There's one time that...and I don't know who, but we missed it, as a state, getting the water utilized. I guess that's what I'm wanting to know. What do we need to do, what do we need set up so we can utilize this resource? [LR174]

ANN BLEED: Well, I think if we could establish agreements among the various parties that we can do that, ahead of time, that would certainly be helpful. I will say, however, I doubt very much, we could ask, but I doubt very much that the Fish and Wildlife Service is going to be very receptive to lowering the target flows on the Platte River program for such, but we possibly could explore that with them. And if it was set up ahead of time, yes, we could do that. That was not the case this spring. We were honor bound, because it was after we had signed the program, to maintain whatever flow was necessary to meet the target flows. [LR174]

SENATOR CHRISTENSEN: Well, you know, I just was looking at we had the surplus, it was obvious, but we weren't utilizing it. [LR174]

ANN BLEED: Well, it depends on where the surplus is, and the problem was that there

was no surplus upstream. [LR174]

SENATOR CHRISTENSEN: Well, there was plenty of water at Lexington, where we'd had to be diverting at that time, and we were already flooding at Grand Island. To me, it's a great use if you divert it, even if you dry the river up there. Maybe we can't, I don't know, but fact that if you was cutting all the water out of the river so it wasn't compounding that flooding down below would be a great thing. [LR174]

ANN BLEED: Well, the question I would ask is at Lexington, at that point in time, were the flows in excess of the Fish and Wildlife target flows? [LR174]

SENATOR CHRISTENSEN: And see, I don't know what the flows are. I can't...don't even know the date at this point in time, but... [LR174]

ANN BLEED: Well, whenever we become aware of somebody who would like to divert, we do check to see if there is excess water in the system that would allow us to do that. And I don't remember the explicit situation that you're talking about that well, Senator, but if somebody did call, we either checked and saw that there was no excess water in the system, or they didn't...we were unaware of the potential. [LR174]

SENATOR CHRISTENSEN: But basically you're telling me if...Lexington has to have so much flowing past it and if there's not excess there, but yet we're flooding by Grand Island, we've got to let that go down, destroy homes. [LR174]

ANN BLEED: Well, it's...we've got to let it go down. Now there's...the Platte River program says we cannot release water from Lake McConaughy if it's going to cause flooding. I don't believe it says that we have to divert or can divert water to avoid flooding if the target flows are not being met. However, we could raise that as an issue and see if we can get some kind of an understanding with the Fish and Wildlife Service to do that, and I'm certainly willing to do that. I do not...to be honest with you, I don't

remember being called and asked to put water in Johnson at that point in time. That's not to say it didn't happen; I do not remember it. The Elwood situation was different. [LR174]

SENATOR CHRISTENSEN: Well, I don't...I have no doubt you probably weren't asked, because I remember asking some questions at one of the Natural Resources hearings if anybody requested it or if it was being done, and they said, no. Because the gentleman said on the tape, no, we don't do that. It's like, why not? So... [LR174]

ANN BLEED: Right. I think you make a good point and I don't see any reason that this can't be raised with the Fish and Wildlife Service and discussed with them, and I'm certainly willing to do that. [LR174]

SENATOR CHRISTENSEN: Okay. Thank you. [LR174]

SENATOR LOUDEN: Other questions for Ann? For my own personal information, Ann, where is the last place water is diverted out of the Platte River? [LR174]

ANN BLEED: Well, just a little bit above Louisville. But the last diversion of any major amount of water that we regulate for, which I suspect is the more critical at this point in time, is the Kearney diversion dam near Kearney. We also, of course, have surface water permits for the cities of Lincoln and Omaha, as well as Grand Island and some others further downstream. We have not ever regulated for those cities, but it could happen in the future. But we do have surface water permits all the way down, almost to Louisville. [LR174]

SENATOR LOUDEN: Okay. Annette. [LR174]

SENATOR DUBAS: Thank you, Senator Louden. Thank you, Ann. Do...all of these different agencies, do you ever just get together periodically where, you know, you're

outside of any specific situation, where you can just talk about some different things, share ideas? You know, in a perfect world probably that's how we do things, but as you had mentioned earlier, time is always an issue. [LR174]

ANN BLEED: Sure. [LR174]

SENATOR DUBAS: But is this something that you've ever done or...? [LR174]

ANN BLEED: Well, I don't know that we've ever actually set up a meeting and say, let's just get together and talk. I can tell you, and this is kind of a standing joke with the Platte River Implementation Program discussions, after the all-day meeting we would usually meet in Norm DeMott's room. He's an irrigator from Wyoming, and he would always have a couple kegs of beer and it would take two or three hours before we went to dinner, and an awful lot of negotiations got done in that room. And so yes and no. I think that, given everybody's schedule, it's difficult to simply say, let's just get together and talk. However, if you develop good relationships with people, and I think the state of Nebraska has done an excellent job of that in the last eight years, you don't have to have a special meeting. You go out to lunch with each other. You go out for a beer after the meeting. You go play golf. Those kinds of things do happen and those kinds of conversations occur, and they are very helpful. [LR174]

SENATOR DUBAS: I was just wondering if...you know, oftentimes we're very reactionary, and if we had these types of meetings where (inaudible) having generalized discussions, we could maybe be a little more proactive. And do you feel like there's a good understanding between the different agencies about exactly what everybody is doing? You know, sometimes does the right hand always know what the left hand is doing? [LR174]

ANN BLEED: Depending on the agency, yes. I think the Bureau of Reclamation and FEMA have a very good understanding of what we're trying to do as a department, as a

state, and what they're trying to do. I'm not as convinced that the Fish and Wildlife Service understands how water resources work. One of the best things that I think happened, and it was by design, was the environmental account in Lake McConaughy being...giving the Fish and Wildlife Service some water that they would manage, as opposed to setting up controls at Grand Island that the districts would have to meet on a basic, established set of criteria that would be there no matter what the conditions of the river were. By giving the Fish and Wildlife Service management of the water, they have had to learn that you can't just release that water and expect it to act like a pipeline to get the water to Grand Island. And they've learned some very valuable lessons about managing the river. We need more of that kind of cooperative work. I think we're getting there. And some of the projects that are going on in the basins with the NRDs and DNR on integrated management projects, I think we are going to be ending up involving other federal agencies in one way or another, and that will help. [LR174]

SENATOR DUBAS: Thank you. [LR174]

SENATOR LOUDEN: Other questions for Ann? Seeing none, thank you, Ann. [LR174]

ANN BLEED: Thank you. [LR174]

SENATOR LOUDEN: Next testifier. [LR174]

DAN SMITH: Senator Louden, members of the committee, my name is Dan Smith, S-m-i-t-h. I'm the manager of the Middle Republican Natural Resources District in Curtis, Nebraska. After listening to the questions and Ann's testimony, I'm not sure if what I have to say is relevant. It appears that maybe some of the questions that were in mind with this resolution aren't...possibly aren't what I thought they were. But the natural resource districts and the Department of Water Resources, originally, have been working together in the Republican River Basin for right at 20 years now. In '93, we began meeting with irrigation districts and we had an informal coalition, that has later

became a formal coalition through the Republican River Basin Management Districts Association, that continues to meet. We work with the irrigation districts. We work with the department. We continue to work with that. We have a Republican River Basin Coalition now that's a separate entity that will continue to work on some of the authorities that were granted by LB701 this year, and we continue to work together on those issues. I think it's safe to say that we have preferences, not differences. There are a number of things that are under discussion, will continue to be under discussion, and even when we agree to take a particular direction it doesn't necessarily mean that one is giving up something and the other isn't. We continue to work, we'll work together, we'll move on in those directions that we need to take. As far as ice jams, we don't have a whole lot of problem with that in the Republican River Basin. Flooding hasn't been a big problem of lately, although my district was active for a number of years in flood control structures through three active watershed programs that we had in our district using federal funds in the PL566 Program. Of course, the moratorium on the Republican River Basin on any new surface water impoundments brought that program to an end. But we do have active watersheds that help control flooding and probably did a lot to control some of the flooding on Medicine Creek in our district this year. I'm sure some of the flooding issues will continue to be brought up as we move along. Now the one place where we have not had any cooperation at all is with the drought. We have asked nearly everybody to help us bring that to an end, and have gotten no cooperation at all. So I won't waste any more of your time. I'd certainly try to answer any questions if there are anything specific that you have in mind. But cooperation does happen, is ongoing in the Republican River Basin. [LR174]

SENATOR LOUDEN: Questions for Dan? Gee, Dan, I guess you explained it all, so I... [LR174]

DAN SMITH: Thank you. [LR174]

SENATOR LOUDEN: ...thank you. [LR174]

DeMARIS JOHNSON: (Exhibit 12) Good afternoon. I'm DeMaris Johnson, DeMaris is D-e-M-a-r-i-s, Johnson. I am the executive director of the Nebraska Water Resources Association and I'm here on behalf of Lee Orton today, who is with the Nebraska State Irrigation Association, and he has a letter for you. I will not sit here and read it to you at 2:00 in the afternoon, but would appreciate if you would take the time to look at this. And basically what he's saying is what Dan just said, is we need to continue the cooperation and make sure that the Irrigation Association is included at the table. If you have any questions, I'd be happy to answer. [LR174]

SENATOR LOUDEN: Any questions for DeMaris? It'd be like shooting the messenger, I guess, if we ask you very many questions. But does anybody... [LR174]

DeMARIS JOHNSON: Thank you. [LR174]

SENATOR LOUDEN: ...have any questions for DeMaris? [LR174]

DeMARIS JOHNSON: Thank you, but I'll go back and tell him that you asked me a lot of questions... [LR174]

SENATOR LOUDEN: Okay. [LR174]

DeMARIS JOHNSON: ...and I handled them well. [LR174]

SENATOR LOUDEN: Tell him we didn't shoot the messenger. [LR174]

DeMARIS JOHNSON: Thank you. [LR174]

MIKE CLEMENTS: (Exhibit 13) I just have written testimony that I would like to have read into the record. My name is Mike Clements. I'm general manager of the Lower

Republican NRD. Thank you, Senator Louden and members of the committee. I've got written testimony that I would like to have read into the record and, really, I think in lieu of the questions that have been asked, there's no sense in wasting any more of your time, because most of my testimony has already been covered, so...unless anyone has questions for me. [LR174]

SENATOR LOUDEN: Any questions for Mike? And seeing none, thank you, Mike. [LR174]

MIKE CLEMENTS: Thanks. [LR174]

SENATOR LOUDEN: And let's see, next testifier? Do we have any more that want to testify on LR174? Seeing one, then I guess we'll close the hearing on LR174 and we'll go to LR177. Take your time, Jody. Take your time. (Laughter) We don't want you crippled up again. Take your time. [LR174 LR177]

JODY GITTINS: Good afternoon again. My name is Jody Gittins, J-o-d-y G-i-t-t-i-n-s. I am committee counsel for the Natural Resources Committee, but I am introducing LR177 on behalf of Senator Mark Christensen. The purpose of the study is to examine the ground water model developed and set forth from the final settlement stipulation of the Republican River Compact due to questions regarding inputs and accounting. And Ann Bleed is here, who will testify as to that model, and the person that developed the model, my understanding, was going to be here until he found out he had to be in the...I forgot what it's called but it's with the Republican River Management group that meets to discuss what's going on with the Republican, the three-state meeting, and so he is attending that meeting and was unable to be here today. [LR177]

SENATOR LOUDEN: Any questions for Jody? I guess not, so we'll take the first testifier on the matter. [LR177]

ANN BLEED: (Exhibit 9) My name is Ann Bleed, A-n-n B-l-e-e-d, and I thank the committee and Senator Louden for this opportunity. The...actually, the person who developed the model, it was a group of people that developed the model. The model was developed as part of the Republican River negotiations that resulted in the final settlement stipulation on the Republican. The key modeler developers were from the states of Colorado and Kansas and Nebraska. Our major representatives on the modeling committee were Mike McDonald, Lee Wilson, and Derrel Martin. Mike McDonald is the person who wrote the code for the MODFLOW model which is the key modeling code that's used throughout the world to do ground water modeling. So we had excellent representation on that committee. Derrel Martin is from the University of Nebraska. Lee Wilson is a consultant out of Sante Fe. The U.S. Geological Survey was also involved as more of a participant observer, if you will, in those modeling conversations. At the end, when the model was finally agreed to by all three states, the USGS was asked is this...how does this model rate with all the other models that the USGS has affirmed, and the key reviewer for the USGS ground water modeling reports stated that, in his view, this was one of the most well-reviewed and one of the best models he's ever been involved with because there was so much scrutiny of every part of the model by all three states, because there was so much at risk at having a model that was wrong. So that is how...that is who developed the model. Now the person that Jody was referring to, Jim Schneider, is a ground water model that we just hired in November, "we" being the Department of Natural Resources, and he, along with our other staff, Paul Koester, are the people who are using the model for compact compliance. And Jim has been very actively working with our consultants, as well as a local consulting firm, the Flatwater Group, to analyze the model. No model is perfect. This one is not. We are continually looking at it to see where we might be able to improve it, and there are improvements that have been made. There's some improvements we would like to see made, and we'll continue to work on it. I should point out that to change the Republican River Compact Administration model requires that the compact administration, all three states--Kansas, Nebraska, and Colorado--agree to the model change. So it's not something that Nebraska can do unilaterally. We have done

that, however. We've already identified several problems with the model itself that the compact administration agreed to change. The meeting today that our modelers are could not be at...or the reason they could not be here is because of the meeting today, is not a problem with the model itself but a problem with how the model is used to develop the numbers that go into the compact administration that Nebraska has discovered, and we're trying to convince Kansas and Colorado that we need to change the protocols. It deals with not the compact administration numbers themselves, but how the model is used to develop the input numbers to the accounting. So it gets fairly complicated fairly quickly. But with that, I believe in the packet that was handed out by the department there are a number of pages trying to answer questions. It gets pretty detailed fairly quickly. I will try to skim the highlights, if that is what you would like. Otherwise, I'd be very happy to just answer questions. But please stop me if there's anything I say that you want to follow up on. And if, at the end of the hearing, you still have questions, please feel free to call the department and let us know what your questions are. We'll try to get them addressed. [LR177]

SENATOR LOUDEN: Questions for Ann? Senator Wightman. [LR177]

SENATOR WIGHTMAN: Thank you, Mr. Chairman. Ann, what has been the degree of cooperation in model changes? You said there have been instances where change has been made but it requires the agreement of all three states. Is that correct? [LR177]

ANN BLEED: Uh-huh. Yes, that's correct. [LR177]

SENATOR WIGHTMAN: Has there been a fair amount of cooperation. Has there been areas where you can see that the model needs changes? [LR177]

ANN BLEED: Well, the changes to date were fairly perfunctory and, clearly, mistakes with the modeling and did not create a big difference. The issue that they're dealing with today, the primary issue that they're dealing with today involving the model, involves,

again, not the model itself but the actual nature of the model runs that are used to develop the numbers that go into the accounting procedure. This is a substantial change. It is to Nebraska's favor, and so that can be a little bit different. I'm optimistic that we think we have a legitimate proposal to make. We think that the model is incorrectly being used and we think we can convince Colorado and Kansas of that, but given everything that's going on, I don't know what the answer will be. I'm optimistic. Another example of the changes that I think will be made fairly readily is the use of pumping numbers, and you'll see in my discussion here we did not use actual metered pumping numbers in the Republican Basin in the development of the model. The model goes back to 1920, of necessity, to get an appropriate understanding of how pumping has affected the basin through time. Well, until Upper Republican started putting on meters in the late seventies, early eighties, we didn't have any meter data so we couldn't use meter data in the model. We used other methods. And until this year, we didn't have meter data that we felt we could present to Kansas and portray as being accurate meter data, because of all the things we were talking about this morning--the need to have the meters properly calibrated, installed, and a proper database, etcetera--until this year. We have used the meter data this year for the first time for all three or all four NRDs and...in the model, and that is a change that has to be approved by the compact administration. My guess is they will approve that one. [LR177]

SENATOR WIGHTMAN: There is no method of change other than the agreement of all three states involved. [LR177]

ANN BLEED: That's right. [LR177]

SENATOR WIGHTMAN: There's no method for mediation or arbitration in the event of a dispute, apparently. [LR177]

ANN BLEED: No, that's not correct. The first thing that happens is the discussion on the technical issues, not the legal issues, but the technical issues involving the accounting

and the modeling; will go through the engineering committee. And if the engineering committee agrees that the change should be made, they will bring that forward to the compact administration. And the compact administration itself consists of the state engineer from Kansas, the state engineer from Colorado, and the director of the Department of Natural Resources in Nebraska. They have to vote on the change, unanimously vote on the change. Usually, if the engineering committee has already agreed, then the three principals generally vote on...go ahead with the engineering committee, but not always. At that point, if there still is a disagreement, there is an alternative dispute resolution process set up in the settlement agreement that we could use if the dispute needs to be resolved. [LR177]

SENATOR WIGHTMAN: Has that ever been used? [LR177]

ANN BLEED: It has not been used to date. We've been...so far, we've been able to work out whatever disputes we've had and hopefully we'll be able to do that again. [LR177]

SENATOR WIGHTMAN: Thank you. [LR177]

SENATOR LOUDEN: Other questions for Ann? Seeing none, I guess... [LR177]

ANN BLEED: Well, if you...I assume then you don't want me to go through the written material, or do you? I can do either one, whichever the committee prefers. [LR177]

SENATOR LOUDEN: No, go ahead and give us a shot here. [LR177]

ANN BLEED: Okay. One of the question is, what are the specific inputs and accounting to the ground water model, and how are they calculated? There are a number of major inputs to the model. One of the primary inputs, as you heard this morning, is ground water pumping and, as I just mentioned, because we do not have meters and had not

had meters on the ground water wells since 1920, for the most part we used an electric power record methodology that we carefully calibrated with actual pumping data where we could, and that has been used in the model until 2001. In 2001 we started using the meter data from the Upper Republican, and then in 2006 we're using the meter data from the Middle and the Lower as well. The number of acres irrigated and the location of the acres irrigated is also an input to the model. Again, until the acres have recently been certified, we've primarily relied on the National Agricultural Statistics Service to determine primarily the location of the acres, not so much the number of acres irrigated. The key input to the model is the volume pumped and the acres give us an indication of where those volumes were pumped. The precipitation, which is the major source of water in the basin, is also a key input. We relied on 34 precipitation gauges from the National Weather Service stations across the basin. Before allowing a station to be used in the modeling, the actual record of the station was analyzed to make sure that it was a reliable record, accurately recording what was, in fact, occurring. Of course, a gauging station, precipitation station will tell you how much rain occurred at an area that's smaller than this table, and we have to extrapolate that from that across a fairly large area. We used a technique called kriging in order to do that. And again, this is all something that was agreed upon by all three states' modelers. Ground water irrigation return flows are a very important part of the model and we agreed, again, through the negotiations, to say that any ground water pump, 80 percent of that would be consumed and 20 percent would be returning either to...or returning to the aquifer. So...yeah, go ahead. [LR177]

SENATOR LOUDEN: Yeah, go ahead. [LR177]

SENATOR FISCHER: Okay. On the ground water return flows, Dr. Bleed, do you think that the 20 percent is a fairly accurate percentage of the return to the aquifer? [LR177]

ANN BLEED: I think on average for the Republican Basin, yes. Obviously, in certain areas it's going to be a lot lower, because if you have a very efficient center-pivot

system you could get up to closer to 90 percent consumptive use. In other areas, it could be a lot less. So that was an average the consultants looked at very carefully and came up with. I've got to tell you that the state of Kansas believes it's too low and that's one of the issues under discussion at the engineering committee. They think that we need to change the 80 percent consumptive use to a higher number. [LR177]

SENATOR FISCHER: Are there different models that are used in other basins? I know we're talking specifically about the Republican Basin here, but does the department have other models that are used in other basins across the state? [LR177]

ANN BLEED: Yes. And when you say different models, I think there are two basic ways a model can be different. One is every model is distinct. Because we're using what's called the MODFLOW modeling program, essentially, that's a set of rules. It's a computer program that tells you, if you've got so much water coming into this cell from precipitation or from ground water flow from another cell, and you have so much water going out through pumping or phreatophyte use or flow to another, what's left in that cell. The MODFLOW program basically does those calculations. But then to develop a model for the Republican Basin you have to provide the appropriate inputs, and that's where models become very specific to the basin. There's no way you could take the model developed for the Republican Basin, with all the 34 gauging stations, etcetera, and so forth, and put it on the Platte. So, in that sense, every model has got to be different. Then you can look at the different kinds of equations, if you will, that you can use in a ground water model. MODFLOW is one of the more commonly used sets of equations or programs. There are certainly other numerical modeling programs out there. You can do an analytical model, which is the Glover/Balmer, for example, or the Jenkins method uses an analytical model. So there are a number of different kinds of models. [LR177]

SENATOR FISCHER: You made the comment that Kansas feels that the percentage is too low for the recharge. [LR177]

ANN BLEED: Too low for the consumptive use. [LR177]

SENATOR FISCHER: Oh, too low for consumptive use. [LR177]

ANN BLEED: They would say that our wells are consuming more than 80 percent of what is pumped. [LR177]

SENATOR FISCHER: I guess I've, in conversations just with people--this is based on no fact, I'll put that right out front--I would say, in conversations with people, they don't feel that the model, either for the Republican or other basins, has a high enough percentage of the recharge to the aquifer. Just a comment. [LR177]

ANN BLEED: Yeah. [LR177]

SENATOR FISCHER: So... [LR177]

ANN BLEED: And in some cases they very well may be right. [LR177]

SENATOR FISCHER: Thank you. [LR177]

SENATOR LOUDEN: Senator Carlson [LR177]

SENATOR CARLSON: Senator Louden. Ann, then to follow up on Senator Fischer's question, if Kansas would like the 80 percent to move up, we'd like the 80 percent to move down. [LR177]

ANN BLEED: Exactly. [LR177]

SENATOR CARLSON: Are there any other areas that you'd want to comment on? You

mentioned some changes you'd like to see made. Maybe you'd like to comment on those, or maybe not. [LR177]

ANN BLEED: Sure. The...let me just simply say that from the state of Nebraska's perspective, if we think there's a valid reason that that number is not correct, we will work to have an accurate number in the model, and that's, of course, a big part of the discussion of whether that number is accurate. There are a number of other input variables that we certainly are looking at in our attempts to make sure the model is as accurate as it can be. Canal seepage, and that's the seepage if you divert water, a certain amount of the water seeps through the bottom and sides of the canal. Usually, this is recharged to the aquifer, although it can emerge as streamflow downstream. That's a big issue, as well as when you apply, as you heard this morning, as you apply irrigation to land, a portion of what's applied to the land does get back to recharge. I should mention, by the way, that a ground water model deals with the ground water portion of the system. It does not predict in any way what the surface water runoff would be. That's an entirely different modeling situation. So we're dealing just with ground water when we're talking a ground water model. We would like...in fact, in the settlement there's actually words to this effect, we do not believe that we're getting as much return flow to the stream from the seepage as we should. We did, during negotiations, increase that return flow number, but we think it should be higher and it's explicitly stated in the settlement that we will reevaluate that number in the near future, and we are pushing for that. Right now we're saying that 17 percent of what seeps through the canal gets back to the stream. I mean, I'm sorry, yeah, 17 percent is consumed; the remaining 83 percent gets back to the stream after it seeped to the canal. We think it should be closer to 90 percent, and that's a fairly large number, so we'd like to see that changed. The potential evapotranspiration in the model, when we're referring to that, that's really the evaporation from vegetation along the river that's not irrigated crops. It's Senator Carlson's favorite topic of vegetation. In ground water models in general, the amount of water loss through riparian vegetation is kind of a simplistic look at what may be actually going on, and this is true for a lot of models, ground water models, but we

think it's too simplistic and we are hoping to look into that a little bit further with our consultants to see if that, in fact, that number can be improved to be more accurate. It's a very important number in the model because we are concerned about the interface between the ground water aquifer and the stream or the river, and this phreatophyte vegetation tends to be between that or on that interface. So if it's overestimating the amount of water that's being consumed by phreatophytes, that means that's that much less water that's getting to the stream, and vice versa. So that's a fairly important number that we're looking at. Other numbers that we're looking at is recharge. A very important umber to the model is how much water is actually going from the land surface down to the ground water table. That tends to be a very difficult number to get a handle on. We don't have meters that measure recharge, so it's kind of an estimate based on other things. You know, we're constantly looking at that as well. I might just mention that the inputs to a ground water model are very important. We try to tie those down as accurately and as closely as we can. The other thing that's important is to look at the output of a model, and in the Republican model there are two key outputs we look at. One is the estimated water table elevations that the model is predicting, and the other is streamflow with a base flow that comes into the stream from the ground water. We do test the output very carefully against certain monitoring wells and measurements of streamflow to make sure that the model, in fact, is working fairly well, and for the most part it is. That doesn't mean in any given location it's going to be precisely on target, but those are some of the things we're looking at and there will be more as we go forward, I'm sure. One of the questions was concerns about the accuracy of the model. I think I've kind of addressed that. Yes, we do have concerns. We think it's a pretty good model for doing what it's doing, but that doesn't mean we aren't continuing to worry about whether it's accurate and to look at that. One of the questions is, does the model take into consideration all the factors that should be included to determine fair implementation of the three-state compact? We certainly tried to make that happen during the negotiated settlement and I think, given the amount of knowledge we had at the time of the settlement, yes, it does. There are some things, however, that we think can be improved with more information, such as the ground water pumping number that

we talked about already. Conservation activities are constantly coming up as something that we should consider in the model, and let me just say a little bit about that. The information we have on the impact of conservation activities is very minimal at this point. We have tried to determine, for example, where terraces are, how many of them are in, and at the time we did the...developed the model, we didn't have the data we needed to do that. Since then, through the Republican River Compact Administration, there has been a study that is looking at the impact of terraces and farm ponds on recharge to the basin and surface water runoff. The study is being done by the three states, in cooperation with the Bureau of Reclamation and others. The...just looking at that, we looked at where the terraces and farm ponds are impacting the model. Jumping ahead of myself here a little bit so I need to find my place. The values of...excuse me. I'm looking for some numbers in here. I will find them and come across them in a minute, but there's some numbers in here indicating the number of acres of farm ponds and terraces in the three states, and Nebraska has the largest numbers, which tells you that the largest impact on consumptive use from farm ponds and terraces is likely to be in Nebraska. We did not explicitly put those numbers in the model. At the time, we simply didn't have the information. However, to the extent the consumptive...or conservation activities impact streamflow, because of the way we calibrate the model, those impacts are reflected in the model. So they are not explicitly an input, but they are part of the modeling implicitly. And so, yes, they are there. As we get more information, obviously, we'll want to take another look at that. [LR177]

SENATOR LOUDEN: Is there any way, Ann, that you can...anyone can figure out what effect terracing has on streamflow? [LR177]

ANN BLEED: Well, that's one of the parts of the study we're looking at, and essentially what it takes is a combination of surface water and ground water monitoring. We do know, from anecdotal information, as well as some surface water runoff studies, that terracing does decrease the amount of water running off to the stream, along with surface water. That's the point of a terrace, to prevent stream...erosion, soil erosion, and

water quality issues that are involved with soil erosion. Of the water that remains in the terrace, then the question is, where does it go? Some of it, no doubt, goes to evaporation, and there may be some increase in evaporation as a result, but our studies are showing that by far the largest amount of water that doesn't run off is going into recharge to the aquifer from terraces and farm ponds. Minimum till is also a big issue, reducing surface water runoff, and again, it looks like a good portion of the water that does not runoff in minimum till is either going into increased crop production, which is a good thing, going to reduce the need for irrigation water, which is of course a good thing, and then increasing the recharge to the aquifer. [LR177]

SENATOR LOUDEN: Well, when you asked about one and two-tenths million acres in Nebraska that's been terraced, if that had much of an effect on water, that would be a significant number. I mean, that could be quite significant if that did have some effect on the streamflow or something, wouldn't it? [LR177]

ANN BLEED: Yes, it would. And, in fact, it may be a positive effect and that...our studies are telling us that the effect may be more positive, in terms of the ground water, than negative. In terms of surface water, it's different, but... [LR177]

SENATOR LOUDEN: Now if they are terracing and ground pumping in the same areas, so would they actually be recharging the aquifer that they're pumping from? [LR177]

ANN BLEED: In many cases, that is correct. They're in the same area. [LR177]

SENATOR LOUDEN: So that would...it would actually it might not ever get...be a long time before it got to the streamflow, I guess, is what I was... [LR177]

ANN BLEED: Depending on where you are. If you're close to the stream, maybe not. But that is part of what's going on, is if it's no longer running off the surface, in which case it'd get to the streamflow fairly quickly, but it is recharging the aquifer. It may be

getting to the streamflow, but over a longer period of time. And depending what's going on, that could help us because when we get a major rainstorm and it's running off quickly, often that's when we have flooding. So it's a mixed bag and this is where it gets complicated, and the only way we can really get a handle on it is to do the studies that are required to really understand where the water is going. Unfortunately, those are not cheap, they're relatively expensive, but we are undertaking that with the compact administration. [LR177]

SENATOR LOUDEN: Now, as I looked at those numbers, 220,000 Colorado, 900,000 Kansas, one and two-tenths million in Nebraska, are those accurate numbers or is that somebody that divided it all up, 1149 and... [LR177]

ANN BLEED: No, those are numbers based on the data that we've been able to actually get in terms of where the farm ponds and terraces are, what types of farm ponds and terraces we're looking at, and studies done by Dr. Koelliker in Kansas, and Dr. Martin in Nebraska. [LR177]

SENATOR LOUDEN: When you take... [LR177]

ANN BLEED: So they are studies. They aren't just a guess. [LR177]

SENATOR LOUDEN: When you take a percentage of...when you divide the total number of acres, that percentage isn't very far off, though, till the way you divide the water up in the river, are they? [LR177]

ANN BLEED: Well, I suspect, to the extent that there's a correlation, it has to do with the amount of land... [LR177]

SENATOR LOUDEN: Okay. [LR177]

ANN BLEED: ...in the three basins. [LR177]

SENATOR LOUDEN: Okay. Now, having said all that, then would terracing have that much effect on each state? Because if you all had your equal...your prescribed share of terraces for the amount of water you were supposed to get, would that have a positive effect or a detrimental effect? [LR177]

ANN BLEED: Well, that's what we're still trying to find out, Senator, exactly what that effect is and just how it plays out, whether there's an increase in consumptive use, whether there's an increase in recharge, and what it does to the surface water runoff. That's all part of the study of what we're looking at. [LR177]

SENATOR LOUDEN: Okay. Thank you. I guess...Senator Wallman. [LR177]

SENATOR WALLMAN: Thank you, Senator Louden. Well, I read an article (inaudible) conservation magazine (inaudible). And I no-till farm myself and one of my neighbors doesn't. (Inaudible). And I (inaudible). So I think if we tie farming with water use, we probably wouldn't have trouble. But it's hard to get (inaudible) change. (Inaudible) It may take a little bit of a yield hit on irrigation, but in the long run I think you're saving money. And my farmer friends that irrigate, they may take a little less (inaudible). [LR177]

ANN BLEED: Uh-huh. [LR177]

SENATOR WALLMAN: (Inaudible) a little more (inaudible), but (inaudible) five years the yields actually increase. [LR177]

ANN BLEED: Yeah. Well, the yields increase and you don't have to pump as much. And just where all that plays out in terms of whether or not, because of the yields' increase, that would suggest there may be some increased consumptive use from minimum till of the rain, but at the same time you decrease the amount of irrigation water you have to

pump. How all that factors out is the question we're trying to get a handle on. [LR177]

SENATOR WALLMAN: (Inaudible). [LR177]

ANN BLEED: It's very difficult and, unfortunately, with things where we don't know the answers, there's a tendency on the part of some to say, well, that's all the...all the problem is due to that factor, or none of it's due to that factor, and we're trying to find out the reality of what is going on. [LR177]

SENATOR WALLMAN: Good luck. [LR177]

ANN BLEED: (Laugh) There was a question on exactly how much the model shows as being consumed by vegetation, and how is that working in the model. We do...did put into the model an estimate of the acres of riparian vegetation, noncrop vegetation, and that does...has changed through time. After the 1935 flood and before the reservoirs were built, there was a lot less vegetation in the basin. It has since increased over time and we've reflected that increase in the model. In recent years, well, in the 1920s the average annual riparian consumptive use of water was about 480,000 acre-feet. In the 1960s this had increased to about 540,000. But then in 2000 to 2005 that decreased to about 420 because water tables had lowered due to increased pumping and, obviously, the drought. And if the water table is lower, that means the vegetation can't use as much water and so the nonbeneficial use...consumptive use of that vegetation goes down. It's a term called ET salvage. And so that has helped us. The problem is, as water tables rise again, which they hope they do so we can get more flow to the river, that means the amount of ET for vegetation will go up unless Senator Carlson can help us get rid of the vegetation in the river. A number of questions about the stream-aquifer relationship: Do irrigation wells above a disconnected stream affect streamflow? Is it easier for Nebraska to comply with the Kansas agreement if the streams go dry? Essentially, as has been stated previously, just because a stream is above the water table elevation and you have a well at that location that is pumping in the ground water,

it may not affect the stream right at that location but it can affect the stream downstream. So the disconnect is that area but not necessarily throughout the basin. Also, the way we determine the impact of pumping on the streamflow is by running the model with all the wells off, so that we have all the water that otherwise would have gone to the pumping well that comes to the stream, and we run the model again with the wells on, and we look at the difference. Given that way of estimating streamflow, we're going to see the difference even if the streambed had gone dry. So the easy answer is, no, drying up the river is not going to help. And it will also get us into trouble as well down the road. What is the relationship of the aquifer level to streamflow? As the aquifer goes down, does the streamflow also go down? The easy answer there is yes. The model does take into account the relative height of the stream and the water table in the aquifer. If the aquifer is above the height of the stream, water will into the stream; if it's below water, it will go from the stream to the aquifer. It also depends on the ability of the water to move through the bed of the stream, and that depends on the nature of the materials in the stream. The model does try to take a look at that. The model and the stream itself is very sensitive to changes in the water table elevation. And a couple of points I'd like to make on that, just because you don't see any major declines in water table does not mean that the wells in an area are not impacting a stream. Pumpkin Creek is a very good example. For a number of years the natural resources district, the North Platte Natural Resources District, was monitoring water table elevations. They weren't seeing very many changes so they thought things were just fine. But then it got to the point where the wells had essentially dried up the stream. They saw changes in streamflow. The minute the stream was gone, the recharge to the aquifer from the stream was gone and the water table started to decline fairly quickly. So you can't look just at water table elevation changes to determine whether wells are having an impact on the stream. If you're increasing consumptive use in a basin and you are hydrologically connected to the stream, there will be a decrease in streamflow. The amount will depend on conditions, but there will be a decrease. An example that was developed by Jim Schneider which I think really speaks volumes is that, based on our understanding of the model, if there's a change in water levels of one foot, that the base

flow in change...in the stream would change about 724 acre-feet per river mile. Translating that into...I'll just use the Lower Republican NRD as an example, which is about 100 miles long. That would mean that for any inch decline in the water table along the stream you would have a 6,000 acre-foot decline in flow. And so that it...just because we aren't seeing four-, five-, six-feet decline doesn't mean we aren't having impacts on the stream. Even a one-inch decline has a significant impact on the stream. Their total annual impacts from ground water pumping in the Lower Republican is about 45,000 acre-feet, so you can see that (inaudible) significant amount of water. Another question: What percent of the normal precipitation has occurred in the Republican Basin each year of the last decade? And there is a table in the packet which essentially shows that about five years we're above the median precipitation, and five years we're below. The key there, however, is in 2002 we only had 2 percent of...a 2 percentile precipitation in the basin. It was an extremely dry year. And one of the things that happens if you have a very dry year is the ground water system, in particular, is very slow to respond. If you pump hard in that very dry year, the impacts of that pumping are going to be seen in streamflows for many years after that, even though the precipitation has increased. So there's a lag effect there. I'll skim over some of this, in the interest of time. One of the questions was, what percent...what portion of the base flows used by the model occur within 20 days of a precipitation event? The model is based on monthly stress periods. We do not deal with daily precipitation events so, in essence, that is not something the model can determine. To get a better handle on that what we'd have to do is do a surface water runoff model. That's something our staff is looking into doing but, again, it's a matter of either finding time for our staff to do it or the money to hire a consultant to do it, and so far we haven't gotten that done yet. But that would be something that would be very interesting to do and would also tie in with the impacts of conservation studies that we are doing. There is one correction I'd like to make to the written testimony. I forgot, a word was omitted on the second to the last page where we're talking about the mound, and I can make sure Jody has this later on, but the first paragraph in the answer, the fourth line down, after the word "decreased" we have to say "slightly." The question here is the mound credit has received from the Platte

River...I think, just to back up, because of the leakage of canals in the Platte system, the NPPD and Central Nebraska Public Power and Irrigation District system, we have developed a mound, which we talked about this morning, where water has been stored in the ground water aquifer, and a lot of that water is getting into the Republican Basin. So one of the things we're able to negotiate in the settlement is to get credit for this water that is not native of water or part of the virgin water supply of the basin. And the ground water model is used to calculate how much of that water in fact is not only getting into the basin but actually getting into the streamflow and to a compact gauge. We have seen the amount of water that's getting to the gauges that we can get credit for in the model decrease over time. We used to get about 20,000 acre-feet, but in 2003 we only got 10,000 acre-feet of credit, and it's gone up slightly since then. And the question is, what's going on? Based on our studies, one question is, is the amount of water actually seeping from the canals and getting into the basin decreasing? And, yes, that has decreased, but only slightly. So we don't think the actual amount of water coming from the mound into the basin is the big issue. The water that is coming into the basin, however, is not making it to the stream to be counted at a compact gauge. Based on our modeling, we believe that a lot of that water is being consumed by wells as it passes from the mound to the actual stream gauge where it gets counted. So that has caused a decrease in our credit. I think I'll stop there, unless there are any outstanding questions. And again, this is complicated stuff for after lunch. (Laugh) [LR177]

SENATOR LOUDEN: Questions for Ann? Senator Carlson. [LR177]

SENATOR CARLSON: Senator Louden. In here, (inaudible) got little section that talks about imported water, and the seepage from Elwood Reservoir is imported water. You give credit for 100 percent once it reaches the stream (inaudible) seeps out of Elwood Reservoir (inaudible) credit (inaudible). [LR177]

ANN BLEED: Well, we've looked at that, and not as much as we would like to get (laugh), but the amount of water that seeps out of Elwood Reservoir to date is not

creating that much water in streamflow in the Republican River. I'd have to check on this number, but I'm thinking it's less than 4,000 acre-feet. In fact, I'm wondering if that's 400 acre-feet. It's a very small amount, based on the modeling, to date. Now that doesn't mean...I'll check on that number for you, Senator, but that doesn't mean that in the future it couldn't increase. Ground water moves slowly, so sometimes these changes take a long time to see. [LR177]

SENATOR CARLSON: Thank you. [LR177]

SENATOR LOUDEN: Other questions for Ann? No, don't see any at this time. [LR177]

ANN BLEED: Thank you. [LR177]

SENATOR LOUDEN: Next testifier. [LR177]

STEVE SMITH: (Exhibits 14, 15, 16, 17, 18, 19, 20, 21, 22, and 23) Senators, thank you for holding this hearing. Thank you for taking public input. I appreciate it a great deal. My name is Steve Smith, spelled S-t-e-v-e S-m-i-t-h. I am the director of WaterClaim. We have taken a close look at the model, we've studied it for several years, and let me emphasize we don't have any problems with the software that Mike McDonald has developed. I think he'd developed a very accurate system. The software itself works well. However, the...we do have some concerns with a number of different inputs and I've prepared a list of what those are. I've given a detailed explanation of what we have as a concern for each one of those, but I'm only handing you out today the summary. If you'd like to take a look at any one of those questions in more detail, we have it on-line, and I've also given Barb a copy for distribution, if you'd like. One of the first concerns we have is with what I call missing water. Right now, if we were to turn off every irrigation well close to the stream, within, let's say, two, two and a half miles of the stream, we would stop using approximately 285,000 acre-feet of water. It wouldn't be taken out of the system anymore. But even after a number of years, if you take into consideration all

the lag effect, the maximum credit we will get is about 50,000 acre-feet. So the question then becomes, what happened to the other 250,000 acre-feet of water? Where did it go? Where did it come from? We've asked that question of a number of different individuals and the answer that we're getting now is that if the irrigation well is not using that water then the ET, the evapotransporation, rate will go up by the trees and grass. So in other words, whether we turn the well off or not, water is going to be consumed either by the corn plant or the tree. That's what our system says right now on a very large quantity of water. I encourage you to take a look at the graphs that we've placed on-line. Take a look at that for yourself. Ask those questions. Does that make sense to you? In order for that to be true, you would have to have a water table very close to the surface where the trees would be able to consume the water if the irrigation well wasn't, but was not able to consume the water if the irrigations were present. That doesn't make sense to me and it is a huge number. A second point and a concern that we have is with some of the input data, specifically, some of the pumping data. At one time, the Republican River Compact Administration placed all of the input data on-line, so you could download that and take a look at it. It was difficult to interpret because there wasn't any column headers and there weren't any row numbers, and so it was your job to figure out what each column meant, a very difficult task to do. The documentation wasn't very clear. Nonetheless, if you stare at the numbers long enough, you can figure out a little bit of a pattern. One of the things that we discovered was the amount of water used in the model runs in 2005 actually had pumping data at three times what the DNR says the pumping data was from the power meter readings. That has a large impact. That may have been corrected since 2005. I don't know. I have not been able to discover that. But if it hasn't been corrected and it had been done from 1920 through 2005, obviously that number gets scaled, but over a period of time that can add up to a significant amount. It's something that I think should be looked at. Another input data issue is regarding the base flows at several stream gauges. If you take the data that you obtain from the RRCA, from their data that they've placed on-line, and you compare that to actual USGS data to take a look what the stream gauge is, in several cases we have found, and we've given examples on those on-line locations, where the stream or what

is being used in the model has the seepage from the aquifer being greater than what the actual streamflow was. That's impossible. The streamflow is made up of two different components--the water that runs off from a rain event, and the water which seeps out of the ground. There are a couple of gauges in the model, in 2005, which have the amount seeping from the aquifer being greater than the amount of water that was in the stream. Obviously, probably just a simple correction that needs to be modified. Overall effect on the model is probably not that great, but nonetheless it should be accurate and that should be corrected. Next point: inaccurate level predictions. McDonald Morrissey and Associates did a review of their own model analysis and went back and did a study, and that study you can also see on-line. This is one of the ones which you can only see on-line. Even if I printed it out, you wouldn't be able to look at this one very well. You need to look at it on-line. Because what we did, we went through and we tied the actual stream gauge that McDonald Morrissey placed in their report to a dot, so you click on the dot and you can see what they predicted and you can see what it actually was. And you can see whether or not their predictions was that it would up or whether it go down, and if they got it correct. By our estimate, 56 percent of the predictions, by the model that we're using, did not match reality. Most of those errors were in the eastern end of the basin. The model said the aquifer would go down by a much greater percentage than it actually did. Well, if the model says it went down, but it really didn't, that means the model is overestimating Nebraska's depletions to the stream, and it's by a large enough amount that it's worth looking at. Now I don't have the ability to run the model, only the three-state compact administration can do that as a group, or each individual state can do it subject to the three states, but it is something which I think needs to be done with that in mind. Let's take a look at it. If it's off by 56 percent of the locations are wrong, that's a very large error rate. You can look at the data for yourself to see if you agree that that percentage is the case. Conservation--obviously, something that has got a great deal of press, a great deal of discussion. Ann Bleed just mentioned, and I agree, that this is the way the model works. Right now the system goes on and says, okay, let's turn off all of the irrigation wells. Let's do a run. Let's take a look at what the streamflow would be with all irrigation wells

off. Now let's turn the model...the wells on, do another model run, take the difference between the two and we're going to assign that to ground water irrigation. It's true that the model does not explicitly include conservation, but what ends up happening is because we take the difference--we take streamflow in 1920 and then we take a look at what wells would have been, if there had been a well turned on in 1920, what would the streamflow have been; or let's just go back to 2006, if we had no wells running in 2006, compared to what they would have been if we did--and the difference is all assigned to ground water. But all of us know that we have significant conservation effects that have affected the stream. So even know conservation is not in the system, it is being assigned to ground water pumping. For example, if I have a terrace here that's holding approximately 65 percent of the rainfall away from the stream, the model says 100 percent of that was caused by ground water pumping. Even though conservation is not in the system, the other effects are all assigned to that. That creates a big problem. And, Senator Louden, I thought your questions were fantastic that you asked there regarding the percentage breakouts and whether or not it would really affect Nebraska any greater than the other states; excellent questions, I think they should be pursued. I think that this is an issue which has profound influence for Nebraska. What's going to happen right now, as we saw in the Senator...or in the Governor's letter yesterday, the Governor says we're going to have to make much greater cuts than what have been publicly discussed. Well, there's two levels of allocations that have been discussed: for the lower, 11 inches. But the Governor proposed in McCook in December, and as reiterated throughout the last several months, that he thinks maybe something like a six-inch allocation would be appropriate. Which number is he saying that we need to cut even greater than we talked about? Was he talking a greater cut from the 11 or the 6? I don't know. It's not clear from his letter. Either one of them is not appealing and causes significant economic harm. Conservation is an area which needs a great deal more effort. Now Ann Bleed is also correct that the compact settlement agreement that we signed includes a provision that we do an additional study, but the interesting thing is the person who's doing that additional study has already done a preliminary study, and that copy I can make available to you, but Dr. Koelliker out of Kansas has already gone

through and made the estimates, and I've given Barb a copy of each one of those that you're welcome to look at. And it shows the percentage caused by...or streamflow retention caused by ponds, by terraces, by no-till farming, etcetera. And what Koelliker says is he just happened to find a location in Kansas where he said, what has happened here in Kansas, which is very similar to what's happened on the Republican, is we had two rain events. He said, we're almost identical in nature. We had almost the exact same amount of water fall on the same location 30 years apart from each other. In the 1950s, it created a flood. The same time of rain event over the same area a number of years later had half as much water go into the stream because we have built thousands upon thousands of miles of two-foot high dams. They have a big impact. That ground water still does have an influence on the stream, no doubt about it, but it is not nearly as great as what we're attributing to it. And here's the problem. Right now, if we go in with a model and we say we're going to shut off X number of wells and we're going to reduce pumping by X percent, let's say we do it, what ends up happening...in fact, we'd have a real life example. We asked the NRDs to cut allocations by 5 percent in the year 2005 and 2006. They did. In fact, the cut their allocations and actual pumping by significantly more than that. And yet, we didn't get the water in the stream that we expected. Why not? Well, partially because we overestimated the benefit of cutting off wells because of the conservation issue. Now one of the more important (inaudible). The next point is regarding base flow, the calculation methodology. I've done a great deal of research on base flow and it is probably the most important number that goes into the model. Base flow is the amount of water that seeps out of the aquifer into the stream. What I discovered is that you would think 100 percent of the base flow would come from the aquifer. Well, technically it does, but over 50 percent of that comes within a few days of a rain event. So, for example, let's say that I have 100 acre-feet of water seeping out of the aquifer into the stream. Fifty percent of that flow, over 50 acre-feet per year, day, whatever time frame you want to look at, occurs within a few days of a precipitation event. If the precipitation event does not occur, the base flow does not occur. In other words, the point is the way we as a society have chosen to calculate base flows overestimates base flows by a very large percent, and that has a

huge and profound effect on our model that we use. Now this is not something that the DNR is responsible for. They didn't make that choice. This is something that we as a group of people, the people who study hydrology, have decided how to do that, but it's not applicable in the Republican River Basin. And I think if you were to sit down and take a look at those numbers and those graphs in detail, I think that you would find that those base flow calculations look awful suspect. And if I were you, I would want to adjust those a little bit. As I was studying base flows, I found something awful curious. I went back and look at the base flows that are used by the model since the 1920 era and I discovered that base flows dropped by 50 percent in the late 1940s. Boom, overnight, within three years half of the water that comes out of the aquifer disappear. It coincided with the construction of the dams. Now think about it. If you would build Swanson Reservoir, you build any one of the dams, Enders, for example, Harlan County, if you build that dam does it make sense to you that the amount of water coming out of the aquifer would drop in half permanently? According to the model, that's what happened. Maybe there's an explanation for that. In my opinion, if you build a dam you're probably going to put more water into a small catchment area, you're going to cause more water to seep out of the bottom of that and fill the alluvial area below the dam. So you would theoretically have a greater base flow, if anything. If there was any change at all, it would be a greater base flow, but according to the model it was cut in half on every stream that has a dam. That looks awful curious and suspicious to me. I don't have an explanation for (inaudible). I'm not even sure what the implications to the model are, but it's worth looking at. Ann Bleed also mentioned the question regarding whether or not this model was better/different than other models. If you talk to a couple of hydrologists, they cite one major deficiency in this model as compared to, for example, to COHYST. The COHYST model is a multilayered model. The Republican River model, using our system that we have, is one layer. The disadvantages for that, especially true in the Upper Republican, where we have a large amount of dirt, dry dirt, between the surface area and the base of the aquifer, the saturated thickness area. If you have a multilayered aquifer model, you will be able to differentiate between that and differentiate between a disconnected stream and a connected stream much easier. By

having one single-layer model, we end up making a lot of assumptions that we have a lot greater connectivity between hydrological areas and nonhydrological. Now that's probably a reasonable and okay thing to do when you are in, perhaps, the Middle and the Lower Republican, where they definitely are close together and they do connect with each other. But in the Republican River Basin there's also a shale layer that goes between most of the Ogallala formation and the Republican River. There is a great deal of disconnect. Sit down with Mr. Goeke some time, talk to him, and let him explain to you. He's the professional hydrologist who probably knows more about water than anybody in the state. Sit down and ask him about a one-layer model versus a multilayer. Ask him about the shale ridge that runs along the Republican River Basin. Ask him what he thinks of having a single-layer model. I chose to just give you the highlights and the summaries. There are a lot of questions/concerns that I have, that we have, about the model. We think that most of these things would be to Nebraska's benefit if they were addressed. If we do not address these issues and we continue on the path we are, then it is my belief that we are going to significantly reduce the amount of ground water irrigation we have in the Republican River Basin from top to bottom. And under the current system that we're putting in place now, it is my belief, within a decade or two it is likely that we will shut off most irrigation under the policies that we're implementing today. If that's what we as a society choose to do, that's what we have a right to do, but I don't think we need to do that to comply with Kansas. We're doing it for other reasons. If the model is correctly calibrated and addressed each of these concerns, I think you would have a little bit of a different response and a different reaction. Thank you very much for your time. [LR177]

SENATOR LOUDEN: Questions for Steve? I do, Steve. You were talking about base loads back when, what did you say, years ago you've looked at it and they decreased, and they decreased in 1940. Do I understand you right? Then you don't think that the irrigation is affecting the base loads? Is that...is that what you're telling me? [LR177]

STEVE SMITH: No. I do believe that ground water irrigation does affect base flows, but

not at 100 percent, as what the model currently says. I do believe that there are a number of other factors that affect it as well. Now from what's the effect of that comment? Let's take, for example, let's say that conservation causes 65 percent of the depletion of the stream, but it's being assigned to ground water pumping right now. Well, Nebraska still has the same problem regardless of whether it was conservation or ground water pumping that caused it. At the end of the day, Nebraska is still out of compliance by the same amount. But it does shift who's responsible and it doesn't shift what we do. It's not just the shifting of responsibility. The other thing is, if I go out there and I shut off an irrigation well and I'm expecting X acre-feet to show up on the stream but it's actually only causing 20 percent of what we expect, then I'm only going to get 20 percent of the water. So it's important that the model accurately tell us what's causing the depletion. Ground water pumping does cause some of the depletion. [LR177]

SENATOR LOUDEN: Now do you agree that ground water pumping will probably dry up some of the creeks and stuff that feed that Republican River as you move out away from the riverways with wells? I mean, if you're in an area where creek drainage is and you put a well in, you're probably going to stop some of the flow of that creek. [LR177]

STEVE SMITH: I will affect that streamflow, yes, and it's happened right where I was born and raised, on the upper end of the Frenchman Creek. On the upper end of the Frenchman Creek we used to fill what is called Arterburn Lake every year. That is no longer full and, in fact, it's been farmed over because it doesn't ever fill anymore. Ground water pumping is a part of that, but it not 100 percent, as it's being assigned the responsibility now. [LR177]

SENATOR LOUDEN: Now how do you feel that that works in with trying to stay within the compact? I mean, what percentage should you give for some of those irrigation wells that are ground pumping, I guess I should say, along some of those creeks in those areas that dries up those creeks? [LR177]

STEVE SMITH: I think that the model which the three states have agreed to use is a very good way to calculate that, and obviously it's going to vary based on a lot of different things. But it's important that the data that we put into the system accurately reflect some of the causes. Right now all conservation effects are intentionally excluded from the system. Well, nonetheless, the way we measure whether or not we're in compliance is we take what is the streamflow. We measure. We thought the streamflow would be X if ground water wells weren't on, but it's actually Y. The difference is assigned to ground water pumping even though there may have been a tree that intercepted it, even though there may have been a terrorist that intercepted it. Well, even though as those things happen, ground water gets full responsibility. Just shutting off the well isn't going to compensate for the tree and for the terrace. [LR177]

SENATOR LOUDEN: One of these graphs here I thought showed the amount of precipitation percentage, you know, that you didn't get, I guess. Those, like this last year, I suppose you've had probably more than normal precipitation up and down that river. Did some of those streams start flowing again that were...that feed that river? [LR177]

STEVE SMITH: They flowed for a few days, but they're back to dry. [LR177]

SENATOR LOUDEN: Did they quit? [LR177]

STEVE SMITH: The ones that have been dry for, in other words, the last five... [LR177]

SENATOR LOUDEN: Did they quit flowing when they turned the wells on, or did they quit flowing before the wells were turned on? [LR177]

STEVE SMITH: They quit flowing before the wells were turned on. [LR177]

SENATOR LOUDEN: In other words, it was more or less surface drainage and that

was, when that drained off, it was gone. [LR177]

STEVE SMITH: Correct. Let me address the concept, though, of like the terraces. I think a lot of what happens to the water on a terrace depends on what time of year you look at it. If I look...for example, this year we've had a lot of water and some terraces existed in my country that I didn't even know existed there, but when there's water there you can see them. They're quite noticeable. If you have that water fill up the terrace in the winter, then that water sits there for quite some time and either the ground is frozen, or maybe it seeps slowly into it, and I do think a fair chunk of that goes maybe into the aquifer or evaporates away. In the summer, however, if that terrace...if you get a big rain event and you fill that terrace, what ends up seeming to happen is the plants...a lot of plants have roots that go three, four, five feet deep. My opinion: If you have a terrace in the summer, you probably lose almost all of that water to increased crop production or weed production or whatever it might be. In my opinion, very little of that water that's in a terrace gets to the aquifer in the summer, and it sure as well never gets to the stream. [LR177]

SENATOR LOUDEN: Well, I understand that and you're probably right, because we notice that in the country where I live. You can get rains in the spring and you'll get puddles, but you get rains in the summertime and the grass uses it up pretty fast because it's used (inaudible). Any other questions for Steve? Seeing none, thank you. [LR177]

STEVE SMITH: Thank you. [LR177]

DON ADAMS: (Exhibits 24, 25) Senator Chairman Louden and senators of the committee, Senator Wightman and Senator Hansen, we appreciate you grinding away on this issue because the last two days have been a grind for you and I appreciate it. I was, I guess, not surprised to hear from...my name is Don Adams, executive director of Nebraskans First, a statewide coalition of ground water irrigators, A-d-a-m-s. I guess I

wasn't surprised to hear from Ann that the cooperative agreement was developed after playing golf and drinking beer. I can identify with what happens in that situation, Ann, so that clears that issue up for me. I'm here--this will be relatively short; three, four minutes maybe--but just to reiterate our concerns on the terracing issue that we expressed at the two LB701 hearings. I handed out again for you, you've had a copy of it before, the BOR study that clearly says that terracing is the largest impact on depletions to streamflow, explicitly states that, and that was when? 1979. Since that time, terraces have doubled. in that area. At the hearing on LB701, and there's a picture coming through now, you saw large aerial photographs of the terracing in northwest Kansas that, at the time, was holding back half a million acre-feet of water. The Republican River Compact Administration summary on the ground water model states, quote: The RRCA model is fully operational and calibrated to represent the physical and hydrological characteristics of the Republican River Basin to a reasonable degree. Yet, the biggest impact is being excluded. Quote: The RRCA model is calibrated to a sufficient degree that depletions from ground water pumping and accretions from imported water from the Platte River system may be quantified and assigned to prescribed streamflow reaches. But again, the biggest impact on streamflow is excluded. Quote: The RRCA model simulates historical and current physical conditions, but it is not an optimization or operational model, and it does not assess the impact of land use and conservation practices or reservoir operations. Why not? It says the model provides a detailed description of all major facets in the RRCA model structure, all except the biggest impact, which is excluded. It is a fact that conservation measures, and primarily terracing in northwest Kansas, are responsible for preventing a tremendous amount of water from flowing into the Harlan Reservoir, as was the case when the compact was entered into over 60 years ago. This is a critical issue because the water storage in Harlan is the primary factor, the linchpin, for determining if there's a water-short, or dry, year. We again appeal to this committee to take an active leadership and oversight role in reassessing and reforming the compliance mechanism to explicitly fully account for the very real and ongoing impact of conservation measures on the Republican River flows. There is just way too much controversy, way too many

questions on this issue to allow it to go forward unchallenged. I think forcing, I know this, believe it, forcing compliance solely on the back of ground water irrigators on that basin will not get us in compliance if we don't deal with the big issues on streamflow effects. But it will send us down the road to economic disaster and will destroy the economic base, our schools, infrastructure, and quality of life that exists, at least currently, in that basin. Thank you. [LR177]

SENATOR LOUDEN: Any questions for Don? Senator Carlson. [LR177]

SENATOR CARLSON: Senator Louden. Don, I think maybe you've misstated something when you started (inaudible) over again, about the effect of terraces and so forth. (Inaudible) say...let's go back to what you said about in the original agreement they weren't there, right? [LR177]

DON ADAMS: That's correct. [LR177]

SENATOR CARLSON: Yeah. I think maybe, unless I heard wrong, you stated it they other way. They weren't there. They're there now. That's the biggest factor. [LR177]

DON ADAMS: Right. Sixty years ago there wasn't ground water pumping either, but there were no reservoirs either, no terracing. It was a free-flowing system. Yeah, the plumbing now has been dramatically changed. Beaver, Sappa or Prairie Dog, with the terraces that hold back the massive amounts of water, cannot fill Harlan unless they're maxed out, and then we get a major precipitation event and then we get whatever runoff there is. But I keep hearing that it's questionable, the impact of terracing. Well, the BOR was on top of this in '79. They did this study and explicitly, unequivocally stated that that is the biggest impact on streamflows. And since that time the impact has at least doubled. So if it was the biggest then, it's far and away the biggest impact today. [LR177]

SENATOR LOUDEN: Any other questions for Don? Seeing none, thank you. Any other testifiers? How many testifiers are left? Just that one? Okay. Was going to say I don't mind running through the noonhour, but the help (inaudible) run fast-forward. (Laughter) [LR177]

MIKE CLEMENTS: (Exhibit 26) Senator Louden and other senators, members of the committee, my name is Mike Clements, that's M-i-k-e C-l-e-m-e-n-t-s, and I'm the general manager of the Lower Republican NRD and we're located in Alma, Nebraska. I thought that Steve made a lot of good points. He raised a lot of very good questions, so I will not reiterate on any of that. I just had some...a few comments that I wanted to make, and I'll try and keep this very, very brief for you. First of all, our district, in 2005 and 2006, used 7.4 and 7.6 inches respectively, with 11-inch allocation. So I thought that we've done quite well (laugh), but we're still overusing. So I think that that's one thing that I'm not really sure that everybody understands when you look at what some of the water use is across the rest of the state. Before we put flow meters in, we had guys that had gravity that were using over 40 inches of water, and they didn't realize it till they had a meter. But anyway, I think we've made some great strides. The thing that concerns me is there's a lot of pieces to this puzzle. There's four major reasons, and they're very simple; four different things that contribute primarily to the depletions of Republican River. Conservation measures, which has been talked about, 65 percent of the depletions to the Republican River come from conservation. You got a very, very...well, not counting 2007, but up until this year probably one of the most severe droughts that we've seen in recent history. You've got riparian vegetative growth that is just unbelievable. Several of you were on the tour last week and got to see firsthand of what that channel of the Republican River looks like. And then you've got ground water pumping and surface water use. Well, of those four categories, there's only one category that's being targeted to make up the entire shortfall and that's the ground water pumper and the surface water users. So that's something that we need to keep in mind because how the model plays into this is...in predicting, making determinations, I don't know all the technical intricacies of the model and...nor do I...nor am I probably capable

of knowing all of them. (Laugh) But one of the concerns that I have is, as far as the staffing that the department has, and I'm...the modelers that we have do an excellent job and I'm not pointing my fingers at the work that they do, but I think that they are overworked. We've got basically two people at the...for the Department of Natural Resources that know how to run the model and I think that that's one area that could be improved upon a lot. It would help with getting us the information that we need and I'm sure will take a little bit of stress off of those folks too. (Laugh) We're totally...we are totally reliant upon the knowledge and the input of two modelers and I think there's a lot at stake here, so we need to make sure that we're not putting all of our eggs into one or two baskets, if you will, and to make sure that we are getting the most bang for our buck, because we're entitled to that. I guess the other thing that I wanted to mention was 60...over 60 percent of the flows to the Republican River come from runoff. They do not come from base flow. So it is primarily...the main stem of the Republican itself is primarily a runoff river. So that's really all I wanted to bring to your attention. I would be glad to answer any questions if you have any for me. [LR177]

SENATOR LOUDEN: Any questions of Mike? Senator Wallman. [LR177]

SENATOR WALLMAN: Thank you, Senator Louden. Yeah, Mike, I realize that (inaudible), but we're not going to change. You know what I mean? [LR177]

MIKE CLEMENTS: Yeah. Yep. [LR177]

SENATOR WALLMAN: (Inaudible) and probably get less. But when we put these structures in, the government did it, Bureau of Reclamation, (inaudible) want to say. Do you think they were really fair in setting up this (inaudible)? They had to realize it was going to make (inaudible) and (inaudible) most of our precipitation (inaudible) May,... [LR177]

MIKE CLEMENTS: Yep. [LR177]

SENATOR WALLMAN: ...in April. So this year we sent a lot down there, didn't we? [LR177]

MIKE CLEMENTS: Oh, yes, we did. [LR177]

SENATOR WALLMAN: It didn't count, did it? [LR177]

MIKE CLEMENTS: No. It...a lot of that, most of it did count. I believe that Nebraska got about 49 percent of the flows that were in the Republican. Below Harlan County Reservoir we had a huge flood event. I don't know what was, probably in April or early May. That got counted. The nice thing about that is it got counted immediately and we didn't have to take the evaporation on it. The flows that are...that came into Harlan from the rainfall events above Harlan were counted if they were...went by a stream gauging station at one of the compact gauging stations. That would be counted. What really hasn't been counted to this point that will eventually get counted would be water that came into Harlan that wasn't...that didn't go past a gauging station, from a smaller tributary or whatever. Then that's not going to get counted until it is released from Harlan, whether it's this year or next year or two years from now, whenever. It will be counted eventually. [LR177]

SENATOR WALLMAN: Thanks. [LR177]

MIKE CLEMENTS: Thank you. [LR177]

SENATOR LOUDEN: Other questions for Mike? Seeing none, thanks, Mike. [LR177]

MIKE CLEMENTS: Thank you for your time. [LR177]

SENATOR LOUDEN: And you got...one more...okay, fine. [LR177]

JASON KUNKEL: I have to say this is the first time I've ever testified in front of a legislative committee, so I appreciate the opportunity. Haven't done this before, so if I'm lacking in protocol, I do apologize. My name is Jason Kunkel, J-a-s-o-n K-u-n-k-e-l. I'm a resident of Lemar, Nebraska. And I was born here in Nebraska, grew up here, educated here. Have always been a little bit of a history buff and I was kind of reminded of an exhibit my wife and I saw just about a month ago in Denver, ironically enough, on the Titanic, and I was reminded of a quote that amateurs built the Ark and experts built the Titanic. That come to mind today as I listened to a lot of this. Not to detract from experts, but if you look into the history of that, the main architect who had a primary role in designing the expansion joints on that ship, which they believe now may have ultimately failed. Those joints were rudimentary, at best. They were the first of its kind, but they did indeed fail, and the ships that come along after Titanic were modified. And none of this really come up in testimony. None of it come up in the investigations. It was done pretty quietly, but it was done belatedly. And even her sister ships who were built with those same expansion joints were modified after the fact. Of course, that was too late for the people on board. And I just want to say that, given what we've heard here today about the concerns that we have of conservation, of how not necessarily the model but how the model is interpreted, I do irrigate and I really hope I'm not on board the Titanic. Thank you. [LR177]

SENATOR LOUDEN: Did you sign in one of those sheets there, Jason? [LR177]

JASON KUNKEL: No. This one? [LR177]

SENATOR LOUDEN: Yeah. [LR177]

JASON KUNKEL: Okay. [LR177]

SENATOR LOUDEN: Any questions for Jason. I have one, Jason, then. You think then

that that model for the way the Republican River Compact is done should be modified then because some of our expansion joints are leaking? [LR177]

JASON KUNKEL: Well, I do. How to go about finding out whether it needs to be done I believe is your job. There's been several individuals that have pointed out our concerns here today. As you can probably tell...I don't know if there's any other members of the press here today or not. The one I saw early on left, indeed before the hearing on this bill was...or on this study was even begun. So I don't believe, and if you read some of the editorials, that they may not be fulfilling their job. You know, ultimately, you're our last resort. I mean you are the supervisory component. [LR177]

SENATOR LOUDEN: Well, on that I might...you might remember the courts, or whoever the water god is down there, has quite a lot to say about it too. But that's what I was wondering, if your opinion that terracing and some of that stuff wasn't taken into...wasn't done back then but it was supposed to have been accounted for in the model. And the question is, has it been correctly taken into account? [LR177]

JASON KUNKEL: I don't believe it's been accounted for accurately. I, as with some of the other testimony here today, I don't believe that it is given full responsibility for its effects. [LR177]

SENATOR LOUDEN: Okay. Other questions for Jason? Senator Carlson. [LR177]

SENATOR CARLSON: Senator Louden, I really don't have a question. Jason, it's interesting, listen to your heartfelt thinking and emotions that came through as you made your brief remarks. I listened to Mike. Of course, I've spent quite a bit of time with Mike over the last couple of years in taking about these water problems. But it gets back, and I just want to make this comment before we adjourn today, that I think that as a Legislature we did about the best job that we could have on LB701, and this isn't putting blame in any direction. We started out with a, in a sense, false pretense. You in

the Republican Basin NRDs, people that are farming, never made that agreement with Kansas. It was an agreement made by the state of Nebraska. And yet, you were willing to step forward and make some real painful, hard decisions and agree to some taxation. (Laugh from audience.) It's pretty serious. And there's nothing pleasant about that. And I think that we need to keep in mind as legislators, again, I believe we did what we could do. We can only do what we can get 40 other senators to agree with. But the state needs to share a bigger responsibility in the cost of what we're facing, and I think we need to keep that in mind as we go along and, Jason, we'll do our very best. [LR177]

JASON KUNKEL: Thank you. [LR177]

SENATOR CARLSON: Thank you. [LR177]

SENATOR LOUDEN: Any other questions for Jason? Seeing none, thank you for testifying, Jason, and we might point out that we're going to be in Alma with our dog and pony show, when, sometime in October, last of October sometime, so come on down, testify again if you want to. We're glad to have you. [LR177]

JASON KUNKEL: If we're not picking corn, I'll definitely try. [LR177]

SENATOR LOUDEN: Oh, take a little time off. We don't care. That corn will still be there the next day. [LR177]

JASON KUNKEL: Maybe. (Laugh) Thank you. [LR177]

SENATOR LOUDEN: Thank you for coming. With that, I guess I close the hearing on LR177. Appreciate your testimony. [LR177]