OFFICE OF CONSERVATION

STATE OF LOUISIANA

IN RE: GROUND WATER RESOURCES
COMMISSION MEETING

REPORT OF MEETING

HELD AT

EUNICE, LOUISIANA

SEPTEMBER 16, 2009

Michelle S. Abadie, CCR

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OFFICE OF CONSERVATION
STATE OF LOUISIANA

IN RE: GROUND WATER RESOURCES
COMMISSION MEETING

Report of the Commission meeting held by the Ground Water Resources Commission, on September 16, 2009, in Eunice, Louisiana.

IN ATTENDANCE:
REPRESENTING THE OFFICE OF CONSERVATION:
Scott Angelle, Secretary, Natural Resources
James Welsh, Commissioner of Conservation
Eugene Owen, Louisiana Rural Water Association
Kyle Balkum, Dept. of Wildlife and Fisheries
Eugene Coleman, Sparta Ground Water Conservation
Paul Miller, Dept. of Environmental Quality
Dan Hollingsworth, Louisiana Municipal Assoc.
Mickey Mays, Police Jury Association of Louisiana
Jimmy Johnston, LA Wildlife Federation
Glenn Cambre, Dept. of Health and Hospitals
Bo Bolourchi, Dept. of Transportation and Development
Paul Frey, Louisiana Landowners Association
Jackie Loewer, Chicot Aquifer
John Adams, Staff Attorney, Conservation
Gary Snellgrove, Ground Water Resources Division
Tony Duplechin, Ground Water Resources Division

REPRESENTING ATTORNEY GENERAL'S OFFICE:
MEGAN TERRELL

REPRESENTING U.S.G.S., LOUISIANA WATER SCIENCE CENTER:
JOHN LOVELACE

REPRESENTING S.J. LANGLINAIS & ASSOCIATES, INC.:
STEPHEN LANGLINAIS

REPRESENTING AGL RESOURCES/JEFFERSON ISLAND STORAGE & HUB, LLC:
TIM GOODSON

REPRESENTING SABINE RIVER AUTHORITY:

JIM PRATT
15091 Texas Highway
Many, Louisiana 71419

REPRESENTING DESOTO PARISH WATER WORKS:

JOHN NEILSON
302 North Washington Avenue
DeSoto Parish

REPRESENTING SELF:

HERSCHEL L. BOURQUE
8461 Highway 99
Welsh, Louisiana 70591

GROUND WATER RESOURCES COMMISSION MEETING

SEPTEMBER 16, 2009

* * * * *

MR. ANGELLE:

We'll go ahead call the Ground Water Resources Commission meeting of September the 16th to order, and I ask for the staff to go ahead and call roll.

MR. ADAMS:

Hi. My name is John Adams, let's go ahead with the roll.

Mr. Scott Angelle?

MR. ANGELLE:

Here.

MR. ADAMS:

Mr. Kyle Balkum?

MR. BALKUM:

Present.

MR. ADAMS:

Mr. Bo Bolourchi?

MR. BOLOURCHI:

Here.

MR. ADAMS:

Mr. James Burland?

(No response.)

MR. ADAMS:

Mr. Glenn Cambre?

MR. CAMBRE:

Present.

MR. ADAMS:

Mr. Gene Coleman?

MR. COLEMAN:
Here.
MR. ADAMS:
Mr. Elliot Colvin?
(No response.)
MR. ADAMS:
Mr. William Downs?
(No response.)
MR. ADAMS:
Mr. Paul Frey?
MR. FREY:
Here.
MR. ADAMS:
Mr. Garrett Graves?
(No response.)
MR. ADAMS:
Mr. Dan Hollingsworth?
MR. HOLLINGSWORTH:
Here.
MR. ADAMS:
Mr. Jimmy Johnston?
MR. JOHNSTON:
Here.
MR. ADAMS:
Mr. Jackie Loewer?
MR. LOEWER:
Here.
MR. ADAMS:
Mr. Mickey Mays?
MR. MAYS:

Here.
MR. ADAMS:
Mr. Paul Miller?
MR. MILLER:
Here.
MR. ADAMS:
Mr. Eugene Owen?
MR. OWEN:
Present.
MR. ADAMS:
Mr. Kelsey Short?
(No response.)
MR. ADAMS:
Mr. Brad Spicer?
(No response.)
MR. ADAMS:
Mr. James Welsh?
MR. WELSH:
Here.
MR. ADAMS:
I believe ten is required for a quorum. We have more than ten here, so we do have a quorum.
MR. ANGELLE:
Thank you, sir.
Just a couple of housekeeping items, I would ask that the members here of the Commission speak rather loudly, above your normal conversation voice, because of the lack of microphones that we have up here. We do have recording devices up here. As I've stated to you before, one of the things that we did in this new,

reorganized Commission is that we were going to have a court reporter here creating a transcript which we have done, and she has microphones spread out up here. I'm assuming that she's picking that all up. However, when you speak, so we don't have to carry the microphone, pass a microphone down, when we have members of the public that wish to talk, just raise your hand, and our staff will help pick up the audio there.

Item No. 2, adoption of minutes, we have presented to you the December 18th and March 5th and the July 28th minutes, I think were sent to you by e-mail. It's also my understanding that the minutes of a previous meeting, perhaps in October -- was that right, Mr. Snellgrove --

MR. SNELLGROVE:

Yes.

MR. ANGELLE:

-- was -- in October of 2008, were also submitted to you, but because we did not have a quorum at that meeting, we are not looking to approve minutes but we have a summary for you, and I'm hopeful that you have an opportunity to review the minutes that have been submitted to you.

And we would entertain a motion to approve those minutes, for the record.

MR. COLEMAN:

So moved.

MR. ANGELLE:

Motion by Mr. Coleman.

MR. OWEN:

Second.

MR. ANGELLE:

Seconded by Mr. Owen.

Any objection to that motion?

(No response.)

Any discussion?

(No response.)

MR. ANGELLE:

Hearing none, that motion is adopted.

Item No. 3, we have with us, from the Office of Attorney General, Ms. Megan Terrell. You recall that Ms. Terrell was with us last meeting and did an exceptional job of kind of going over the duties of the Commission so that we can continue to understand what our role is and where the bright lines exist between the authority of the Commissioner and the authorities of the Commission. Having said that, I thought it would be a good idea for her to continue, and we will continue to do this, until such time that we all have a pretty good grasp of it.

So thank you again, Ms. Terrell, for being here, and we ask that you thank Attorney General Caldwell for his extraordinary support of the protection of the natural resources of this state.

MS. TERRELL:

I am glad to be here. Again, my name is Megan Terrell, and I work for the Environmental and the Lands and Natural Resources Section of the Attorney General's Office.

I'm here really just to give you a brief overview of the existing ground water statutes. I paid specific attention to the dual jurisdiction and the duties of both, the Ground Water Resources Commission and the Commissioner of Conservation.

MR. ANGELLE:

Ms. Terrell, excuse me, just for members here, which is where they're handicapped, is there a copy of the PowerPoint presentation in each member's packet, and is that in the folder; is that correct?

So if the members would pull the -- is this it -- if you would pull this out of your packet, you would have the information in front of you that Ms. Terrell will likely be going over; is that correct?

MR. SNELLGROVE:

Yes.

MR. ANGELLE:

Okay. Give everybody a moment, if you would, just so they can find it.

MR. HOLLINGSWORTH:

Is there someone who can work on your microphone? We've got feedback making it hard to understand. I think it's up too loud.

MS. TERRELL:

I might not need it. Can everybody hear me if I speak without the microphone? I usually do a pretty good job of carrying my voice, so I'll just speak loudly. I might be easier to understand than the microphone.

First, I'll go over some of the main duties of

the Ground Water Resources Commission. Some of those duties include reviewing and approving or rejecting challenged orders; placing restrictions on water wells issued by the Commissioner of Conservation, and it's my understanding that, at this time, no orders have been challenged.

Another duty is to review and comment on the rules and regulations proposed by the Commissioner of Conservation, and the statute provides for an opportunity for review and comment of the Commission.

Also, the Commission is to continue to develop, in conjunction with the Commissioner, a statewide ground water resources management program. The Commission must also hold public hearings and consult with local government entities in the development of this program. And the details of this are going to follow later on during at the meeting, and this process is ongoing at this time.

The Commission is also going to review the contingency plan developed by the Commissioner of Conservation to respond to ground water emergencies.

Also, to attend all public meeting called by the Commissioner of Conservation.

And, finally, some of the -- the statute also provides specific duties of the Commissioner of Conservation, and some of those duties include requiring registration of all new water wells by water well owners, and this process is ongoing at this time; to review well information submitted with the notices of intent within 30 days of their receipt, and the

Commissioner may either issue an order to the owner placing restrictions on the well, request additional information if necessary, or allow the well to be drilled as proposed.

The Commissioner also determines areas of ground water concern and designates critical areas of ground water concern, in accordance with the statute; collects data with respect to water wells and water resources; also development of a statewide ground water resources management program.

The Commissioner also will continue the development of a contingency plan to respond to a ground water emergency that gives ground water needed for human consumption the highest priority. I understand that there is a contingency plan that was effective August 15th of this year.

The Commissioner also can authorize the use of drought-relief wells for agricultural use in times of drought upon the determination that efficient water resources are otherwise not available. This has been authorized by an order issued by the Commissioner.

He can also enter into interagency agreements and interstate compacts in order to manage the ground water resources, and there are agreements with multiple agencies for data sharing to pursue this goal.

And also, he can enforce the Louisiana Ground Water Management Law through the issuance of compliance orders and civil penalties.

So, as you can sort of see, this statute really

spells out what I referred to earlier as the dual jurisdiction between the Ground Water Resources Commission and the Commissioner of Conservation.

MR. ANGELLE:

Questions?

MR. HOLLINGSWORTH:

Mr. Chair, could I ask a question?

MR. ANGELLE:

Yes.

MR. HOLLINGSWORTH:

Gene Coleman and I were visiting before the meeting, and someone had indicated to Gene that there is such a myriad of different and conflicting laws regarding water usage right now, that is a major, major problem.

Is this effort going to clear that up and -- to where we've got distinct lines of delineation between what we can do and what we can't do to where you can --

MR. MILLER:

I think --

MR. ANGELLE:

When you say "is this effort," I'm not sure what you're referring to.

MR. HOLLINGSWORTH:

Well, I thought, in outlining these duties and try and get the --

MR. ANGELLE:

Well, I mean, yes. The purpose of -- let me say that, there is obviously a historical body of law that

exists --

MR. HOLLINGSWORTH:

Right.

MR. ANGELLE:

-- that gives a lot of different agencies a lot of different authorities and what they do and how they manage it, not only local governments and water districts, but also DEQ and DHH and DNR and the Office of Conservation and on and on and so forth.

The reason for my having Ms. Terrell here is not to, during her presentation, provide a real clear understanding of where all those lines exist, because, quite frankly, I don't think that there has been yet a comprehensive review of all those lines.

And it -- you will see a little bit later in our ground water management plan perhaps that's one of the things that we need to address, okay?

What I'm trying to do here is -- it is somewhat odd that the Commissioner of Conservation is also a member of the Commission, and yet, he has statutory authorities of which we do not have the authority to get into his business because the legislature has clearly delineated that to him, and as we try to go through it, when you take the folks that we have here who have a lot to do in your ordinary lives, I think one of the clear things that I have a duty of doing is saying, okay, if I'm going to go to this meeting and I'm going to contribute, I need to know where I can contribute, how I can contribute, and where I'm out of bounds in my contribution. And I think that, if we

can continue to have and see this in front of us, over time, we will grow into the Commission that I think the state needs us to be, at the same time understanding that, if we want to get into another area that is the Commissioner's authority, then we need to respect that and we need to go to the legislature in the ways that we can before we get into a situation and I'm overseeing a Commission that the Commissioner is telling me, look, I appreciate it, but that's my responsibility.

And, Mr. Mayor, you understand the clear lines between chief executive officer of your office, as well as City Council, so it's more that.

What I would like is some just kind of a interaction with Ms. Terrell. Again, I understand the dual role. One of the things I think I see here, though, is that the legislature has invested in the Commissioner the responsibility of the day-to-day execution, and we either -- and some of the things on Page 4, we review and approve or reject his work when it comes to placing restrictions on water wells. We review and comment on his work. We review -- Item No. 3 seems to me where the meat and potatoes of what the Commission will do.

Certainly, the State has invested, in my mind, a budgetary category, a statutory responsibility for the Commissioner to do the heavy lifting associated with regulating this industry. We serve as a check and balance perhaps, and where I think we can best implement the things -- or we can best impact, I

should say, the things that the Commissioner has to implement is how we put together a comprehensive plan, much like a board of directors of any organization, which you leave to the CEO to implement the day-to-day duties of then and then perhaps come back and check whether or not the implementation of those things are consistent with the plan.

And I hope that is -- you know, now we're in south Louisiana today, I get to give you the Cajun explanation, Mayor, which is a long answer to every question that you might have, and so I hope that kind of helps you and the Commission members and me, in particular, too, understand where we're trying to go with this.

I'd ask, if any member wants to question Ms. Terrell on, you know, your individual duties and responsibilities to, please, do so, to send us e-mails, because we are trying to build this as we move forward. Okay?

MR. HOLLINGSWORTH:

Very good.

MR. ANGELLE:

Very good.

That will probably cure your desire to ask me another simple question today.

Okay. Thank you, Ms. Terrell. I appreciate it very much.

And we will now move on to Item 4, and welcome Mr. John Lovelace to the Commission, and thank you for being here, sir. I appreciate it. You are our

partner with the U.S.G.S., and as I appreciate it, have a lot of knowledge of the Chicot Aquifer. You were with us, I think, a couple weeks ago --

MR. LOVELACE:

Yes, sir.

MR. ANGELLE:

-- is that correct?

Again, welcome to the Ground Water Commission and thank you for being here. We do appreciate our Federal partners.

MR. LOVELACE:

Well, thank you.

And I'm going to make two presentations. The first one is basically a shortened recap of what we talked about a couple of weeks ago in Baton Rouge, and it's just an overview of the status of the Chicot Aquifer system. And the second one -- the title is a little bit beyond what I was going to do, but it's going to be -- I'm not sure what the best management practices out there are for artificial recharge, so I'm going to give you an overview of what artificial recharge is.

MR. ANGELLE:

And which document are we looking at here?

MR. LOVELACE:

The first one is the "Chicot Aquifer System."

MR. ANGELLE:

Is it this one here (indicating)?

MR. LOVELACE:

Yes, sir.

MR. ANGELLE:

Members of the Commission, if you would look this way it is this one here (indicating).

Thank you, John.

MR. LOVELACE:

All right. Let's start out with a thanks to our funding partners for all the data that I'm going to show. The information was collected through partnerships with DOTD, the LSU Ag Center, the Rice Research Board, and some data from Calcasieu Parish. The Calcasieu Parish Police Jury funded -- funding some work for us to work in the parish.

Our problems and concerns that I pointed out before, there are some areas where there's withdrawals that are causing water level declines in the aquifer, in the Chicot Aquifer system, and in some areas, those withdrawals have caused declines to the point where there's -- conditions are favorable for the saltwater encroachment, especially along the coast and over here in the Atchafalaya River Basin.

The Chicot is the most heavily pumped aquifer in the state. This is a -- chart just showing how much water is pumped from each major aquifer or aquifer system. You can see right away that the Chicot right there, the longest bar, is by far the most heavily pumped aquifer.

MR. LOEWER:

Can we ask questions during your presentation?

MR. LOVELACE:

Certainly.

MR. LOEWER:

When you say we have water level declines, is that depression or depletion?

MR. LOVELACE:

Depression, depression, it's just water levels -- the Chicot, most of its extent is a confined aquifer, that means it's -- the water is under pressure. It's confined by clay, and if you put a well into the aquifer, then you go drill down through a particular layer of clay, and the water is under pressure, so it's going to rise up so far in the well casing. It's still above basically what we consider the top of the aquifer in most areas.

So, when you say "depletion," I'm thinking of water levels have fallen below the top of the aquifer and starting to pull -- starting to create some empty spaces down there.

MR. LOEWER:

And it's not that?

MR. LOVELACE:

It's not that.

MR. LOEWER:

Okay. Thank you.

MR. LOVELACE:

I'll show you in more detail just that in a few minutes, and we'll also get into what it means when you start dewatering an aquifer, does it have much need? In some cases, perhaps not.

And this is where the Chicot Aquifer is. That lighter blue area near the top, that is the recharge

area, and that is where it's, more or less, unconfined. It comes up to the surface there and gets a lot of its recharge. The darker blue area is where it is confined.

When you look at pumpage around the state, you'll see right away that some of the -- these are kind of color-coded. The darker parishes have the heavier pumping, and you'll see right away that southwest Louisiana has some of the heaviest pumping. And really, you can see there Jeff Davis and Acadia Parish. Then the surrounding parishes are all kind of dark, and that's because there's a lot of agriculture, particularly rice irrigation, in those parishes, and rice irrigation requires a fair amount of water.

MR. ANGELLE:

John, how much of -- how far does the Chicot Aquifer extend into Texas?

MR. LOVELACE:

It extends all the way down the coast, basically, to Brownsville.

MR. ANGELLE:

So what geographic areas -- I mean, is -- would it go as far as the Houston area?

MR. LOVELACE:

Yes. It is south of Houston. It swoops across and down the coast.

MR. ANGELLE:

So when we talk about the Chicot -- from the Federal level, when we talk about the Chicot Aquifer, what happens, as a nonscientist, somewhat handicapped,

what happens in --
MR. LOVELACE:
Is what is happening in Texas affecting us here and vice versa?
MR. ANGELLE:
Yes.
MR. LOVELACE:
No. As far as we can tell, looking at our water level surfaces, the maps we create for Texas and we create for Louisiana, there is essentially a divide around the Sabine River where what we're doing over here really doesn't affect them over there very much.
MR. ANGELLE:
Okay.
MR. LOEWER:
And they have their own recharge area?
MR. LOVELACE:
Yes.
MR. LOEWER:
This is not the only recharge area?
MR. LOVELACE:
That's right. The recharge area extends across and down there, too.
MR. ANGELLE:
Okay. All right. That's interesting.
MR. OWEN:
Mr. Chairman, there is -- information -- I don't know if Mr. Lovelace agrees with this -- but the water that you're drinking here in Eunice today is not really typically Chicot water. It's from Evangeline,

which may have at this point some natural interconnections with Chicot, but it's mostly from the Evangeline and from the very bottom of the Evangeline. You may notice that the water here in Eunice is -- tastes a little flat compared to Baton Rouge water, and that's -- the reason for that is because of the use of lime to extract the iron and magnates that occur naturally in this water. If you go to Crowley, just 20 miles south, that's typically Chicot water.

MR. ANGELLE:

Thank you, sir.

MR. LOVELACE:

That is absolutely correct. If you go a little bit east of here, the town of Opelousas does have wells in both the Chicot and the Evangeline, but they get the bulk of their water out of the Evangeline.

And right in this area, they can get water out of either source, but the Evangeline has better quality than the Chicot in this area, so, typically, most of the public supplies right in here are tapping into the Evangeline.

A little farther south, the Evangeline starts breaking into saltwater, so, basically, below here, most of the public supplies and everyone else is using water from the Chicot Aquifer (indicating).

MR. COLEMAN:

But the general flow is from the recharge area almost directly south?

MR. LOVELACE:

Before there was a lot of pumping, yes, that is

correct, it was south to the coast.
MR. COLEMAN:
Naturally, it would be.
MR. LOVELACE:
Naturally, naturally, it was from north -- north to south and slightly to the east where it's the Atchafalaya River Basin, also.
This pie simply shows the breakdown of what the pumping is used for. You can see, about three-quarters of it is for agricultural purposes. irrigation is almost all rice irrigation, and the aquaculture is crawfish farming, which is often on the same plots as –- with the rice.
One interesting thing on here is a ten percent slice of the pie for industry, and almost all of that pumpage is very concentrated in the Lake Charles industrial area, which is sort of between Lake Charles, Sulphur, and Westlake.
MR. BOURQUE:
Can I ask a question, sir?
MR. LOVELACE:
Yes.
MR. BOURQUE:
Do you all show charts on the salinity of the Chicot from south to north?
MR. LOVELACE:
I have -- I don't have it on the part of this presentation, but it's fresher and slowly grades a little bit saltier as you go both south and to the east.

MR. BOURQUE:

It would give some of us a better idea if you are -- according to south to north or if its --

What I'm asking you is to give us a chart of the salinity from south to north. For the agriculture business, we're having more problems convincing people that in Kaplan and the Vermilion Parish area that the water is still not -- it's not getting any saltier. They're just using it more because they have less surface water to use. So if there's an argument, I'm having problems with the farmers convincing them that it's not a problem. We're cycling (phonetic) back up, and, in fact, you're showing us those people -- I'm just looking for a chart.

MR. LOVELACE:

You're saying a map?

MR. BOURQUE:

Well, some kind of chart to give us an idea of what the salinity should be in Kaplan --

MR. LOVELACE:

Oh, okay.

MR. BOURQUE:

-- versus Eunice and south of the Lake Arthur. Because at your last meeting, they asked about that. They complained about the water being too salty.

MR. LOVELACE:

Right. And what --

MR. BOURQUE:

And I want to see if it did change from the '50s until now.

MR. LOVELACE:

We do monitor chloride content in several wells. We have about 20 wells in the Chicot, so that's a huge expanse that we're monitoring chloride in, and we're not seeing much change in the rice farming areas in those wells.

Now, there are some points, like south of Abbeville, there's an interconnection between Vermilion River and the Chicot Aquifer, and there's a shallow sand there and we see those wells becoming more salty, so there's a -- there is a salty area around -- but that's been there. It's been known for a long time. That area, there's an area up in St. Landry Parish that's getting saltier. The -- they're asking about, the Gueydan area, is also an area.

In those areas, the salt water is closer to the surface. It's about 400' or less down, and if you pump heavily in those areas, like during drought, years they can pull salt water up into the wells.

The project we did with the Rice Research Board and the Ag Center was specifically to look at chloride and specific conductance at the wells, at the irrigation wells. And we made some maps from historic data from around the area as to what sort of conductance in chlorides could be expected in different areas. And maybe that might help you out more than anything. I can give you a copy of that report after the meeting.

It also has a chart -- someone had asked, what

the effects -- you know, how salty does the water have to be before it starts affecting rice? There's -- the LSU Ag Center developed a chart for that some years back, and I included that into the report and tied it to grains per gallon, which I'm not familiar with the term, but we tied that to milligrams per liter chloride and also the specific conductance.

MR. ANGELLE:

So, John, obviously, from the Ground Water Commission, the gentleman had a great question. It would be important, as we're driving towards a management plan, at least in my mind, that we need to, not only have an idea of number of wells, volume, the kind of statistics that we all talk about with regards to quantity, but it would be good for the Commission to have in the ground water management plan a review of salinity levels by, you know, geographic areas, I guess, monitoring wells or whatnot, over a period of time to see how those salinity levels have increased, decreased, whatever may be the case. It would seem like to me that would be an early warning sign or a concern for management to pay attention to those kind of things.

MR. LOVELACE:

And we've been looking at that for a long time. We have the model (phonetic) network with DOTD. This specific project with the Ag Center and Rice Research Board, we were looking -- because this same thing came up. Those drought years in the late '90s, farmers were saying, hey, our wells are getting salty. We

went out, we did a three-year study. We asked -- we distributed sample bottles to the farmers, asked them to bring them in, we would test their water, and we did this for a couple of hundred wells scattered all through the Chicot, and we did not see the kind of problems that they were saying they were having. There was one well where the chlorides were obviously going up over in the Iowa area, but that's -- that is another area where there is high salt.

But part of the project was to establish sort of a baseline across the area, get as many samples from as many wells as we could, and I guess, if the problem arose again, we could go back and sample those same wells or they could bring in samples again, and we could try -- you know, look at it again to see if they were really any changes.

Lots of times -- we hear a lot of anecdotal information, people saying, hey, our water quality is changing, and when we go and look, lots of times, we just don't see it.

MR. ANGELLE:

One of the things, it's not so much I'm concerned about checking it again as much as there is of wanting the Ground Water Commission to have the historical information, have it part of our vital statistics, if you will, have it out there on our Ground Water Resources website so that folks who have concerns can get to that information rather easily in one place. I know that we're probably linked up with U.S.G.S., but those are some things that I don't want people have to

come through different windows to get to. It's something that I want to be very, very forward and out front with regards to interaction with the public, because I think it's very important.

MR. LOVELACE:

Okay.

MR. ANGELLE:

Thanks.

MR. WELSH:

John, is there not a great deal of rebound in the agricultural cone of depression when it's not rice farming season?

MR. LOVELACE:

That's correct.

MR. WELSH:

About how many feet; do you --

MR. LOVELACE:

Between 5 and 20 -- 5 and 30'.

MR. WELSH:

So that -- what time of the year that you take these samples would have a bearing on chlorides, too, I guess.

MR. LOVELACE:

That's right.

We did look at a couple of wells over in Cameron Parish which were mildly impacted by saltwater just to see. We measured conductance in those wells hourly while they were pumping, just to see what was happening, but, typically, they're pumping for a matter of days to a week then they turn off the pumps,

and a month later, they'll pump again, and they'll have -- they'll pump for five or six different pumping events during the year to replenish the fields, refresh the fields, whatnot. When we're looking at that, what happens when they turn on the pump, is the salt going up? What happens during the season? Is the salt going up when they turn it off? Next season, you know, six months later, when they turn it on, is there any change?

And what we saw is, when they turn on the pump, the conductance or chloride level was lower, but over a matter of 12 hours, it went up and it stabilized at some level, and it really didn't go very much past that level. Then after a week, they turned it off. It was off for a month or so, and they turned it back on, it started that low level again and went back up. It never got -- the wells never became saltier. There -- but they did seem to be slightly fresher when they first turned them on, for whatever reason.

It could be leaking of fresher water at the top from the shallower part of the casing down into just the -- into the well casing, so when they turn it on, they're getting a little bit of fresher water first. There could be some sort of stratification in the well. I'm not really sure, but we didn't see the wells getting saltier over time, either during the event or during the season or over three-year's time.

MR. OWEN:

John, you're saying -- we're doing our best to keep you from addressing the subject at hand, but if

you will entertain one more question and fully answer this gentleman's question about salinity in the Chicot. Is it necessary on the south end of the south side of Chicot to distinguish between the Upper and the Lower Chicot? Because we have found in the New Iberia area that the Lower Chicot is actually changing its salinity as opposed to the Upper Chicot, and invariably, it may depend on which of those sands that they exist is two separate sands the well is actually developed in.

MR. LOVELACE:

That's right. And we're seeing changes over in that area, too. Generally, I'm seeing freshening in our monitoring wells, similar to what you're seeing, but -- we have one monitoring well in Iberia Parish and one in St. Mary Parish, and they're both getting slightly fresher over time.

I think that break between the Upper and Lower -- I haven't really looked very much in that area to see what it's like. I really don't look at the Lower Chicot that much. I know it is used in more of the eastern side. In the Lafayette area, there are wells in the Lower Chicot, but most of the work that I have done has been kind of more looking at the Upper Chicot, because we do -- it's where we start grading of the saltwater in a lot of areas.

This graph is showing the changes in pumping over time, and you can see that pumpage now is not all that different than it was back in the '50s and '60s in the Chicot. It's pretty much stabilized. There has been

a period where pumping was -- withdrawals were rapidly increasing, but that's tapered off and pretty much stabilized since the '80s.

I'm going to show you a couple of cross-sections just to give you an idea of what the aquifer is like, and the -- it slices from the north, going down about 1,500, 1,600' along these lines, runs essentially north-south from Vernon Parish down through Cameron Parish to the Gulf, and the other one is going to be along the -- basically along I-10.

So this is sort of an idealized view of what the Chicot Aquifer looks like, and this is kind of compressed laterally. This is -- from north to south, it's really about 90 miles, so it would be -- if I stretched it out, it would be a very thin, narrow strip, and you can see the vertical scale going about 1,600', so that's 90 miles --

And you can see, the red area -- oh, I'm sorry. The blue area is where you have fresh water, the tan is confining clays, the red is where there is salt within the sands. I put a green-dash line in there to mark the base of the Chicot, and beneath that, you have got the Evangeline, and beneath that, you have the Jasper Aquifer.

In the Lake Charles area, in Calcasieu, and Cameron Parish, we've divided it up into three sands, the Chicot Aquifer, and they're named after their depth in the industrial area. Most of the pumping over there is actually in the 500' sands.

There is concern that heavy pumping from the

aquifer in the middle of the parish will pull some of the saltwater out. Saltwater is denser than fresh water, so it typically hangs what we call downdip in the aquifer. You can see, the whole thing kind of dips towards the coast, so it stays downdip and really moves along the base of the aquifer. It stays near the base because of the density of it. There is some concern that the saltwater will move up along the base of the aquifer because of pumping in the Lake Charles area.

And as far as water levels -- and I do have a line showing what water levels were like in about 2005. You can see the dashed line near the top, and you can see, it's well above the top of the aquifer and typically anywhere between 700' plus of fresh water beneath that line.

MR. HOLLINGSWORTH:

John, could I ask a question?

MR. LOVELACE:

Yes, sir.

MR. HOLLINGSWORTH:

The Chicot is a really prolific aquifer, as I understand it.

MR. LOVELACE:

Yes, sir.

MR. HOLLINGSWORTH:

It recharges pretty quickly, and there's an enormous usage on it, but it recharges at a very high rate?

MR. LOVELACE:

Yes, it does.

MR. HOLLINGSWORTH:

Has there ever been an analysis done to study whether the turnover in the aquifer, itself, that is, large volume of new water, large volume of outgoing water, the turnover process, itself, does that contribute to the saltwater if it gets a certain level; have there ever been any analysis done on that?

MR. LOVELACE:

We have done computer models of the Chicot Aquifer that shows inflows and outflows. I haven't really seen any effect on the saltwater.

You're asking -- I'm not quite sure what you are asking, as far as how the saltwater would be affected, if there's a flushing going on?

MR. HOLLINGSWORTH:

Well, I -- that's what I'm asking. Is there so much new water coming in and such an enormous volume going out that you've got a change -- you've got an exchange going on all the time, is that contributing to maybe pulling saltwater into the system that you might not get any other way?

MR. LOVELACE:

No. Because there's -- what's happening is that the saltwater or -- the fresh water most of it is recharging up in the recharge area, up there in Vernon and Beauregard Parish, and it's moving southward, and what is, you know -- before there was any pumpage, that water moved down -- downdip until it encountered the saltwater, and it sort of pushed against the

saltwater, that's where the aquifer is confined, and it held the saltwater back. And because of pumping now inland, there is not that pressure on the saltwater anymore, and that's what is precipitating the saltwater movement, and the -- you have saltwater that may come up from the coast or a little from the Atchafalaya Basin and possibly up from the bottom of the aquifer, but it's just that whole change in the pumpage -- the flows in the area that's contributing to the areas where saltwater is an issue. Saltwater has always been there --

MR. HOLLINGSWORTH:

So your water level hasn't changed any?

MR. LOVELACE:

The water level has changed.

MR. HOLLINGSWORTH:

Okay. So there's less pressure on the saltwater?

MR. LOVELACE:

That's right; that's right.

MR. LOEWER:

John, several years ago when we were in a drought, we asked some of these same questions, and it was interesting to note in your answers that the pressure -- that the problem was not the flow of the water, it was the pressure on the water, and what -- for laymen to -- for me to understand it, it was very revealing that it's the pressure that keeps it back.

MR. LOVELACE:

Right.

MR. LOEWER:

And this is not a bathtub filled full with water that you take it from any place and then someone lowered the levels. It's really a pressurized, contained system.

What was really interesting, as you say that and while it's highly recharged, I think you had mentioned the fact that the flow of water from north to south, it takes decades for it to move.

MR. LOVELACE:

That's right.

MR. LOEWER:

It's not like when it rains there and Morgan City sees it tomorrow.

MR. LOVELACE:

-- decades, centuries, maybe even --

MR. LOEWER:

For that same water to -- when you say "new water," "old water," that new water doesn't get to Kaplan very quickly, from what I understand.

MR. LOVELACE:

That's right.

MR. LOEWER:

Just to share a layman's view of it, it's the pressure on it, that's really --

MR. HOLLINGSWORTH:

So, it really -- it can't be there to relieve that pressure, is what --

MR. LOEWER:

Right.

MR. LOVELACE:

That's right.

MR. HOLLINGSWORTH:

Right. Which exacerbates the problem where it's got heavy withdrawal.

MR. LOEWER:

Plus, it reduces the pressure, the heavy withdrawal.

MR. LOVELACE:

Looking at that east-west section, you can see, there is saltwater in the base of the aquifer, in the base of the lower sand.

And if you'll look east of Calcasieu Parish, you see, there -- it's basically divided into an upper and lower sand. There's very little clay in there. It's a pretty big, massive sand, and that's why it's such a good aquifer. The sand grains are medium to coarse, and it's capable of transmitting a lot of water.

Again, we show the water level there at the top. You can see, it's -- in both of these, there's a below point in that water level, and that's where the pressure is lowest, so with the pressure change, the water movement is going to go towards where that pressure is lowest.

MR. BOURQUE:

John?

MR. LOVELACE:

Yes?

MR. BOURQUE:

Does U.S.G.S. still estimate that you lose 1' of water per year, or do you have a chart to tell these

folks in the Chicot how much is lost per year?
MR. LOVELACE:
Yes. I am going to show you that in a minute.
MR. BOURQUE:
Okay.
MR. LOVELACE:
And this is a water level map. I'm simply showing where the water levels are lowest and the direction of water movement. And as Mr. Loewer pointed out, that water is not moving very fast. It's a very slow process, but it is moving towards the -- this long, elongated, irregular cone of depression. Those water levels are up here in southern Evangeline Parish, and all across Acadia and parts of Jeff Davis Parish, water is lowest.
And the little arrows, which you probably can't see very well, but they're showing the directions of the water movement. This is a recharge area up here, water moves down, but it's -- instead of moving all the way towards the coast like it used to, it gets intercepted in this area, and now water levels are lower here (indicating). So we do have the gradients for water to move from the eastern and southern extents where there is saltwater in them towards the pumping areas.
Let's talk about the chain of perspective in this map, but let's reorient you a little bit here. Here is Acadian Parish, Jeff Davis, the eastern side of Calcasieu. This green blob down here is where we have a fresh water/saltwater interface in the aquifer.

It's fresh water on top of the saltwater. South of this line, there's no fresh water in the Chicot at all, but in this area, there's fresh water on top, and, typically, people in this area are pumping it from the upper part of the sand where there's fresh water.

Now, you can see a couple of little, odd shapes here, and those are south of Abbeville and over in Gueydan and the western side of Vermilion Parish, those are areas where the saltwater is only about 400' down. So if you have a 300' well and you're pumping pretty hard on it for an extended period of time, you do run the risk of pulling some of that saltwater up off the bottom of the aquifer into your well and putting the saltier water on your fields.

Here are graphs of three wells in the Chicot Aquifer, and two -- the top two are the Evangeline and Acadia Parishes. You can see the large fluctuations caused by seasonal pumping for agriculture, and you can see long-term declines there since the '60s. We ran this back to the beginning of the century. It just goes up and up, where we have about 100' decline over 100 years in the aquifer, but you can also see that water levels haven't changed a whole lot in the past 20 or 30 years or so. They've been relatively stable. There was some decline in the '90s, but other than the fluctuations, the change hasn't been a whole lot.

And this map simply shows areas where there is large, seasonal fluctuations, and in this area, there

is a risk, you know, the 20 and 30' fluctuation, some of the shallower wells may be impacted often, especially domestic wells. They're trying to -- you know, wells typically cost more the deeper you go, so homeowners try and cut their costs. They put the well kind of as shallow as they can but try and be safe, but typically, those are the first wells that are showing up, start having problems, when water levels decline. And it's kind of the greener areas here where we would expect to see any problems with water level declines.

And, Mr. Bourque, this is what you were talking about. This is -- shows seasonal change -- or I'm sorry -- long-term changes, a ten-year period of change, in the Chicot Aquifer. From 1990 to 2000, that was the time when we did see that drop in water levels across the area, and we saw about a 1' per year drop in -- especially in the rice farming area. But we realized there was a lot of -- there was several years of drought in the late '90s, and when we redid this map from '95 to 2005, we were only getting about a half a foot per year drop across the Chicot.

So when you start looking at how much water there is in the Chicot, 700' plus, a half a foot per year can go a lot of years without having a whole lot of problems.

A different scenario in Calcasieu Parish where they're pumping from the 500' sand, there's a very deep, concentrated cone of depression over the industrial district.

I moved my slides around.

And anyway, there is saltwater at the Calcasieu-Cameron Parish line, and because of the gradient here, water is moving towards this cone of depression. There is a potential for that saltwater to move north. And we do have three monitoring wells along that interface. They are all showing some slight increases.

So, in summary, we do have some declines. We do have saltwater encroachment in some areas. Really, the only place we're seeing the -- any real -- interface seems to be at the Calcasieu-Cameron Parish line in the 500' sand, but with those, you do have the gradients there for saltwater encroachment. We're continuing to monitor the area and trying to watch and see if anything does happen.

I'm going to go right into the second --

MR. BOLOURCHI:

John, question.

MR. LOVELACE:

Yes, sir.

MR. BOLOURCHI:

You mentioned the water use in Calcasieu Parish?

MR. LOVELACE:

Yes.

MR. BOLOURCHI:

And you do have a water level surface in 1995. Would you say something about why is the water level -- since -- from 1985 to today --

MR. LOVELACE:

Okay.

MR. BOLOURCHI:

-- and the reason for it?

MR. LOVELACE:

Okay. The lower graph, if you go back to the chart that had three graphs on it, water levels and wells, the water level, the well at the bottom is in the Lake Charles industrial district, and it's screened in the 200' sand. Now, that well is -- that sand is not -- it is really used for domestic purposes. There's a little bit of pumping from it but not a whole lot. Most of the pumping in the Lake Charles area is from the 500' sand, a little bit from the 700, but the aquifers are pretty well interconnected, so everything that happens in the 500' sand affects the other sands.

As you can see, in this graph, in about 1982, water levels rose abruptly, and that's because the Sabine River Diversion Canal was completed and about half the water that was being pumped in Lake Charles, the ground water, about half that pumpage stopped, and they started taking water out of the Sabine River Diversion Canal. And water levels in the 500' sand rose 60 to 70' over about a six-month period.

And this is the 200' sand, water levels that felt a change transmitted through the sands into the 200' sand. We saw a 10 to 15' rise in that sand, also.

But that was a big event over in Lake Charles when they started using that water, that solved a lot of their water problems in a very short period.

MR. FREY:

Was that industrial use or municipal use or both?

MR. LOVELACE:

Most of the use out of the Diversion Canal is industrial use. There is one public supply over there that's using water from it, but it's pretty much industry making that change.

MR. PRATT:

Wasn't the Diversion Canal constructed to discard irrigation purposes?

MR. ANGELLE:

Mr. Pratt, you want to speak in the microphone?

MR. PRATT:

Sure.

MR. ANGELLE:

Identify yourself for the court reporter.

MR. PRATT:

Mr. Bolourchi is very familiar with this --

MR. ANGELLE:

Your name, sir, your name for the record.

MR. PRATT:

Jim Pratt, Sabine River Authority, State of Louisiana.

The Diversion Canal was made -- built primarily for the agricultural and industrial customers at that time. It was actually conceived back in the early '70s. It came around, of course, in '82. Department of Public Works, which Mr. Bolourchi was involved with, constructed a transfer to the River Authority in the early '80s.

Currently, we run 20 billion gallons a year through this system. It's primarily industrial. There are two refinery plants, Conoco-Phillips and CITGO. We no longer have a municipal water supply on that. They went to another source. So it's all industrial, with the exception, we have a small number of agricultural customers that still buy water from us. But I'd say 98, 99 percent of it is industrial.

FYI, we're at about 30 percent capacity of what we can deliver. So we're delivering about 20 billion gallons a year from the Sabine River. Through that system, we could increase that three-fold.

MR. LOEWER:

Is it pumped or natural flow?

MR. PRATT:

No, it's pumped. It's pumped at the river, raised about 27', and then it's a natural gravity flow through a canal system. But we do have two pump stations in the west Lake Sulfur area where we put it into a pipeline and go on over to the Lake Charles industrial park.

MR. ANGELLE:

So the elevation of the Sabine River and this canal is a 27' difference?

MR. PRATT:

Correct. We lift it right at the river, so from the river to the industrial area, it's a gradient up north, so that we don't have to use any pump stations until we get into our pipelines.

MR. ANGELLE:

Is it cost effective for you based on the amount of revenue that you generate from your sales to run the cost of the pumps?

MR. PRATT:

Originally, when it was conceived, by the time the bonds were issued in the early '70s and the customers came online to completion, no, it necessarily was not. Although we did not have to supplement operations, but the original bonds were forgiven by the State.

We just renewed our contracts this past July with all industrial customers, and the rate that we charge in the canal is around 18 cents per 1,000, 22 cents per 1,000 with pipeline, and all the customers were more than willing to sign up for that. But that gives us a reserve account to do our capital improvements and maintain the system, so it works very well, from a financial perspective.

MR. ANGELLE:

What would be a rate that you -- that, you know, a typical homeowner would be paying, or commercial customer would be paying, from a system across the state, just, I mean, 10, 12, 8?

MR. PRATT:

Typically -- well, the water out of Toledo Bend Reservoir brings us 15 cents per 1,000, and we're delivering it actually through the system for 18 and 22.

Comparatively, industrial customers has come to us that have looked at the Beaumont area for location.

We get those from the Lower Neches Valley River Authority, and their prices were comparable to ours, a little bit more, but we're still well within the market, from an economic feasibility perspective.

MR. ANGELLE:

Anybody know what the average Louisiana resident is paying?

MR. HOLLINGSWORTH:

Yes. I know what --

MR. ANGELLE:

What are the rates in Ruston?

MR. MAYS:

Nothing.

MR. ANGELLE:

It's free?

MR. MAYS:

Well, just the distribution.

MR. ANGELLE:

No, but, I mean, it costs money to deliver it to -- I'm assuming that the residents have to pay a monthly bill, and it's something based on value; is that right, Mickey?

MR. MAYS:

Yes.

MR. ANGELLE:

So what is that rate for 1,000, I guess what I'm looking at?

MR. HOLLINGSWORTH:

It's about five or six cents.

MR. ANGELLE:

Five or six, okay. I'm just trying to get a comparison.

John?

MR. BOLOURCHI:

Mr. Chairman?

MR. NEILSON:

John Neilson, Water District No. 1.

I think you're talking apples and oranges, because when we deliver potable water at our commercial rate, at our system, is $3.00 a 1,000, and $3.25 for homeowners, but what Jim was talking about is just raw water out of the river, so it's -- there's a lot of difference in the water quality, and, of course, that makes a difference in the price.

MR. ANGELLE:

Yes.

MR. BOLOURCHI:

Mr. Chairman?

MR. ANGELLE:

Yes, sir.

MR. BOLOURCHI:

I think this -- the -- providing the water to the industry and to irrigator at the time the Chicot Aquifer was really -- the water level was going down, I think this is really -- we need to congratulate the State and the legislators for providing the fund, for stepping to the front and do something about it.

A lot of people keep talking about, you know, the water level is going down and all that, and maybe they should take this group off the -- off from using the

water and all that, but that's not going to work.

I think our job is to come up with solution, and that was an excellent solution, that we provide water as much as they need. We brought the water to the back doors of the industrial complexes of Calcasieu Parish, that is a good example of what can be done.

Now, on the other side, the owner can do something about it, that's in Morehouse Parish in northeast corner of our state. The International Paper, we worked with them ten years ago in regard to their wells, et cetera, et cetera, and they went -- started using surface water about 50 percent, and the water level came straight up.

So the Chicot, and also in Morehouse Parish, it shows that aquifers are a living thing, and when you move away from pumping, the water level comes right up, so it's not all lost. The aquifers recharge.

A good example John mentioned that, in 1984, within six months, the water level came up 20', but overall, really, it was more than 20'.

Thank you, John, for the explanation.

MR. ANGELLE:

Thank you. Good comment.

MR. BOURQUE:

One other thing I'll add, Bo said that is the best thing Calcasieu Parish could have ever did for commercial and residential -- in a residential area. So these larger wells, 4-inch wells, had a static level between 100' and 140' in the '70s, so it's easier to make them shallower. Now, the same wells

had a static level between 50' and 60'.

Now, as you move closer to Texas (phonetic), it's a little lower, but it shows that what was done in Calcasieu Parish was excellent. It helped industrial. It just changed the world all together, because Calcasieu Parish would have been in trouble with water, if something wouldn't have got done in that time. Whether it's rough water or treatable, it still helps them -- it helps the Chicot to rebound. Of course, it's a lot in there, but it can be drawn out, and it can be repaired if we use water reasonably.

But that's something that they did that helped the industry, it helped everybody in the south part of the state, and that's what -- I want to make sure it doesn't happen in Vermilion Parish, Iberia, the south part of -- we want to see if agriculture is damaging the zones full enough -- they say that agriculture uses the majority of the water. It's big, big usage, and some of them use surface water if they have it, but the surface water is not as -- with the levees and the saltwater encroachment thing. They don't use it near what they used to, but they can't.

So we, as an industry, we can monitor some of that south of us. Calcasieu Parish got a handle, but Cameron, Vermilion, all that, needs the same treatment Calcasieu got. They need to look at it and measure it, not to suck that water back up because the barrier is there. If we suck it too hard, you know what's coming. We just need a formal (phonetic) vision to look and see what we're doing with this industry.

Thank you.

MR. OWEN:

Mr. Chairman, I think that we have touched on probably the easiest, most accessible, most available fix to our ground water problems. In so many instances, there are industrial uses of water which can be, at a nominal cost, but with an imagination, used to completely eliminate or alleviate the withdrawal on our ground water supplies and diverting them to surface waters.

And it's a matter of money, and I think that, as Mr. Pratt has just pointed out, a timely application of imagination and engineering to address this problem has been there. It's been the salvation in your area.

There -- Mr. Bolourchi pointed out one area in the area of Baton Rouge -- for instance, when Exxon voluntarily removed its cooling water supplies from ground water to river water and installed its river water cooling and recirculating system. For a while, Exxon was using once-through cooling water through all of its heat exchangers. When they did that, we had the average rise in aquifers in Baton Rouge of 15 to 30'.

MR. ANGELLE:

I think when we look at the suggested tasks for the ground water surface management plan and getting -- selecting a contractor that is going to help us develop this plan over the next several months -- and we'll get to that toward the end -- but one of the things that we looked at was identifying those

situations and then trying to inventory them, if you would, so that we could, if you would, to borrow a cliche', identify that low-hanging fruit where there is little capital costs, as you have indicated, but yet, a high return on that investment. And, again, you know, everybody is kind of doing their own thing, and hopefully, the Commission can kind of start over time bringing that together.

MR. OWEN:

Right.

MR. LOEWER:

FYI: For those of you who live in the Baton Rouge area, if you go back on Interstate 10, on the other side of Lafayette, I guess it is, where you cross the Teche River, you see water running down that Teche River. Now, it's been raining, so, naturally, it's been running, but you can go there any day of the year and see rough water because of the Teche River Diversion Project that pumps water from -- I think Red River and goes down to the Atchafalaya.

In our community, we've kind of laid it to rest for a while, but because of the -- but there's been a plan that we've tried to develop, taking Red River water, and we've contacted your office before you were in it, to take Red River water and run it down through the Mermentau River, and what that will do then -- it's not industrial, but it would -- those people along that water bayou would support that, then would not have to use their deep wells. They could use surface water for agriculture purposes.

There are many different ways -- like you said, be creative and --

MR. ANGELLE:

Hopefully, we can lead the discussion for those policy issues here and bring about those solutions where we can manage the resource over the long term.

Okay. John, we've interrupted you enough. Why don't you go ahead? You're doing a really great job of kind of fielding these questions as we go, and I appreciate that.

MR. LOVELACE:

Thank you.

Artificial recharge, what I'm going to do is –-

MR. ANGELLE:

Which document are we looking at?

MR. LOVELACE:

I'm not an expert on artificial recharge. I know a little bit about it, and I did a little bit of preparation for this, and I'm going to give you a broad overview of water use. You would be surprised at how much it is used across the U.S. because of the reasons.

But it's basically -- it's really a tool to maintain or increase reliable water supplies. And "reliable" there is the key, because a lot of areas that have -- are using artificial recharge don't have reliable, year-round supplies. They have, you know -- especially in the very western states, they get a lot of snow melt, runoff. Their streams are frozen part of the year, and so they have come up with these

different ways of banking water when they have it. They store that water for future use, and it's used in areas where there's a lot about agriculture and where there's serious ground water depletion. And they bank this water, and it gives them a way of stabilizing their supply so they have water year around and not just times when their streams are full and the aquifers have a little water in them.

It's also -- this term is used in coastal areas where artificial recharge is used to create hydraulic barriers to keep saltwater encroachment back.

And there's two common methods for artificial recharge, one is surface spreading and the other is injection wells. I am going to talk a little bit about both of them.

This is simply a schematic of a hydrologic cycle showing all the different recharge you have. It's your classic picture here of rainfall running into the -- falling in the uplands, running down through the streams. Some of the water infiltrating the ground, in this case, running down through streams and out to who knows where, out to the ocean eventually (indicating).

The block here shows -- the side view, shows the area underground. Where the ground is -- the blue area is where the ground is completely saturated. All the pore spaces in the ground are full of water. Above that, the brown is where the soil is unsaturated. It's simply called the unsaturated or vadose out there. And around rivers, there's your

constant supply of water in areas where the water table -- the line between the blue and the brown is the water table, and where there is a constant supply of water table -- or of water from rivers, the water table is typically somewhere that meets the river, so there's -- in this case, it's showing a constant movement of water, infiltration, from the river into the ground. Now, some of the water in this -- they diverted it off to this little refuge area, this little marshy area, over here, down into this agricultural plot, and this also serves recharge the ground water a little bit, so we're understanding that some of it is infiltrating down through that unsaturated zone.

In this example, they've also put in this recharge basin, and this is a little reservoir specifically maintained to provide recharge to ground water, to the shallow surficial aquifer, in this area. And basically, they keep the bottom of it clean. They pretty often go through and they clean out refined sediments and algae and stuff that keeps -- that would inhibit recharge to the ground water.

MR. ANGELLE:

John, can I ask you to stop for a moment?

And can I get some staff members to help us. I think we're going to have to move these tables down here. I apologize for -- I mean, I am trying to engage on -- and ask questions and I'm doing everything I can, and I'm noticing that members are also having a hard time following. So if we can get

these tables moved down here by staff members so that Commission members can participate in some of the viewing of what is going on here.

Thank you.

(Brief recess.)

MR. LOVELACE:

Okay. So I was showing you a couple of examples and this little schematic of -- this is a recharge basin. It's a maintained basin. The water is diverted from the river into this basin and used to recharge the shallow aquifer system.

And, also, on here, they show an injection well. The well was pumped down in the confined aquifer. This red zone here, I'm guessing, is a clay-confining layer. So they're pumping water deep down into this deeper aquifer system. They replenish it down here, and it's being -- water is being pulled back out over here and it's for industrial uses. Notice, they have the monitoring wells here in both, the shallow and the deep zone, to monitor how the aquifer is affected all across this area (indicating).

MR. ANGELLE:

And this happens in California now and some of the western states?

MR. LOVELACE:

Yes, yes.

MR. ANGELLE:

The injection?

MR. LOVELACE:

Yes.

MR. ANGELLE:
That must be a highly-permitted, highly-regulated situation?
MR. LOVELACE:
Yes, it is.
MR. LOEWER:
Are they injecting more than industrial is pulling out?
MR. LOVELACE:
What's that?
MR. LOEWER:
Are they injecting more than industrial is pulling out?
MR. LOVELACE:
I don't know.
MR. LOEWER:
Because if --
MR. LOVELACE:
But I am going to give a couple of examples.
MR. MAYS:
Does California monitor the conditions of the water that's injected in there? I mean, you know, do they have to treat the water before it's injected?
MR. LOVELACE:
We can talk about that in a minute, but there are different regulations for different states.
Injection wells are considered Class V -- injection wells for this purpose are considered Class V disposal wells, which means that they can pump a fluid down into -- directly into or above a drinking

water aquifer. So, because of that, they are regulated either by EPA, or if EPA has given State the primacy, then whatever State agency. Here in Louisiana, I believe, right now, DOTD, DNR, DEQ, and DHH, all have some oversight into injection wells.

MR. WELSH:

The Office of Conservation has primacy through the State of Louisiana. With Class V wells, we do coordinate our approval with those agencies he's talking about, but it is the Office of Conservation has the primacy.

MR. LOVELACE:

I see. So this is –- first, I'm going to talk briefly about surface spreading, and, as I said, this is where canals or reservoirs are used simply to trap the water and allow it to infiltrate into the ground. This is typically used for surficial aquifers and unconfined aquifers where the water can sit there at the source and slowly infiltrate down into the ground. It's basically –- the high-permeable areas, and the trapping the water, the flow it runs off, in these reservoirs and using it to recharge the shallow system.

There is -- like I said, periodic maintenance of the ponds or canals is required to keep the pores open and keep the recharge rates as high as possible. And it's pretty common in a lot of countries, and most of the western states seem to have some sort of surface spreading projects.

MR. ANGELLE:

So it's artificially bringing water to a recharge area --

MR. LOVELACE:

That's right.

MR. ANGELLE:

-- and having it sit over time and migrate into the water table?

MR. LOVELACE:

Right. And typically, it's used where there's just a seasonal source of water.

MR. ANGELLE:

Right.

MR. LOVELACE:

Here's an example of one. I apologize for the slides, they don't fit along with the map to well, but -- this is actually a recharge basis. This is Dayton, Ohio, where they've been using this technique since the 1930s. I was really surprised of this, but they're diverting water from two different rivers into a series of lagoons and ponds, and typically, they'll have a high capacity -- and those ponds are maintained to recharge the surficial aquifer there, and they have high-capacity municipal wells right adjacent to the pond. They're pumping out of that surficial aquifer, so we're getting constant –- well, constant or seasonal recharge there, but it gives –- recharges the aquifer enough where these wells can pump year round. In this case, it's for municipal purposes.

MR. BALKUM:

John?

MR. LOVELACE:

Yes, sir?

MR. BALKUM:

If construction of a reservoir is identified as a beneficial means to reduce demand on an aquifer, would it benefit possibly the State to locate that reservoir in a recharge area?

MR. LOVELACE:

It could –- it kind of depends on if -- well, if it actually is impacting a recharge to the aquifer, and I'm going to give you a little example of that in a moment.

One other example, this is over near Orlando, Florida, where they were spreading treated wastewater into these little rapid-infiltration basins, they call them out there. You can see, there's quite a few of them. The reason this water –- not for municipal purposes, but for citrus irrigation, they're recharging, again, the surficial or shallow aquifer and so it kind of spreads out from the basins a little bit, and they pump it out down the roads at wells and use it for irrigation.

Now, this is toward addressing your question. We have a computer aquifer for model –- a computer model of the Sparta aquifer was developed jointly between the Arkansas Soil and Water Conservation Commission, U.S.G.S., and DOTD. And the Arkansas office has been dealing with this model for years and years doing different things, and one of the things they did was looking at whether they could put these infiltrations

-- these recharge basins in the outcrop area and affect the Sparta Aquifer in Arkansas. Because, most of you know, there's -- have designated critical areas in Arkansas. There are some areas where there are pretty steep cones of depression and some more problems.

And what they did was, they simulated by very large canals in the recharge area and put these into the model, and made the recharge from the canals into the aquifer or the recharge area, they made a pretty good recharge rate. And when they simulated what the water level change in the aquifer would be, it was about 30:3. And what they found was that they did get a lot of recharge, and water levels rose as much as five feet, roughly, adjacent to the lakes. And across the greater part of the Sparta, because it can a millennia for water to move through this porous media we call an aquifer, it really -- you know, water levels only rose about half a foot throughout most of the rest of the Sparta. So that was their way of saying, this really isn't going to work, except in the recharge area directly adjacent to the -- to where we put the reservoir.

MR. BOLOURCHI:

John, I think Kyle has a point. If we could build a reservoir for recharge purposes, you specifically locate it with the material sanded (phonetic) so the water would go down. But the reservoirs that we handle, the State, we have, oh, 10 to 11 reservoirs in various stages of planning,

design, construction, you don't want your water to be leaking out. Because pretty soon, people around there will start complaining, what kind of lake is it, it's leaking?

But I do believe if we can locate a pond, let's say, in a recharge area and fill it with the floodwater from an area that is flooding, you do two things. You reduce flooding downstream from the pond; two, you have stored the water. A lot of it will be going down into the shallow aquifers and you have the stored water.

MR. LOVELACE:

That's right.

MR. BOLOURCHI:

So it does have –- we need to think about it. When we're talking about conserving the ground water, we have to think about alternative solutions, and that's one of the solutions. Many states have put that to use.

MR. LOVELACE:

Yes. So those are examples of surface spreading technique for artificial recharge.

The other thing -– use is injection wells for -– these are used where surface spreading isn't going to work. Surface spreading is only for the unconfined, surficial aquifers. Injection wells are used for deep, confined aquifers, and again, we get into some periodic maintenance of injection wells, removing small particles, microbial growth, chemical precipitates, and some cleaning has to take place.

And depending on the state and the State regulations, people are injecting untreated surface or ground water, treated drinking water -– some states require it treated to drinking water standards -– or reclaimed wastewater, and that's often treated to tertiary standards.

One of the -- one specific type of artificial recharge is called the aquifer storage and recovery, and this is where, typically, one or more wells is used to inject water down into an aquifer or under the ground for temporary storage, and later, when it's needed, it's brought back out of the ground, out of that same –- typically, out of that same well. And a lot of the states are using this particular water-banking technique to inject water to get when they have it, pulling it out of a stream, unused water in a stream, injecting it down, and saving it for future use or for drought periods. El Paso is a really good example of that. They're doing this a lot.

And interestingly, you don't always have to inject it into a high-quality water aquifer. Some areas, they're injecting the fresh water down into a saline aquifer. As they pump it down there, the fresh water displaces the saline water, and when they pump it back out again, they can, you know –- are recovering –- of it, their fresh ground water or fresh water that they pumped down there. There is some mixing around the edges, that occurs in the –- there can be some changes in the water, especially around

the edges.

It's really important in injection wells to look at the chemical composition of the water you're injecting, look at the composition that the water is receiving it, and also, the composition of forced matrix, because you can have different chemical, geochemical, reactions that can change your water quality, cause precipitation, all sorts of odd things.

Part of the challenges of injection wells, number one is surface availability. Do you have a source of water at the injection well?

And the water quality issues are pretty big. They need to be studied heavily, see if there's any changes that could occur. Not all aquifers are really conducive enough, porous enough, that it's going to work out, and in some cases, you may have gradient there where it's already -- a ground water gradient where it's not practical to try and store water, but it is -– could be used to recharge the aquifer.

There's management, monitoring considerations, and in some states, there's water rights and intrastate, interstate water administration issues.

The water quality issues, as I said, if you have water with different chemistries, pH, temperatures, redox conditions, you can have changes occurring in the casing, in the aquifer, you know, precipitants falling out that will clog the well screens, clog the gravel pack around, clog the aquifer matrix. So these things need to be looked at pretty closely because anything is done.

In surface spreading, sometimes you can have just -- as the water moves through that vadose zone, it can pick up some of the chemicals, things that are found left in the soils, nitrates, salts, things that are commonly left behind from agricultural use.

One of the things that you –- that's sort of –- we've had emerging contaminants, something on the scene with the use of surface water, is that or –- and in our wastewaters or waste streams, we're finding things like pharmaceuticals and disrupters, and these things aren't taken out by typical wastewater treatment. They stay in the water, and if you pump those down with the wastewater, they're getting into your ground water source, too.

With injection wells, like I said, there's monitoring and maintenance. Typically, if you remove mechanical plugging, you'll find some precipitants and also entrapped air. Biofouling is common where algae builds up and microbes build up in the soil down in the well, and monitoring wells are necessary. The costs of maintenance and monitoring need to be including in the artificial recharge project and design and can be considerable.

We already talked about regulation. We'll skip over that.

Here are some examples of projects in western states. This was out of a 2008 journal, the Journal of Southwest Hydrology. It had a little aquifer and storage recovery primer in it, and it listed several project in western states. See, in Arizona, there's

actually five projects. There's –- several of them are geared toward surface spreading, as it indicates there, in basins. And I just threw this in, so you could see that, in these six states, it's pretty common. These are southwestern states, as I gave you examples. It's also common on the west coast –- not only the west coast, the east coast, especially in coastal aquifers that are threatened by saltwater encroachment. But these folks are primarily banking water for future use. They're planning to grow. They've got limited supplies there now. They want to be able to grow, so they're storing water for future use.

So the injection wells are often used as a variable to build this hydrologic barrier to saltwater intrusion. And simply injecting water ahead of the saltwater-fresh water interface and creating a ridge in the potentiometric surface, keep that pressure up to hold the saltwater back, that pressure that is often there naturally. And typically, to build that ridge, you need one or more lines or arrays or wells that you're pumping water down to create a good enough barrier, a solid barrier, that the water can't go by. So the optimal spacing of the wells is really important, not only for effectiveness, but as it's very expensive to put in wells and maintain these wells, so --

MR. WELSH:

Do you think that would have potential down in the southern part of the Chicot?

MR. LOVELACE:

It could, but you're looking at such a large interface there, it needs to be a very focused project, and I'm going to give an example here in a second that's going to show you why.

And this is –- in the Los Angeles area, they have been using saltwater barriers for years. In Los Angeles County -- and the adjacent counties are also doing the same thing, but we found this one example. In Los Angeles County, they have three separate barrier well arrays that cover about 17 miles. As I think about 17 miles, it's a pretty short span, when you're looking at, you know, an area of saltwater encroachment, say, for –- say, look at the 500' Sand, where you have saltwater encroaching at a very slow rate along the entire Calcasieu-Cameron border, that's 30 or 40 miles or so. They have 300 injection wells here. They have put in 750 monitor wells to monitor what's going on, and they are pumping in mostly treated wastewater, but also potable water into -- to a Los Angeles community. And their annual operating costs, just to maintain this, is about $3 million, that doesn't count the cost to put them in, initially, so it's pretty expensive proposition and they only use it in very small, focused areas.

We have tried it in the Baton Rouge area in the 1,500' Sands. We have a fault running through Baton Rouge. South of the fault, we have saltwater. North of the fault, we have all the fresh water supplies down in the –- sands, going down to about 3,000'. One

of them we call the "1,500' Sand," we count on heavily for public supplies. There is saltwater slowly seeping across the fault into the 1,500' Sand, and we have been tracking it for many years now. In the Baton Rouge area, we have something called the Capital Area Ground Water Conservation Commission. In the '90s, they came up with the idea of putting in this barrier well system between the fault and one of the public supply well fields to try and build up the strata levels in that area and slow the saltwater movement. The original plan called for three wells to create a ridge. After all was said and done, the budget, only one well was put in, and it did, indeed, make a mound in the potentiometric surface, but unfortunately, one well did not make a barrier in the saltwater. Within a few years, it moved around it.

This is a water level surface, these squiggles here, showing in the 1,500' Sand area. This little, blue area is where there is no –- we don't have a 1,500' Sand. It pinches out in this area, so it's –- there's nothing there (indicating).

Here is the Baton Rouge fault. Baton Rouge is essentially across this area, and you can see, by the shape of this, this is a cone of depression here, it's a bull's eye. This is a pretty big public supply field here. There's a small public supply field here, another one over here. But, generally, water movement is from south up here in front of the east towards these pumping centers in the 1,500' Sand.

Right here is the connector well. We had

saltwater moving across the fault here, coming north towards this pumping station. The connector well -- we call it the connector well. It connected the 800' Sand to the 1,500' Sand. There wasn't a pump on it. It was just passive flow because the water level is higher in the 800' Sand, so it flowed down into the 1,500' Sand and recharged the 1,500' Sand, created this mound shown here in the water level surface.

What happened -- the pink area is where the saltwater, and this first little lift down here, this little line, is where saltwater was first discovered, 1966. We decided that it was only in this one little area just north of the fault. By '77, the area had expanded. By '87, it was up here. It was at -- Government Street station is here, that's a public supply pumping station. It has several wells. And then the Lula Station is here farther to the north. It has several wells. The connector well was put here. The original plan was probably to have three wells across this, so that this spreading saltwater front moving northward would be stopped along the line here. And because only one well was put in, we didn't have a line. We had a mound, and the saltwater, over time, simply moved farther west, and instead of immediately impacting the Government Street Station, it went off, and we're starting to see very low concentrations of chloride increases at the Lula Station. So this concept has been practiced for a little bit in Louisiana.

I was asked to talk about this, because, I guess,

artificial recharge has been talked about in the Sparta aquifer, so I have tailored a couple of slides to it. I am not really sure what the focus is in the Sparta, so that's the first question to ask, is, what is the desired impact. Are we trying to raise water levels across the region; are we trying to create a barrier to saltwater encroachment; we're trying to just simply bring more water to specific wells?

As I indicated with the example of using this recharge basins in Arkansas, they wouldn't really have an impact on the problems that we have in the Sparta. Because the cone of depression over in Monroe is simply too far from the recharge area, so spreading the basins wouldn't work, except possibly if you put a spreading basin near Hodge that could supply water to the paper plant there, because that's very close to the recharge area. That's one of the reasons why there's not a big drawdown at Hodge, it's not that big of a cone of depression for water level surface because they are so close to the recharge area already, and they have a pretty good constant source of new water here.

So the question is, if you're going to, you know, increase water levels all over -- all over the Sparta, how many wells are you going to need to do that? It's like, you know, having holes dug all over your back yard. If there's thousands of wells in the Sparta, how are you going to bring recharge to all of them? I would be like having pits all over your back yard and going out there with a bucket of sand and pouring it

out and hoping it's going to spread across all of the pits. It just isn't going to happen. It's going to recharge –- you know, one well is going to recharge right there where you have the recharge flow.

So you need to figure out, if you're trying to do that, how many wells do you need across the area, can you recharge the whole aquifer, or are you just going to try and recharge a specific area? You need to figure out where they need to be placed, what sort of pumping rates, and is there a source of water. What would be the source of water to recharge these wells, and is that water quality going to be compatible with the water in the Sparta?

The best way of figuring out these things is using a computer model. It is there for the Sparta. It could be done. Figuring out optimal placement, there are programs that will do this sort of stuff and figure out what the impact will be, depending on what impact you're trying to get.

MR. HOLLINGSWORTH:

John, to answer some of your questions, overuse is what has got our Sparta in bad shape because it's not recharging at a rate fast enough. It's dropping two to three feet a year, and those parishes over close to the recharge area are not affected like we are. Those of us on the eastern edge of it are enjoying saltwater encroachment, water quality problems, and the level is dropping substantially, so –- for instance, the State just spent $55 million to save a chicken plant in Union Parish recently. Big

business, the State spent a lot of money to save the major employer. However, about three years ago, they found saltwater in a well just two miles north of that plant. So injection wells, in that case, would help preserve a $55 million investment, if somebody did it, but I don't know –- they're going to have to treat water out of Lake D'Arbonne to do that, and that project is years away.

And I don't know what led to Baton Rouge not having the budget to do two other wells to stop that barrier, if that was a State problem or what, but how much is it going to cost once it intrudes? I mean, we've got to start asking some questions like that. What are we going to do, and I think getting major industry, like -- mentioned a moment ago, is -- major industry and the State stepping up and helping make that happen, not just from an enforcement standpoint, but helping them to get past the monetary problem which is the major issue there. If we've got something like that, injection wells are not going to solve that problem.

MR. OWEN:

Well, I'd like to say that the downside of injection wells is that, you already have in every aquifer in this state a highly-diversified, vested interest in the aquifer. Frequently, it's just for domestic consumption, and what happens is that, if you are -- every user has to revert to the quality of water that is being injected, whether they are realizing it or -- that specific water or not. For

instance, if you inject raw water, say, raw river water, into an aquifer, then every user in that aquifer that's been there before has to regard the water that he is extracting from that aquifer as river water, and he has to completely change his treatment, if he is using it for potable water purposes to match the quality of river water.

If you're injecting drinking water quality, then that's a different matter, but even injecting drinking water quality is not a panacea, because if you ingest -- inject drinking water quality, you frequently are using drinking water that has a high dissolved oxygen content in the water, and when you inject drinking water quality with a high dissolved oxygen content, you immediately oxidize the iron and manganese that's in the solution. You begin to clog your sands with an unusual situation. You clog the injection wells, and this is a problem as far as the permeability or transmissibility of the aquifer ultimately. So it's a difficult -- this is not a panacea here.

MR. JOHNSTON:

You're talking about the quality. I guess it's more about the quantity of water while it's recharging.

MR. LOVELACE:

Uh-huh.

MR. JOHNSTON:

It's good quality, but also the quantity --

MR. LOVELACE:

That's right.

MR. HOLLINGSWORTH:

You also reach a point to where it's cheaper to go ahead and treat the river water and use it --

MR. OWEN:

And use it, that's right.

MR. HOLLINGSWORTH:

-- when you inject it --

MR. OWEN:

That's exactly right.

MR. HOLLINGSWORTH:

That's kind of a no-brainer.

MR. LOVELACE:

That's what I kept coming back to every time -- if we're -- are we treating it to drinking water standards, apparently, is the rule in this state to inject it. Why don't we just pipe into where we'll need it --

MR. OWEN:

Exactly.

MR. LOVELACE:

-- if we're going to be doing that? I think, you know, pipelines are cheaper, in the long run.

I just have a couple of more slides.

Just illustrating the Sparta example, no longer the west -- the eastern edge of the Sparta, this dashed line, that is the limit of fresh water in the Sparta. East of that line, there is no fresh water. West of this line, for some distance, maybe several miles, I know there is a larger lobe going over into Union Parish, there is saltwater in the base of the

aquifer. And it looks something like this, this is kind of a line along I-20, the cross-section, and you can see the recharge area up in Bienville Parish and going through Lincoln down all the way to the Monroe area (indicating.) And this vertical line is aquifers and sediment, but this is the Sparta in the Monroe area.

There's several sands. You can see, here's the saltwater down here. And the issue Mayor Hollingsworth was talking about is that, in the West Monroe area, they have wells down in this sand. This is the -- I forgot what they call it -- I think they call it the 700' Sand. It's a deeper sand in the Sparta there, and some of these municipal wells and industrial wells are starting to see some saltwater encroachment from this leading edge of saltwater. And that's because the water level is lowest in this area, so it's just waiting for saltwater to move westward towards this heavy pumping area.

Here's what the potentiometric surface looks like with arrows showing directions of flow, recharge here, and you can see, throughout most of the aquifer, the water is flowing towards this big pumping center. And there's a very short distance between the -- there's a very short area where there's fresh water here and saltwater below it until you get into this pumping center, so they are starting to see some saltwater encroachment problems here.

This cone is so deep right here, I'm not sure if -- I mean, it would take a major effort to put in a

barrier well system here. You can see, this is a long interface along this area. You'd probably have to put an injection -- a barrier system that was several longs, 10 to 15 miles long, to protect the wells in this area, and -- I mean, you can pump considerable amounts of water down it. Here's the water level line. In 2001, it scooped down like this. You can see, it's -- the water level is -- the grading is very steep between West Monroe and this area where there's saltwater. So the water it moving pretty fast towards this, and you need to build this up and build a ridge probably tens of feet high in the potentiometric surface to stop -- to slow the saltwater movement from the earth at this point.

MR. HOLLINGSWORTH:

John, would it be -- would it be feasibly, if available, in the Union Parish area where it's not that deep, and yet, there's saltwater? It's going to close the plant, and the State is going to lose that money eventually, and it -- would barrier wells be imprudent at that point?

MR. LOVELACE:

I don't know. I'm sorry. I'm not as familiar with the area. I know that there is a lobe of saltwater that extends across Union Parish down towards this area. It comes down from Arkansas, and it comes in there. And we've always had some little problem with saltwater there.

MR. HOLLINGSWORTH:

I see.

MR. LOVELACE:
Currently, it's moved enough where it's affecting the wells that are --
MR. ANGELLE:
John --
MR. LOVELACE:
Yes, sir.
MR. ANGELLE:
-- the previous slide, the green outline is --
MR. LOVELACE:
That was the recharge area.
MR. ANGELLE:
Can you go to that slide?
MR. LOVELACE:
(Complying.)
MR. ANGELLE:
The one before that, okay.
The green, dotted line and the green, solid line on the left represent the fresh water? I'm trying to understand where is the geographic area that matches the title of that slide?
MR. LOVELACE:
Okay. This -- between these two lines is the fresh water extent of the Sparta aquifer in Louisiana.
MR. ANGELLE:
And the dark blue?
MR. LOVELACE:
That's the recharge area.
MR. ANGELLE:
Okay.

MR. LOVELACE:

This is the recharge area (indicating).

MR. HOLLINGSWORTH:

I believe the paper mill in Jackson Parish is probably getting their water out of the recharge area, is that the case, because they're getting it out of Bienville Parish?

MR. LOVELACE:

Yes.

MR. COLEMAN:

It's close. It's not in the recharge, but it's close.

MR. LOVELACE:

You're talking about the plant here?

MR. HOLLINGSWORTH:

Right.

MR. LOVELACE:

Their wells are actually in Bienville Parish. The plant is physically in Hodge in Jackson Parish, but they're pretty good -- they actually had wells in Jackson Parish too, but they primarily pump out of the wells in Bienville Parish. And I think, I don't know for sure, but I'm guessing, because it's in the recharge area there, it's easier to maintain those wells and there's less drawdown.

What's important to know, although this is the fresh water extent, it's not all entirely fresh water in the Sparta. In this area, for some miles east of this -- I'm sorry -- west of this line here, there is saltwater in the base of the aquifer as illustrated on

here (indicating). This is the base of the aquifer, and there's saltwater -- a ridge of saltwater down in the base that extends westward.

MR. COLEMAN:

A question, I know we were talking about the Sparta -- what is your suggestion as some solutions that would be practical and sensible for the Sparta to be considering to resolve its problems?

MR. LOVELACE:

There's -- what I see is, the cone of depression in the Monroe area is the problem. It is affecting water levels throughout the area, so throughout most of the Sparta in Louisiana -- well, most of the Sparta in Louisiana, so it's something -- doing something about that coning, and -- whatever that would be.

MR. COLEMAN:

Then we also have a cone of depression in the Ruston area and down at Jonesboro.

MR. LOVELACE:

Yes.

MR. COLEMAN:

That's encroaching us.

MR. LOVELACE:

The cone of depression near Ruston is pretty small, and Jones -- in the Hodge area, it's -- you know, they're minor, compared to this cone of depression here, which when the folks up in Arkansas draw this cone of depression on the map, they draw it all up, taking Arkansas water. But, anyway, it's -- there's -- the cones of depression between El Dorado

and Monroe have basically coalesced. I mean, it's a pretty long trough. This is the problem here.

MR. ANGELLE:

John, you say that the cone of depression in the Ouachita-Monroe area is -- did I hear you correctly say, is having a negative impact on the Sparta in other areas?

MR. LOVELACE:

(Nods head.)

MR. ANGELLE:

It is; is that right?

MR. LOVELACE:

Yes.

MR. ANGELLE:

Okay. As we begin to try to formulate long-term solutions, is that where, in the Sparta, you would, in your professional opinion, focus the initial solution?

MR. LOVELACE:

Yes, absolutely.

MR. ANGELLE:

Okay. And the lowest-hanging fruit, in your opinion, in the Monroe area, would be to -- if we were trying to have a rebound, if you would, or -- and I'm thinking that's the right word -- what would be, you know, the -- our solutions are all -- we are always depending life on the amount of financial resources we have available, and so it takes identification, prioritization, and the funding.

If you were to identify the two or three things that you would think would be the best thing the State

could be doing in the Monroe area that would have a positive impact, would it be conservation, conservation, conservation; would it be conservation/injection; would it be --

MR. LOVELACE:

My personal opinion, another source of water is needed to get -- to relieve some of the pumpage from ground water.

MR. ANGELLE:

From what you know, you do not see our ability to conserve our way out of the problem, as much as the need to begin to look for an alternative source of water for that geographic area?

MR. LOVELACE:

Pretty much. I think there's about as much conservation as going to be out there.

MR. ANGELLE:

Right.

MR. HOLLINGSWORTH:

The State has endorsed the program of using the wastewater from the treatment plant at West Monroe City to treat that water to a drinking water state so that we could get that paper mill off the aquifer.

MR. ANGELLE:

Right.

MR. HOLLINGSWORTH:

And the State has invested a good bit of money trying to make that happen, and that will -- take the biggest user in that area off, although all of West Ouachita uses the Sparta for drinking water purposes.

The three major users are the paper mill in West Monroe, the paper mill at Hodge, and the City of Ruston on that eastern edge of the Sparta.

MR. OWEN:

It's almost axiomatic, Mr. Chairman, where surface water is available, where there's a concentrated load that is made up principally by a few or one uses, the cheapest solution is to take surface water, treat it to those standards, and deliver it to that plant and get them off the ground water. It's -- that's almost every time the answer.

MR. ANGELLE:

Okay. Good.

MR. MAYS:

Mr. Secretary?

MR. ANGELLE:

Yes, sir?

MR. MAYS:

I think the one thing that is unique about that, from our standpoint too is, there's not another aquifer down there. There's not a river that goes through Lincoln Parish, so our sources --

MR. ANGELLE:

You want one?

MR. MAYS:

Yes. Can you deliver on that?

MR. ANGELLE:

Bigger promises in public life have been made (laughter).

MR. MAYS:

But our options are so limited versus other areas of the state, that's the one thing that I'd like to point out.

MR. ANGELLE:

Would Lincoln Parish, the Ruston area, benefit in some substantial proportion -- will Lincoln Parish and perhaps the Ruston area benefit in some substantial proportion if the Monroe situation is solved or is improved?

MR. HOLLINGSWORTH:

Yes.

MR. MAYS:

Yes.

MR. ANGELLE:

John, you agree with that?

MR. LOVELACE:

Yes. Because water levels on the east side of Ruston are lower than they are --

MR. ANGELLE:

Right.

MR. WELSH:

John, would it be fair to say that, in looking at the cone of depression in West Monroe, the area of influence would be outward to the farthest closed contour?

MR. LOVELACE:

Yes. It's affecting --

MR. WELSH:

Would that be --

MR. LOVELACE:

-- pretty much all this area. You can see the directions of the flow lines.

MR. WELSH:

No. This closed contour here, this closed contour (indicating)?

MR. LOVELACE:

Well, I think it would really have an effect all the way to here, because right here, we're getting overlap of the cone of depression from El Dorado, which is right up here (indicating).

MR. WELSH:

Yes.

MR. ANGELLE:

So the State's efforts in the West Monroe-Graphic Packaging, combined with the leadership of Mayor Norris and the City of West Monroe, represents a significant opportunity for Sparta; is that correct?

MR. HOLLINGSWORTH:

Absolutely.

MR. COLEMAN:

Absolutely. We all agree with that.

MR. HOLLINGSWORTH:

And there's a water source in Jackson Parish that is big enough to have a compound there that would supply the needs for the paper mill in Hodges, as well as --

MR. WELSH:

That lake, you're talking about?

MR. HOLLINGSWORTH:

-- the two biggest users of the aquifer.

MR. WELSH:
Caney Lake?
MR. HOLLINGSWORTH:
Right.
MR. MAYS:
Caney Lake.
MR. ANGELLE:
Okay. Good.
MR. HOLLINGSWORTH:
We just need to have a policy in the state, if we're going to build a lake, that we going to -- and a superstructure in there -- within there, that we could use it for a fresh water source in the future.
MR. ANGELLE:
If we were to construct --
MR. HOLLINGSWORTH:
A new lake --
MR. ANGELLE:
-- a public reservoir anywhere?
MR. HOLLINGSWORTH:
It needs to have a priority use for water as the number one reason --
MR. COLEMAN:
In other words, with this salvia thing that we talked on these two lakes, surface water, there may have to be some restrictions about people being able to bring boats in, unless they're extremely clean, otherwise, you destroy what you're trying to build.
MR. ANGELLE:
In those areas that are used for reservoir

water --
MR. COLEMAN:
Right. If they're using recreation, as well, so the primary purpose needs to be, everybody understand that builds around it, the reservoir is used for utilities and industry and et cetera, and the fact that it's going to go down and you can't get your boat in is not going to be --
MR. ANGELLE:
Right. Other than -- and I'm not sure even this is right, but other than Toledo Bend, has there ever been, to anybody's knowledge here, that the funding of the construction -- Bo, perhaps can help me, where are you at, Bo -- the funding of a reservoir, dam, et cetera, for the primary purpose of providing or yielding water supply?
MR. OWEN:
I would offer the Pearl River reservoir just outside of Jackson, Mississippi.
MR. ANGELLE:
Yes. Here in the state, however?
MR. OWEN:
In this state?
MR. ANGELLE:
-- in the state, is anybody -- I hear what you all are saying. It seems like when I hear of reservoirs, I hear of reservoir funding for recreational purposes, and what we're saying is that --
MR. COLEMAN:

A different animal.

MR. ANGELLE:

Right, okay. I just want to make sure that -- you're not aware of any -- what's Toledo -- what was the original --

MR. PRATT:

Water supply, hydroelectric power supply.

MR. ANGELLE:

So, to your knowledge, that's the only project that began with that purpose?

MR. PRATT:

Yes, sir.

MR. ANGELLE:

And it has a recreational value, as well, but that was not its original -- primary purpose.

MR. PRATT:

And those elements do conflict, no doubt.

The question I would like to ask John is, we're talking about the Monroe area. No one has really focused on the river, itself. The river is there. Canals and pipelines are much less expensive than a reservoir, itself. You don't have the perceived recreation benefit, nor do you have a conflict. Why not; why not the Ouachita River?

MR. HOLLINGSWORTH:

Well, I think one of the things is that they're planning on using their wastewater treatment plant effluent to do this instead of the river. As I understand it, and John can speak to this better than I can, but it is much more difficult to treat river

water than it is something with a known value, because the river can change so radically, at times.

MR. ANGELLE:

What about both; what about, you know, the wastewater situation having some value and then also river water?

MR. HOLLINGSWORTH:

Both of them do.

MR. PRATT:

You know, for the Sabine River and the reservoir, itself, we have one member here that operates a parish water works district. Its sole source of water is from the river. Every day -- the plants are designed specifically for the water quality of that river. John and his people have the water quality data, in addition to our State agencies, on all of these rivers that go back 100 years, typically.

Operating a reservoir canal system on a river, the most difficult is always the reservoir, itself, not only from just the -- a cost perspective, but from a regulatory. You're typically at hardwood bottoms. You're looking at having to take lands for that project.

And when we talk about reservoirs, everyone thinks about the economic impact it's going to have on that area and all the housing boom. You can't do that with a water-supply reservoir, because you will have those fluctuating -- if you've got the river running through there, why not tap into it?

MR. COLEMAN:

I think there's some reasons contrary to that, but somebody else has their hand up.

MR. ANGELLE:

We're getting a microphone out to you, Gary, if you don't mind.

MR. HANSON:

Gary Hanson, LSU-Shreveport.

MR. ANGELLE:

Yes. Thank you.

MR. HANSON:

One of the original issues that the Sparta was dealing with was when they we going to move that -- plan forward was to have two lakes to supply water from the surface, one was Lake Bistineau in Shreveport. The other was to use the Ouachita River. There are some water quality issues in the Ouachita River, also. It may be, not necessarily saltwater, but contaminant problems coming in from up north. But that was supposed to be one of sources. The plan is probably ten years old now, I guess, about the time you came on, Gene.

MR. COLEMAN:

The Meyer, Meyer, and Hixson plan.

MR. HANSON:

Right. The Meyer's plan, so there was a plan for using that water, yes.

MR. ANGELLE:

Very good.

MR. COLEMAN:

Mr. Secretary?

MR. ANGELLE:

Yes?

MR. COLEMAN:

One of the problems is, among other things, with the Ouachita River is, natural contamination from the soil. It is a real major problem. And as I understand it, when we talked with the people in Arkansas that are using that facility up there, that their cost to treat that water for industrial use, not drinking water, but industrial use, is roughly $.72, that's just operational costs, that's $.72 per thousand.

Now, by the same token, if -- I believe my figures are right, the treatment of the water from the West Monroe facility recycling that water, they were -- it was costing them about $.10 or $.11 to treat their wastewater per thousand gallons, initially. When this system is put in place, it will only add another $.10 or $.11, so they can deliver that product for $.22, where, doing it from the river, not including capital costs, will likely be three or four times that.

MR. ANGELLE:

So, as we go through the evolution or a matrix of decisions in enforcing this Commission, over time, I guess the reason we use ground water today is because it is the cheapest and it is the most available. And as we go through a sliding scale, our job will be to develop those potential alternatives, and we will all, as a people, want the highest quality, cheapest, next

best alternative?
MR. COLEMAN:
That's right. And it's got to be an ongoing management situation. There is no such thing as fixing it and forgetting about it.
MR. ANGELLE:
Right, right. You manage it. You don't fix it, that's right.
Okay. Next?
MR. OWEN:
Mr. Chairman, out of the hierarchy that Mr. Coleman just mentioned, it's possible that you could use some sort of mixing the dilution to achieve a different standard and have an entirely different cost structure than he alluded to.
MR. ANGELLE:
A blended solution?
MR. COLEMAN:
And I understand that.
And I think El Dorado did a study on that exact thing that you're talking about, and their figures are available on that for people that knowledgeable, such as yourself, about it, but I don't understand it.
MR. LOVELACE:
From what I understand, Monroe is using water from the Ouachita River already. They're using it, that's where they get the bulk of their water from, the Ouachita and the --
MR. COLEMAN:
Say again now.

MR. LOVELACE:

Isn't the City of Monroe getting the bulk of their water --

MR. HOLLINGSWORTH:

They get them out of Bayou Desire, which is runoff, while it's connected to Ouachita, but not directly out of there.

MR. COLEMAN:

Well, when they get it out of the bayou, the water is -- the sedimentation and et cetera is settled out in that area before they start treating it.

MR. LOVELACE:

That's right.

MR. COLEMAN:

So it's a much better quality than that that would be in an active river.

MR. ANGELLE:

Mr. Mays?

MR. MAYS:

Just a point, that D'Arbonne lake, when it was built, included in the legislation was Lincoln Parish and Union Parish able to use the water from D'Arbonne lake --

MR. HOLLINGSWORTH:

Water rights.

MR. MAYS:

Water rights.

MR. ANGELLE:

It's a man-made lake; is that correct?

MR. BOLOURCHI:
That's correct.
MR. MAYS:
That's correct, and the State funded it, and that's part of the legislation that created it, but it's not dedicated strictly for water.
MR. ANGELLE:
Mr. Adams, at the next meeting, would you research the legislation that created Lake D'Arbonne and give us a -- give us some history on that, working with -- folks in north Louisiana perhaps can help you develop that. I think it's important that we know that.
MR. HOLLINGSWORTH:
Mr. Chairman?
MR. ANGELLE:
Yes, sir?
MR. HOLLINGSWORTH:
I'm not a native Louisianaian, but Shreveport gets their water out of Cross Lake.
MR. ANGELLE:
Right.
MR. HOLLINGSWORTH:
I don't know whether that's a man-made lake or an incident --
MR. BOLOURCHI:
It is.
MR. ANGELLE:
Is Cross Lake man-made?
MR. BOLOURCHI:

Yes. It was an embankment for the railroad. We changed it into a city --

MR. FREY:

Mr. Secretary?

MR. OWEN:

-- the water settles out.

MR. ANGELLE:

Yes, sir?

MR. FREY:

I don't want to overburden your staff, but if he's going to research D'Arbonne, I would suggest we research several of the lakes that are man-made lakes --

MR. ANGELLE:

Yes.

MR. FREY:

-- Caney, Bistineau -- there's two Caneys, there's a Caney in Claiborne Parish, there's a Caney in Jackson -- Saline Lake in Winn. I can go on and on and on, but you've got several man-made reservoirs up there, and I'd -- you know, I'd be curious to know myself, as well as -- and I'm sure -- John, you may have this information, but how much current use of those existing reservoirs for -- you know, for water usage is happening.

MR. ANGELLE:

If you will hold that, we can talk about that when we talk about the scope of services. That's a great question.

MR. FREY:

Okay.

MR. ANGELLE:

And if you recall, I asked a question initially, are there any lakes that were built for the primary purpose of providing water supply, and the answer was, no, other than Toledo Bend. And now I'm hearing that there were other lakes that perhaps were built.

The question is, were they built with the intention to provide water supply?

Mr. Mays has indicated D'Arbonne has legislation, has something in the legislation, that says water supply to a couple parishes.

MR. MAYS:

Right, water rights.

MR. ANGELLE:

So, as we move -- and you'll see what we're talking about in our scope of services, getting those surface-water inventory assets -- those assets inventoried so we can understand is going to be a very, very big part of our job.

MR. OWEN:

Claiborne, I think, also had that in their -- when they were constructed.

MR. ANGELLE:

Do we have any questions -- any additional questions for --

MR. HANSON:

If I could say, I just remembered, there is one lake in Bossier Parish, but I -- I'm pretty sure it is Cypress Black Bayou, that was part of the -- the

reason for building the lake was to supply Bossier Parish with water. They've never used it, but that was water supply when it was built.

MR. ANGELLE:

Let me just make sure that I'm doing the proper protocol.

Mr. Commissioner, would it be okay if Mr. -- could you direct Mr. Adams to do that? I don't want to overstep the authority from which I laid down at the beginning of the meeting. Would that be okay, sir?

MR. WELSH:

I'll consider it (laughter).

MR. ANGELLE:

Thank you, sir. I do appreciate the opportunity to work with you, sir.

Okay. Any other questions for John; anybody from the audience have a question for John?

MR. NIELSON:

Mr. Chairman?

MR. ANGELLE:

John?

MR. NIELSON:

The City of Natchitoches, Louisiana, built Sibley Lake specifically for water supply, that was the City that took the initiative to do that because they saw issues coming up. Now, they have had some treatment problems, as well, but they -- the treatment program is evolving so rapidly using in-ground (phonetic) filtration and everything that a lot of these issues

with surface water are no longer a stop sign, so to speak. I think you'll find there are a number of impoundments that are built around the state, maybe by municipalities and such, that are being used for water supply.

MR. ANGELLE:

As we do our research, obviously, John, it won't be -- your first draft won't be complete, but we'll float it around and get some additional information.

MR. ADAMS:

Yes, sir.

MR. BOLOURCHI:

I was going to say, Caddo Lake, there is a power plant that uses a lot of water off Caddo Lake. And as a general rule, if the state has some money into reservoirs, which is the larger reservoir, there is always a potable water supply was one of the reason -- they would use as an alternative source in an emergency.

MR. ANGELLE:

Okay. Any other questions for John?

MR. JOHNSTON:

I've got a question. How far does your chloride database give out salinities?

MR. ANGELLE:

What's the question?

MR. JOHNSTON:

The chloride database, salinity?

MR. LOVELACE:

At least into the '40s.

MR. JOHNSTON:
The '40s?
MR. LOVELACE:
If not before that.
MR. JOHNSTON:
I just wanted to see.
MR. LOVELACE:
Yes, at least into the '40s. We have some really old data, maybe into the '20s.
MR. ANGELLE:
Okay. Very good. It is a good opportunity for us to take a break.
Item No. -- I'm assuming that we have just taken care of Item 4 and 5, right, Mr. Snellgrove?
MR. SNELLGROVE:
That's correct.
MR. ANGELLE:
Item No. 6, at my request, I asked to delay this presentation. I think this presentation is better suited for a presentation on one of our north Louisiana venues.
And it's my understanding, based on what Mr. Commissioner just told me, that Mr. Langlinais is en route.
So when we come back from our break, we will go to Item No. 8, okay, then we'll come back and take up Item No. 7.
We'll have a ten-minute break.
(Brief recess.)
MR. ANGELLE:

Our next presenter is Mr. Stephen Langlinais with S.J. Langlinais and Associates, and he has requested an opportunity to be on the agenda to discuss the Chicot Aquifer ground water issues. That will be followed by a company representative from AGL Resources, which we will identify the specific name of that person, who will be talking about some of the issues, I'm assuming, that Mr. Langlinais will be talking about.

MR. LANGLINAIS:

Thank you. I apologize profusely for not showing up early this morning, but I had it on my calendar that I had -- this meeting was scheduled for tomorrow at 10 o'clock, and my secretary, I had it on her calendar, and I got a call at 12 o'clock that I'm supposed to be here this morning. So I apologize for not -- I don't know what happened with the miscue, but there was a miscue somewhere down the line.

MR. ANGELLE:

Well, you are not late, because when we broke, you actually did Mr. Owen a favor because he was over there waving over here for a restroom break, and had it not been for us waiting on you, Mr. Owen would be sitting over there and waving a little bit more. We also apologize for the mix up, but it's not a problem. You are not late, and we're ready to hear from you.

MR. LANGLINAIS:

All right. Well, thank you. I appreciate it.

I think some of the slides I am going to show you probably have already seen before, but a lot of this

may be redundant or duplicated, but there are some new slides that I have here that I think would be of interest to the Ground Water Commission as far as issues -- to address some of the issues that you are concerned about.

Of course, this is a slide that everybody has seen where the Chicot Aquifer system is, and it regenerates itself from the northern part -- let me see if I can find my pointer here. You see where the regeneration of the Chicot Aquifer takes place, and I think this is not on your slide. This comes from the U.S. Geological Survey. The amounts of water used by parish, this is also another slide which has been used.

Initially, when the problems of the ground water usage came up, the number 5.1 million gallons per days was going to be used by AGL by drilling two water wells 250' apart, but I think those numbers have now since changed because of the pending lawsuits and some of the settlement issues.

The 100,000 population increase in the town of Youngsville equates to about 10 million gallons per day, so that would be the equivalent to about half of the population -- half of the water usage by a population of the town of Lafayette, the Lafayette area.

Between the two drilling -- the two additional water wells, it has consume the equivalent of no more than two to three of irrigation wells and our calculations show that this is based actually more

than equivalent to about 35.6 additional irrigation wells. And some of the hydrologists that we have spoken to in this area, in some of my work -- I have drilled many irrigation wells for subdivisions as an engineering consultant, and I have done many of these wells, and we'll look at drawdown curves. But some of the hydrologists of the some of water wells (phonetic) are telling me that it could range anywhere from 15 to 75' and that, of course, this could cause saltwater intrusion into the Chicot Aquifer, which I think some of you may have already addressed earlier this morning.

If you take the volume of gallons -- and these are the calculations that I have used -- apply 5.180 million gallons times 365 days a year, times four years, it comes out to one billion -- or one million cubic feet. And then, if you take the typical farm irrigation well, which pumps about 30 days a year, it comes out to 27 million cubic feet, and you divide that into one billion, you come out with a number of 36.5. So the well of 5.18 million gallons will equate to the equivalent of what thirty-six and-a-half -- 36.5 farm irrigation wells would be pumping over a period of one year. Now, this is -- we're basing this over an annual -- over an annual basis, an annual period.

Just to give you some idea of -- for some of you that may not be familiar with drawdowns, which I think is the issue we want to address here. This is a well that was drilled, and I took pictures of this well

being tested. It's a 10-inch water well, and I think it was pumping 1,500 gallons per minute, and it was being tested. And at the time it was being tested, after six hours, this particular well had a 15.2' drawdown at the point inside of the wellhead, okay. So that gives you some idea, when we're talking about drawdown levels, what capacity of wells will produce what quantities of drawdowns.

Of course, we've seen this -- probably this slide before. Groundwater withdrawals are lowering water levels in some areas of the Gulf and the Chicot Aquifer, and, certainly, these withdrawals are creating conditions favorable to saltwater encroachment.

Now, what I'm going to look at is some of the -- if you look at the Chicot Aquifer system, I'm going to discuss some of the items where we are actually -- it's not a problem that could be happening, it is a problem that is happening, and that's what I want to address here.

You've seen this slide before, I'm sure, so I don't want to bore you with some of the details of the slide, but this is the Chicot Aquifer running through Cameron Parish and going north and south. And then this is a -- well, this is the one going -- this is Vermilion Parish running north and south. And the area -- let me see if I can find it. The area that we're talking about is in this area right here (indicating). The wells that will be drilled are in this zone right here, and you can see, the red area is

where the saltwater is encroaching. It is very, very close to the Gulf of Mexico, and this is about eight miles north of Vermilion Bay, so you see how close it is to the saltwater encroaching the zone -- it is encroaching, is getting into that zone as we speak.

This is the Cameron Parish area that shows you the drawdown running from north to south, and then the drawdown -- the geology running from east to west. And, of course, this slide, you've seen before. It shows what happens. It illustrates what drawdown effects actually occur -- how it occurs, and how you can actually cause a well to run dry that you can pump too close to an adjacent irrigation well.

And I will say at this point that, in the Jefferson Island and the Delcambre area, there are five known wells that have already gone dry in the last five years, so this is a problem that is occurring. Many of the wells are having to be deepened or redrilled because the water level has dropped and the aquifer has dropped below the intake table -- the intake of these wells, and these wells are running dry.

This is the farming area that shows the rice irrigation areas in south Louisiana, and the drawdown curves of these wells that are listed in the Crowley -- in the Acadia Parish area. I think it shows like a -60 elevation, and it is dropping 60' from mean sea level of zero. So you have about a 60' drop in the water table from the edge of the Gulf of Mexico, down to -- up -- or down to the middle of where it has

formed this crater, and so, from here to up here is about 60 to 65 miles, and there is a 60' drawdown right there. And I will illustrate what is happening.

These are some of the water levels, and it shows how fast -- how quickly the sand -- the aquifer levels will change. These were taken in the fall of '95, and this is in the spring of '96. This is the same zone, and you see the changes in the contour lines of the -- these are metric lines of the drawdown curves in this particular area. This is in the Lake Charles area. You'll notice how fast it can change from fall to spring. This is fall of '95, okay.

Now, the impact of subsidence of water withdrawal, this is a slide that was obtained from a meeting that we attended. As oil-land surveyors, we were called -- and engineers, you recall at the meeting in Baton Rouge, right -- that would have been in November or December, after Hurricane Rita. And the U.S. Geological Survey and the Center for Geoinformatics at LSU had been conducting some elevation of the benchmarks, and they compared the benchmark to elevations that they were getting by GPS signals benchmarks, comparing those to what they were finding on present day. And this is the results of their findings, and it shows the amounts of subsidence that had actually occurred in certain areas.

Now, you notice in one area, where you see the Crowley area, there's a big -3 that shows right there in front -- in the magenta or pink, that's -3' of subsidence of the ground over -- since these tests

have been conducted. Now, what has been the cause of this and what has been the reality of all this, if you take a real close look at it and a close-up look at it, you can see the -3, and that means that the ground level has dropped, literally dropped, from where it was in 1929. Now, what has been happening with this zone, if you look at all of the irrigation wells -- and these are the monitoring wells that are published by the U.S.G.S. --

MR. ANGELLE:

Excuse me.

MR. LANGLINAIS:

Yes.

MR. ANGELLE:

Would you go back to the previous slide?

MR. LANGLINAIS:

The previous slide? Okay.

MR. ANGELLE:

Did you give testimony that from the land elevation in that area is 3' lower that the land elevation was in 1929?

MR. LANGLINAIS:

That's what this slide represents.

MR. ANGELLE:

All right. I understand what this slide represents. Do you have elevation data, ground elevation data, that supports that Acadia Parish has had a 3' drop in elevation in seven -- only seven years?

MR. LANGLINAIS:

I am doing any work, but I know of some colleagues of mine who work in the Acadia Parish area, they have done GPS work in that area, and over the period of time, they have had serious problems and conflicts with surveyors going in and running into established or published benchmarks. You take off of a published benchmark and you run the elevation in, you get one number, another surveyor comes from another benchmark and runs it in, they are both showing 11', but they are at different levels.

MR. ANGELLE:

Well, I guess my concern is, if that's the case, we have buildings in Acadia Parish that are certainly -- were constructed in 1929, like school buildings and churches, that I'm not hearing of major structural failure as the result of a sinking elevation. This does impact some of my work in coastal Louisiana, so I'm particularly interested in hearing. And I would like for you to, please, provide the data that shows what this attempts to represent, if you could.

MR. LANGLINAIS:

Okay. This slide comes from the Center for Geoinformatics at LSU. They are the ones that published this, and it was presented at one of our surveying conferences.

MR. ANGELLE:

I certainly understand where it comes from, but it is a dramatic statement to be able to say that Acadia Parish, or parts of Crowley, have dropped elevation 3' in 75 years, that is a dramatic statement

and I wanted, inasmuch as this is considered a public record, you know -- and with all due respect to Louisiana State University, they do some things that over time have not always be accurate, as every other research institution has. So I would be interested in seeing the backup data to that.

MR. LANGLINAIS:

Okay. I would think I could get some of that information from them, where they're obtaining the -- this the doctor -- the doctor from LSU who is in charge of this --

MR. ANGELLE:

They've got a bunch of them.

MR. LANGLINAIS:

They've got a bunch of them, yes. But he was the one -- it's him and his team that has gone out and run GPS of these benchmarks that have been established that we have been having problems with over the years.

MR. ANGELLE:

Right, okay. Thank you. Go ahead.

MR. LANGLINAIS:

All right. Now, this is the drawdown curves, so -- what is this, I can't read it. This is too small for me to read, but -- well, this in 2002? Yes, okay.

I took this slide, and I'm going to overlay the previous slide. This slide on top of this slid, and this is the overlay of the two slides combined. Now, when I did this, put these two slides together and did these overlays using the latest computer technology that's now available, you'll look at the pink area,

and it lies directly south of that -- you see where that -3 is located and see that -3 zone, and you see where it lies south of that cone, south of that main depression cone that says "Acadia" up there? Now, what does that -- this is where the subsidence has been occurring in relation to where the ground water has been settling, okay.

Now, the problem that we are concerned with, if that has been occurring and you pump with extreme volumes of discharge equivalent to 35 wells, and it may be adjusted now to -- with the new -- the latest numbers that have been settled in the settlement with the AGL, it could be -- I understand, it's 3 million gallons per day, but 3 million gallons per day could cause 15 to 20' subsidence -- I mean, not -- 15 to 20' of drawdown in the area around where the well has been drilled.

Now, for some of you are not familiar with the rice-farming problem, the term that is used to determine salinity in rice is the grains of salt. Thirty-five grains of salt is equivalent to about 600 parts per million. This comes from the LSU website. Now, this is what they publish as the required maximum that you -- well, could put saltwater on the rice crop. So the magic number here is 35 grains of salt. Anything above 35 grains of salt can leave 800 pounds of salt per acre at 35 grains, and if you do that three times a year, it could be 2,400 pounds per acre for all -- which is about all that a crop would use for one year. So you should essentially -- if you put

three floodings at 35 grains of salt, you essentially destroy the rice crop because you're putting so much salt back into the soil.

Now, these are some wells that lie directly in that path. You see the big arrow on the right-hand side, these are -- some of these people are clients of mine. A Mr. Charles Broussard has two water wells, if you look at the black dots, he has one water well that he had to shut down about four years ago that had 75 grains of salt -- and remember, the magic number is 35 -- and the other one had 70 grains. He has essentially had to abandon those wells because he cannot put any of that water on his rice crop.

MR. ANGELLE:

Mr. Langlinais?

MR. LANGLINAIS:

Yes?

MR. ANGELLE:

I ask this question, not because I know the answer, because I'm trying to understand. If we've had a 3' drop in elevation in Acadia Parish, and of these slides indicated that it Is the epicenter of rice farming in that area, has there been any withdrawal -- any regulation on the rice farmers in Acadia Parish to quit using the volume of water that they're using if it's causing that big of a problem?

MR. LANGLINAIS:

I don't see that there has been -- I'm not aware of any regulations being applied to the rice farming area.

And the other factor they have to factor in here also, which is not -- which I just failed to mention, is the Merchant power plant.

MR. ANGELLE:

Well, just getting back to the rice farming thing, because I'm particular interested in rice farming. If there is no regulations to it, has there been any self-regulations? I mean, it's gone from 35 to 75 grains, in your opinion, because of what?

MR. LANGLINAIS:

Because of the slow migration of the saltwater coming in from the Gulf of Mexico migrating into the Chicot Aquifer.

MR. ANGELLE:

Why is that happening?

MR. LANGLINAIS:

Well, it's happening because the Chicot Aquifer, in its earlier days, used to flow from the north, directly to the south, and we all know water flows from the higher to the lower areas. However, if you look at the contour lines, what the contour lines represent that the -60, that's 60' below sea level, and the zero is zero, that means it is at sea level. So that means that the elevation of the water at the Gulf of Mexico is at zero, and in that cone, it's at a -60, so there's a 60' drop in that -- in the gradient -- the water going this direction.

MR. ANGELLE:

Why is that; what caused that to happen?

MR. LANGLINAIS:

Well, because there's -- if you notice, the flow is flowing -- the flow of the water is flowing into that depressed cone.

MR. ANGELLE:

I understand what's happening. My question is, why is that happening; why is that water flowing into that depressed cone?

MR. LANGLINAIS:

Well, because water flows -- hydraulically, water flows -- it seeks its own levels. It flows from high to low.

MR. ANGELLE:

We have a cone, and we have that problem.

MR. LANGLINAIS:

That is correct, yes.

MR. ANGELLE:

And what caused that cone?

MR. LANGLINAIS:

Well, what causes the cone, there is a lot of debate on that. This area here in the Gulf has been related to some -- some of the oil -- some of the -- a lot of the oil -- the oil wells that were drilled in this area have a lot of withdrawal. There are many, many oil wells drilled in this area, and there are some of them that's related to all drilling activities that have lowered -- that have depleted the sands of the oil, of the fluid, and you've got water that is being depleted also in these zones. So the combination of those two could be the main thing that has contributed to the -- the lowering of the water

table causing the water to flow into this zone.
MR. ANGELLE:
Right. On one of your previous slides -- if we could go back, if you would?
MR. LANGLINAIS:
Okay.
MR. ANGELLE:
I'll tell you when to stop. No. Back, back, again, one more, right here.
It says that Crowley, this is the rice capital of the world, in this scenario, okay. I don't see anything up in there about oil and gas being a problem.
MR. LANGLINAIS:
Well, the -- in the presentation that was made, there is a GIS that was put together by LSU, and it showed the -- it showed oil wells and water wells combined.
MR. ANGELLE:
Okay. The reason I'm saying, I want to make sure -- because this is a public record. I'm trying to understand. Are you are making the connection -- because I'm not there yet.
Are you making a connection that the ground in Crowley, the 3' drop in Crowley, is too much water being used by rice farmers?
MR. LANGLINAIS:
Well, it's a lot of water being withdrawn that's causing a -- causing a --
MR. ANGELLE:

Right.
MR. LANGLINAIS:
-- decline in the aquifer.
MR. ANGELLE:
Do you believe it's the rice farmers that are causing that problem?
MR. LANGLINAIS:
Well, I wouldn't put blame on any one particular industry, because it could be a combination of both, the rice -- the rice farming area and also the heavy oilfield activity that has occurred in that area over the years, but I wouldn't -- you know, I wouldn't say that it's anybody's one cause, but it could be -- it's several factors that's contributing to the cause.
MR. ANGELLE:
Okay.
MR. HOLLINGSWORTH:
Could I ask a question?
MR. LANGLINAIS:
Yes, sir.
MR. HOLLINGSWORTH:
Hasn't it been determined in recent years that oil and gas extraction in Texas has caused some depressions in the earth over there, over the last few years?
MR. LANGLINAIS:
I have some slides of the Houston area and the Beaumont area, that I think I have them on here that shows a similar scenario that is occurring -- or that has occurred in the Houston-Galveston area.

There was a similar situation beginning to occur in the Lake Charles area with all the heavy industrial withdrawal from the Chicot Aquifer, and they had -- if you'll look on the -- you see the blue area just on that slide right there? Let me see if I can get my pointer, yes. See this area right here, that's the Lake Charles area, that's more subsidence –- there's more subsidence that has occurred here, but there is also -- in those contour lines, if you'll look back on some of the older ones, you'll see, going with the contour lines, where those contour lines are beginning to drift south in this area right here, and it flows to this area, now, it's the Crowley area -- we all know, and I just showed the slides of that. If you look back in some of the records of the Lake Charles area, what has happened in this area, in order to prevent this from becoming exacerbated from what conditions that existed there before, what they have done in the Lake Charles area, as I understand it, is that they have put a squash to this by preventing the oil -- or the heavy industry from around the Lake Charles area from drawing from the Chicot Aquifer, and they have dredged the industrial canal where they're requiring the industry now to take surface water rather than taking ground water as part of their activities in their plants -- in their operations of their plants.

But if you'll look further, you see this blue area that goes off the chart here, you see Houston has a very, very similar situation, but Houston is not a

-3. Houston is at -4, okay.

Now, this is not something that is occurring where -- it's occurring -- you've got a -3 subsidence in about a 20-mile area, so it's such a gradual thing that the eye cannot detect this. It's gradual thing, but you could have a home settling and the whole -- all four corners of the home settling at the same rate, so you don't get the problems as severely as if you have these contour lines being real close together, where you have settling occurring more substantially in one corner than you do in another corner. But on a house, it's, you know -- an average home, 30 by 30 or 15 by 40 or 15 by 60 or 30 by 60 home, 1,800-square-foot home, you would not experience any cracking of slabs or that type of a situation, but you're experiencing a generalized depression.

Now, this does not mean that this is 2' -- a 3' hole. It simply means what ground elevation we had in 1929, they are 3' lower today than they were in 1929, over this whole generalized area, okay.

MR. COLEMAN:

Could that affect flood maps where people are more prone to flood because of the subsidence and the lower elevations?

MR. LANGLINAIS:

I think --

MR. COLEMAN:

Could the lower elevation throw your flood maps off and create problems for people to where their homes to be more apt to be flood?

MR. ANGELLE:

I think I could answer that question because I deal with that on a daily basis, okay.

MR. LANGLINAIS:

The question was, can the subsidence affect the flood maps? Well, since Hurricane Rita, I probably have done over 3,000 elevation certificates in my firm. But what has happened in the Town of Delcambre, Louisiana, if you'll look at the Town of Delcambre, it's just to the edge of that little blue area, between the green and the light blue on there, that area there, the benchmark in the Town of Delcambre has subsided .5', which is six inches, from where it was in 1929.

Now, picture this. For the past 30 years, we have been working off of old benchmarks, 1929 benchmarks. We take off a benchmark, and we run it into the site, and we put a nail in a pole, and the guy builds his house at that level. Another surveyor comes from another benchmark, he runs the benchmark, and he puts an 11' nail, and his nail and my nail don't agree, and this has been going on for the past 20 or 25 years.

Now, what's the problem here? Are the surveyors crazy, or is there some problem?

Well, when they came up with these maps and indicated -- they came back and ran 12 benchmarks in Vermilion Parish. The one in the Town of Delcambre is 5 inches lower. So what do we have to do now in the Town of Delcambre? We have to take off of a benchmark

that we thought was 7.0 elevation above sea level is now 6.5, so that means that every house in the Town of Delcambre, with the new subsidence criteria, has to be raised a half a foot higher than we ever thought would needed to be raised.

MR. ANGELLE:

And I understand that, but I still have a problem with data that shows a -3 in Acadia Parish. I can understand Delcambre, -6 inches over 75 years, but -3 in Crowley in 75 years, to me, is hard to imagine based on all the things that I've read and I've been exposed to, and it concerns me. If it is -3 in Crowley, to me, it's -10 in Delcambre, and that's how it would show.

Now, I may be, as a non-engineer, having a hard time understanding it. If you said, you know, it's -3 over a 20-mile area, I understand that, but if it's -3 over a 20' area, it's got to be -3 at one area. Somewhere it's got to be -3.

MR. LANGLINAIS:

Well, it's -3 at -- in other words, when they shot -- there's an engineer in Lafayette that works the Crowley area, and we've had conversations with this, and he has told me that he has gone into these zones with his GPS and sat on top this monument for two hours. And you've got to collect your data from the satellites, and then you get -- you send it up, and then they send you back the elevation. His numbers are 3, you know, 2.5, 3, you know, 2.5, 2.2, depending upon where he is, and he was shocked the

first time he did them. And I could give you his name, if you would like, but, I mean, I -- we've had conversations with this over the subsidence problem. And I always was of the same impression as you are, that we were closer to the coast, so we would have more subsidence because we're farther to the south.

But when you look at the extent of the oil well drilling activity and the water wells that have occurred in the Crowley area, 100 percent of those rice farmers in the Crowley area have to use ground -- have to use aquifer water. As you get farther closer to the coast, 99 percent of your farmers will use surface water, but if the surface water becomes salty because of a very large drought and you get surface water encroaching from the Gulf or Vermilion Bay, then they revert to their water wells only as a back-up event. So that's what happens in the southern part of the state. But when you get up to Crowley, those guys are using their water wells 100 percent of the time, because they don't have tidal waters that far north.

MR. ANGELLE:

This is my last question on this, because I want to understand this.

MR. LANGLINAIS:

Okay.

MR. ANGELLE:

But if I represented the rice farmers, okay, if my job was to represent the rice farmers and I know that there is nearly as much oil and gas activity south of Crowley as there is in Acadia Parish, this

portion --
MR. LANGLINAIS:
Uh-huh.
MR. ANGELLE:
-- I would be very cautious by making a statement on a slide that shows in the epicenter of the rice capital of the world that there is a 3' drop in elevation, because we've got so many -- the deduction that I'm getting right here is that we've got a lot of irrigation wells in Acadia Parish and that's causing our problem, and we don't want somebody else to drill a well which will ultimately decide upon on that issue. But in the meantime, you're bringing forth, in my mind, a concern that it's a problem that we have today in your mind, in this public record, you said that is being made by the farmers in Acadia Parish. I know that's not what you're trying to say.
MR. LANGLINAIS:
No, that's not what I'm trying -- there is -- when you overlay the slide that shows the water wells and the oil wells, there's a concentration of those water and oil wells in the areas where there is the greatest subsidence. Now, I'm not going to draw a conclusion that, you know, the average person would look at that and try to find a correlation. If you have a concentration of oil wells (sic) that occur in the area of subsidence, and you cover that with the oil wells in the area of subsidence, what conclusion can you draw. And it's a mind -- it's something that is in the back of your mind, could it be something

else, you know.

MR. LOEWER:

Didn't we hear this morning from John that you don't get subsidence until you get dewatering, and we don't have a dewatering problem, we have a depression problem in the Chicot, and you don't get subsidence until you -- you really don't get subsidence until the water table of the aquifer drops?

MR. LOVELACE:

Typically, that's right. Subsidence is not -- not all the city gets subsidence. It typically occurs in aquifers with a lot of clay and --

MR. WELSH:

Would you mind getting on the record, John, if you want to get on the record.

MR. ANGELLE:

If you would come forward, John. I'm sorry, but it's an important question.

And just so members of the Commission understand why I'm drilling down on this issue is because, if the management of ground water -- the management of ground water -- are we hearing that management of ground water has an impact way beyond having fresh water supplies for the people of this state? Okay. And what I'm hearing is that it is, the withdrawal -- this is what my opinion is right now, based on what I've heard, is that testimony has been put forth that the withdrawal of the volume of water by the users, which are -- the largest user is the rice farmers in Acadia Parish, is causing subsidence which leads to other

problems, then we've got bigger problems than I thought we had, okay. Now, if that's not the case, if that's not what it is, I want to correct it.

And maybe you all have a different deduction than I got, but I went to that right away. And I appreciate Jackie picking that up, because that could at least put that in dispute in terms of what is causing the subsidence.

MR. HOLLINGSWORTH:

And that's -- Mr. Secretary, that's based on whether the science is correct or not.

MR. ANGELLE:

Correct.

MR. HOLLINGSWORTH:

And that's the question I wanted to ask.

Let me ask --

MR. ANGELLE:

Let -- if we could, let's let John --

MR. LOEWER:

Let John answer.

MR. LOVELACE:

The focus was for Stephen. He's probably an expert on subsidence, but from what I know subsidence is -- when it occurs in an aquifer situation, such as, there's steep drawdowns, the water level falls below the top of the aquifer, and is, you know -- if the aquifer has lots of sand, it is generally not so much of a problem, because sand grains, coarse grains, work hard (phonetic). You can get some realigned with the grains, but there's not going to be that much

compression. It's when you have an aquifer with a lot of clay in it. Clay, as we all know, is kind of squishy. The water goes out and it tends to flattens out, and that's when we start getting subsidence effects. But you have to dewater the -- be dewatering the aquifer first, and you're not going to see it in the Chicot Aquifer.

MR. WELSH:

So the Chicot Aquifer is a sand with little clay.

MR. LOVELACE:

With clay, yes, with some clay in it, but it's mostly sand.

MR. WELSH:

Okay.

MR. ANGELLE:

At least -- for at least debate and discussion in the future is, we do not have dewatering of the aquifer. We have perhaps more saltwater, but we don't have dewatering. Jackie, you can help me articulate this. And as a result, while we may have subsidence and that can be proven as well, it may not be from the depletion of the aquifer that's causing that subsidence.

MR. OWEN:

Well, Mr. Chairman, there is a well-known report issued by an LSU professor, and I cannot call up his name. The report was done in the late '50s or early '60s, and it has to do with the subsidence in the Baton Rouge area in an industrial area. The subsidence was significant, and the conclusion that

LSU reached, this author, in particular, is that that subsidence was due specifically to the withdrawal of water in the industrial area, which is a highly, closely-defined area within that report, and, of course, that was huge amount of water that was withdrawn over a number of years. But that report exists, and I think it was fairly conclusive.

MR. BOURQUE:

He's got a good point about it, in Acadia Parish, but if you get above it, you go to Evangeline or somewhere like that, your static level, in Acadia Parish, the static level falls at 80' and 90'. Evangeline is above, maybe 110, 115, so the static level is a lot lower the higher -- the numbers didn't change. So it's hard to understand what he's saying about the cone -- the higher you go, the farther north you go, the static level is higher -- lower, a lot lower. Opelousas is lower. Opelousas has probably got 120' static level. So, as you're moving over to the north, east, and west, the level drops significantly, but the land didn't drop. So that's what is hard to see, why the 3 and the 2 is that, and as you go higher up where the water -- again, it didn't drop, but the level is lower as you go farther north, is all I'm saying, north and to the east.

MR. ANGELLE:

Thank you.

MR. BOURQUE:

It's a critical thing I'm looking at.

MR. HOLLINGSWORTH:

Could I ask a question?
MR. ANGELLE:
Yes, sir.
MR. HOLLINGSWORTH:
I know GPS has changed a lot of our ideas about where things are and where they are or not. Since GPS has been around, how much has that changed; have you run any charts on when you first GPS'd it ten years ago?
MR. LANGLINAIS:
Well, ten years ago, probably, very few people that were using GPS were like the (inaudible), the people with the outdoor stuff, and there were some people who were using it around this area.
MR. HOLLINGSWORTH:
But if it is sinking, there ought to be some incremental, fractional part of it that would illustrate that it is still happening or it stopped.
MR. LANGLINAIS:
Well, I think part of the problem is that the studies we were doing, the data wasn't conclusive, because no one was going out and physically GPSing these U.S.G.S. monuments.
MR. HOLLINGSWORTH:
But that makes it all based on the accuracy of the 1929 information, right?
MR. LANGLINAIS:
Well, in 1929, and you see, the -- if you go on the 1929 datum, as you go with the 1929, as you move farther north, those elevations have been -- in some

cases, many of those have been rechecked with GPS and they've showed no change farther north than that green area as you go north.

As you come down farther south in the blue zones there, that's when you find more changes having occurred.

MR. HOLLINGSWORTH:

That's a good reference. Thank you.

MR. LANGLINAIS:

Okay.

MR. ANGELLE:

Okay. Good job.

MR. TOMASZEWSKI:

Yes. I'm Dan Tomaszewski with the U.S.G.S.

And one of the problems is that, with this, you need to know whether it is deep subsidence or shallow subsidence. For instance, if you go to the New Orleans area, it's generally shallow, and here -- I'm not a Chicot expert, but in the Baton Rouge area, for instance, we did monitor subsidence, and we have subsidence monitors now, three of them. And they do show that clay will compact, but it is very, very small, and it's been 2' about, since the time we have monitored it.

MR. LANGLINAIS:

Okay. Anything else?

(No response.)

MR. LANGLINAIS:

Okay. Well, let me try and get back to where we were.

These two slides -- and, of course, you -- and you'll notice the flow -- I think, in answer to one of you -- somebody asked a question, why is the part north of the Acadia area not subsiding? And I think if you look at this, you see the arrows that are shown on here. Those are the arrows that come off of this map right here. Those are the directions of the water flow. All of your water flow is perpendicular to these contour lines. So, on the area north of there, the water is flowing from the recharge area back into the cone. If that situation were to exist all the way from there to the Gulf of Mexico, you would have a north-to-south flow, and you probably -- most likely, you wouldn't have this situation. But because we have less recharge coming from the north, directly south of that subsidence cone, you have that alley which I'm referring to that lies directly south of there where all of those wells have gone dry, and these wells -- these wells that have gone dry or that have gone salty, okay.

And I just want to make one more point here. If you look at the two yellow dots, those are in the Gueydan area. Those are two -- well, you'll notice as you move farther north, the salinity levels are less than as you move farther south, so you have -- the black dots are 75 -- 65, 75 range, and then you get to the yellow dots, that's the Gueydan area.

This one farmer has two wells that are right at 33, 34, 35 grains of salt, and he's fighting -- he's debating whether to use those wells on his rice crop,

but you'll notice where he falls right in that path where that flow is from south, flowing to the north, into that depression cone.

This is another map that I think, once again, you've seen already. It shows the area of most use of irrigation water. These are the monitor wells that are published. And if you take 35 wells -- the equivalent to about 35 wells and put them in one isolated spot, what the concern is that you will get such tremendous drawdowns that you are going to pull that drawdown curve and create a much steeper hydraulic gradient of the water from the tip of Vermilion Bay. If you'll notice, on this slide, you only have eight miles from Vermilion Bay to the area of Jefferson Island, but if you take Vermilion from the Gulf of Mexico, straight north, you've got about 60 or 65 miles. And in that 60 or 65 miles, we have a 60' drawdown, so that's about 1' per mile of drawdown.

If you get to the New Iberia area where the -- the Jefferson Island area, you've got eight miles, and if you get 30' of drawdown in eight miles, that's -- about two -- almost 2' per mile or 3' per mile. If you get 15' of drawdown in eight miles, that's 2' of drawdown, which is twice the level of the slope of the hydraulic gradient that would bring the water in. And we all know that you can change the velocity of the water by changing the grade of slope. And if you change the grade of slope, you can increase the velocity, using Manning's equations and all the other equations that we, as engineers, use to compute water

flows and velocities. So that's our deep concern. If this were to occur and you put the equivalent of 30 to 35 wells at one point, it would be a steep drawdown, not a graduated drawdown.

Yes?

MR. LOEWER:

I'm not sure I'm the only one in the dark here.

MR. LANGLINAIS:

Okay.

MR. LOEWER:

Possibly I'm not, asking questions on the side.

MR. MAYS:

No, you're not.

MR. LOEWER:

We're trying to get -- I'm trying to get my mind into the point of your discussion, and I understand you're saying some of the things that have actually happened, but there seems to be explanations on why something shouldn't be done, and I don't have a clear understanding on what is the threat.

From what I understand from reading this and looking at that, is that, if someone wants to put two wells in equivalent to 36 rice irrigation wells, and you're giving us two reasons why that shouldn't happen; is that what it is?

MR. LANGLINAIS:

That's part of the reasoning, yes, sir.

MR. LOEWER:

Because I don't have a handle around that.

MR. LANGLINAIS:

Yes, okay. I appreciate that.

MR. LOEWER:

And the issue is not here, is should we stop subsidence. You're using that as the reason why we shouldn't be drilling two wells?

MR. LANGLINAIS:

Well, it's not so much a subsidence problem that our concern is. It is the concern of drawing saltwater more rapidly into that drawdown cone and contaminating wells that lie directly south of that area.

MR. LOEWER:

And let me qualify that. I'm a rice farmer myself, so I'm on your side. I understand that issue, but I'm not understanding the point you're trying to make.

MR. LANGLINAIS:

Yes. The point is that, if you have a slope of water at this -- at this slope, you're going to have a certain flow. If you increase the slope three times, it means the water is going to flow into that area three times -- or almost three times faster.

MR. LOEWER:

Right. But let me clarify, you're not talking about water -- Gulf of Mexico water?

MR. LANGLINAIS:

No. I'm talking about water in the Chicot Aquifer.

MR. LOEWER:

Right, but it doesn't start at -- it doesn't

start at water level. It starts -- if you drill a well at -- what is it, is it 20; what is the static pressure at the -- at sea level?

MR. LOVELACE:

In that area?

MR. LOEWER:

Yes.

MR. LOVELACE:

I guess right there, it's about 10'.

MR. LANGLINAIS:

It's about -- yes, about 10'. Yes, if you look at the curves up there, it's about -10 in that area.

MR. LOEWER:

And we understand that the drawdown -- or the static pressure of Crowley, the center of Acadia Parish, is more than anywhere else.

MR. LANGLINAIS:

It is a -60 from zero. From the Gulf, on there, it is 60' below the Gulf of Mexico, and at that area, it's about 10' below the Gulf of Mexico, currently.

MR. LOEWER:

Right.

MR. LANGLINAIS:

And if you increase that and draw it down to a minus -- another 20', 15, 20', it would now be 20' below what it is at the Gulf of Mexico. But the 20' in an eight-mile area gives it a 2' -- over 2.5' to 3' per mile, and that's the slope of the drawdown curve, which creates a more rapid movement of water into that area of the drawdown curve, or where the drawdown cone

occurs.

The steeper the slope, the faster the water comes in, basically, that's what the issue is.

MR. COLEMAN:

Are you saying it's going to bring in saltwater faster?

MR. LANGLINAIS:

That is correct, yes. It will bring in saltwater, because you have much steeper slope of the ground water under the water -- the piezometric lines, the rate -- the slope of the water table underground would be about three times steeper than what it is currently from the Gulf of Mexico to the Crowley area, the epicenter of the drawdown that currently exists.

And I think I have a couple of more slides that may help to illustrate what happened in the year when the first two wells were drilled.

This is monitored well No. Vermilion 501, which is just a little bit north of this area. You'll notice, in 1990, the elevation of the drawdown level from that monitored well where it was, was about a -2, -3, -4. Then there was ten-year gap, from about 1990 -- about 1990, to about the year 2000, that there was really no data taken, but then that's the year in which the two wells were drilled. And we presume that there was a -- and I'm just using this illustration of this water well, which is currently drawing 15' of drawdown, if you pulled the drawdown level at that point near that well over that period of four years when that well was drilled, you probably have a

situation similar to here, but I can't prove that, but we know that that well produced a 15' drawdown, and the well that's being proposed is slightly larger than this.

MR. ANGELLE:

So what you're talking about, on the first AGL water wells drilled --

MR. LANGLINAIS:

They were drilled in 1994.

MR. ANGELLE:

-- in 1994, okay. I see one 1994, and then I see an arrow over to 2000.

MR. LANGLINAIS:

Yes, that's the ten-year period from about 1990, to 2000, that's the ten-year gap that there was no data taken on the monitored wells, but I can't -- when they started collecting the data, recollecting the data, again in the year 2000, that was the data. So it had not recharged from where it was before to over that ten-year period. It had dropped -- well, you can see the number. It had dropped and it had not recharged to its -- or close to its initial point.

MR. ANGELLE:

That's a monitoring well -- VE-501 is a monitoring well at a specific location?

MR. LANGLINAIS:

That monitoring well -- let me see if I can locate where that monitoring well is. Let me go back.

Okay. If you'll look on there, you'll see just below the red dot, you see a VE-501, that's where that

well is located.
MR. ANGELLE:
Okay.
MR. LANGLINAIS:
Okay. And if you'll look down, you see where Abbeville is, and just to the right of Abbeville, it says V-19?
MR. ANGELLE:
Right.
MR. LANGLINAIS:
That's the two monitored wells that I'm showing right there (indicating).
MR. ANGELLE:
What about the wells around there; do you have that data?
MR. LANGLINAIS:
I don't have the data of the other wells, no. I only picked the two closest wells in the vicinity of where this area was concerned. Because you can see, the monitored wells are not spread as densely as the area where the actual water wells of all rice farmers are located.
MR. LOEWER:
What is an AGL water well?
MR. LANGLINAIS:
It's a water well that's being drilled -- that was proposed to be drilled where they want to withdraw 5.18 million gallons per day.
MR. LOEWER:
What size?

MR. LANGLINAIS:

Let's see. 1,500 gallons per minute. I think it's around 3 million gallons a day. I'll have to check my numbers again, but...

MR. LOEWER:

A 6-inch well, 8-inch well, 12-inch well?

MR. LANGLINAIS:

Is it two -- I beg your pardon?

MR. LOEWER:

It's a 10-inch well, 12-inch well?

MR. LANGLINAIS:

That well there was a 10-inch well, that was a 10-inch well.

MR. LOEWER:

So you have a situation, similar like we had in Eunice about -- if we go back about four or five years ago.

MR. LANGLINAIS:

Is that near the Merchant plant, you're talking about?

MR. LOEWER:

Yes, right there.

MR. LANGLINAIS:

Yes. That's what I'm thinking would be the similar scenario.

MR. LOEWER:

Because they wanted to drill four?

MR. LANGLINAIS:

Two more wells, there are probably two that are drilled.

MR. LOEWER:
I mean, the Merchant plant did four?
MR. LANGLINAIS:
I don't know all the situation of the Merchant power plant. I've heard stories about it, but I don't have the details on that.
MR. ANGELLE:
Steve?
MR. LANGLINAIS:
Yes, sir.
MR. ANGELLE:
This one right here, is that AC-332?
MR. LANGLINAIS:
I'm trying to see where you are.
MR. ANGELLE:
Up here, on the top, I'm shooting way up here. Look, you see the little -- where Crowley is up here, the top of this long, 60-mile line, this right here, right under the word "Crowley" (indicating)?
MR. LANGLINAIS:
Oh, yes, okay, uh-huh.
MR. ANGELLE:
AC-332?
MR. LANGLINAIS:
Okay.
MR. ANGELLE:
Okay. Have you been able to look at any data that would show either salinity increases or any problems over here as a result of the 1994 well?
MR. LANGLINAIS:

No. I haven't looked into that. Those wells -- and I think, if there were some salinity increases, the farmers would have brought it to the surface, but apparently, the farmers -- apparently, the saltwater has not reached that far north in the Chicot Aquifer in that area. And I saw a slide at the last presentation that showed where the previous point was.

MR. ANGELLE:

Yes. My question is, if we -- let me rephrase, instead of saying specific to that.

Have you seen any data that would show that the 1994 -- go back to your -- the slide that you had that shows the two wells that were drilled in '94.

MR. LANGLINAIS:

(Complying.)

MR. ANGELLE:

Have you seen any saltwater increases in other areas by looking at data as a result of these two wells drilled?

MR. LANGLINAIS:

I haven't seen those, because the only information I get is from clients that come to my office and I hear their complaints, and those are the ones that I have plotted that have experienced saltwater. For instance, the one they did --

MR. ANGELLE:

But if we have -- if we have a situation -- what I'm trying to get an opinion from you on is, if we have a situation where we have two wells that were drilled right here, okay, and for the first half hour

we talked about subsidence and saltwater flowing into an area, okay. We talked about the gradient and the flow and everything else.

MR. LANGLINAIS:

The subsidence cone, yes.

MR. ANGELLE:

Right. Did that happen in 1994?

MR. LANGLINAIS:

On the other well, I can't answer that question because I don't know. I have not done --

MR. ANGELLE:

Are you concerned that it would happen now, if --

MR. LANGLINAIS:

I think the concern from the farmers is that there is this slow migration of this plume of saltwater that is migrating farther north, and --

MR. ANGELLE:

Right. For a variety of reasons, including the farmers who are using and causing that cone of depression by taking out water, is what you're testimony was earlier. So the farmers, by drawing out water, have caused -- in addition to other people, have --

MR. LANGLINAIS:

Yes.

MR. ANGELLE:

-- caused that cone of depression that allows the saltwater to flow in, and the concern is that we want to make sure that that doesn't get to a point that it has an adverse impact on the ability for the farmers

and for other folks to be able to use that water for the purpose of what they need to use it for.

MR. LANGLINAIS:

That is correct.

MR. ANGELLE:

I understand that.

What I'm asking is, so everybody's withdrawal -- everybody's withdrawal contributes in a cumulative way to that situation?

MR. LANGLINAIS:

That would be -- yes, that's what I was getting at.

MR. ANGELLE:

So the next farmer that wants to drill an irrigation well is going to add to that problem?

MR. LANGLINAIS:

He will add to the problem to some small extent.

MR. ANGELLE:

Sure.

MR. LANGLINAIS:

Yes. Because his well only runs about 25 to 30 days a year.

MR. ANGELLE:

Right.

MR. LANGLINAIS:

But the problem here is wells that run 24 hours a day, 365 days a year, four years, that cone never has a chance to recharge. It sits down there for a long period of time, and it doesn't give it the opportunity to recharge.

And I might mention something about the rice farmers. I'm a -- I grew up on a rice farm, so I'm very familiar with rice farming. There are now policies with the natural -- NRCS, where they are paying farmers to recover their water. When they drain their rice fields, they're trying to reclaim that water and reuse the same water over and over. So there are some practices that are being initiated by the NRCS and some of the other agencies to help conserve water by means of rice farmers.

I mean -- and water leveling is another reason.

MR. ANGELLE:

So you do not have any evidence that shows that this well right here caused any additional saltwater problems elsewhere, but it's something that we probably could look at?

MR. LANGLINAIS:

I think it needs to be looked at.

Now, I might also mention that, in an area just directly south of this -- of Jefferson Island and Delcambre area, I had farmer come -- one landowner come to me and tell me, "Steve, every time my neighbor turns his irrigation well on, my water well goes dry at my house." And I think I heard those comments at the last meeting, also. So what do you do? Well, I wait -- I tell my farmer to run his well for a day and then stop running his well and then let me pump my water well so I can get water for my house. It's just one of my clients who lives south of the Erath-Delcambre area, because of the drawdown from his

water well, it has reached a point below the intake of his existing water well.

So the drawdown phenomena is causing a few problems, as we all know. The drawdown causes the well running dry, and it also causes a further increase of the saltwater encroachment coming into that area where you have that low -- that low cone of depression.

MR. ANGELLE:

I got you.

MR. LANGLINAIS:

Okay. Here is the other water well, Water Well I-19. If you look at Water Well I-19, and look at the numbers, it was at about a -2, a -2.5, and then after -- ten years later, it was down to a minus -- what, about -8, a -9, and it had not recovered, and then -- I just put the period in there. Well, that's the zone in there that shows what most likely did happen during that four-year period when these wells were being drawn down very, very heavily, causing a decline in the drawdown curve at Well No. I-19.

Of course, take another look up, see the well, that's 1,500 gallons per minute, I believe -- or 18 -- I can't read the numbers -- 1,500 gallons per minute, and that caused a 15.2' drawdown, and after six hours -- on a six-hour test, after that well has been run for six hours.

And these are some of the drawdown calculations that I've done to illustrate what can happen at various radiuses, and these are the equations and the

formulas and the hydraulics and the hydrology that's used to test that data.

Somebody asked a question about the Houston area. This is some of the LIDAR data of the Houston area that showed where they have had some similar problems to what is going on in the Crowley area, in the Lake Charles area. Now, I'll show you this slide right here. If you look at the area near the Houston area, I think, if you look real close, you can see a -4 at the epicenter. Yes, that's a -4, I think, the smallest curve at the epicenter, that's a -4 of subsidence in feet. Now, this is data that was published by the U.S. Geological Survey, okay. This is the subsidence that occurred around the area.

And, in fact, what's happened in the area now, I understand that the City of Galveston now has to draw its water from up north, because they cannot drill any more water from their -- from their water wells, because their aquifer is contaminated, it's salty, because the water has migrated into that area and now they have to draw their water from farther north.

I understand that Houston draws a lot of its water from Lake Livingston which lies about 50 or 60 miles north of Houston, in that area, and some of the other areas, where they cannot get salt -- they cannot get aquifer water. They are having to draw it from these reservoirs farther north.

Yes?

MR. HOLLINGSWORTH:

That was over a 22-year period of time, now.

MR. LANGLINAIS:

That's happened in a 22-year period, yes, yes.

And I'm 65 years old, so the next 22 years, we're going to have to expect it, okay.

So to answer one question, so I guess the question then, you know, what are some of the problems --

MR. ANGELLE:

Excuse me, Steve, go back.

MR. LANGLINAIS:

Go back to this one?

MR. ANGELLE:

That's the subsidence of water level, not elevation of land, right?

MR. LANGLINAIS:

No. This is a subsidence in land. This is not water level defined. This is the subsidence of ground.

Let me back up. You see the Houston -- did you see the pink area around the Houston area, that's where that slide is, that is that whole area that shows the amount of subsidence. This is the same subsidence chart that attaches to Louisiana on the west, as you go to the west. If you just put Louisiana on the right-hand side there, it would continue all along that Gulf Coast area.

And near that area of Houston, that's where they have a minus -- and this is their subsidence in feet. This is ground subsidence, not water subsidence.

So this is the problem that we're concerned

about, is drawing more volumes of water from a one-point source, so close to the Gulf of Mexico can cause severe drawal of saltwater into that drawdown cone, and could contaminate those wells that lie directly south, the towns of Erath, the towns of Delcambre, and the little communities in that area that lie in an area south and -- I guess, south and west and east of that area, depending upon how the drawdown cone would developed.

All right. Drawdown effects of having two wells located 250' apart, pumping at the rate of 5.16 million gallons a day could be as much as 30 to 40'. Now, this is in talking to one of the water well drillers who has done some of the work for me in the past, and this is some of his comments for what could happen for putting two wells that close.

The rate of drawdown could be potentialed -- could the potential exist for reverse flow of the hydraulic gradient, which is the slope, which could pull the saltwater from the outfall of the Chicot Aquifer into the drawdown cone? And there again, you see -- I think this is one of the U.S.G.S. slide that I'm using here, but it shows what would happen with a steep drawdown from the Gulf of Mexico coming down, compared to a well that lies very far north, we have a very shallow slope of the drawdown curve, of the drawdown level.

There, again, you see this area here, and the area that we're talking about is in Vermilion Parish. This would be about eight -- about eight miles north

of the Gulf of Mexico -- or Vermilion Bay, not the Gulf of Mexico.

Another issue that we are concerned with is that, in the area of Jefferson Island, when the collapse occurred in 1980, that salt mine was 1,300 -- no, 1,500' deep, so there is an area of shattered salt all -- from ground level down to where all those caverns collapsed and the catastrophe occurred. Nobody knows what happens in that area, but we know that whole area goes down to 1,500 and 1,800'. And you plot this -- I've got it plotted down to about 1,200, 1,300' there. And what exists in that area where you could possibly put some wells so close to that area that you could possibly be flowing some water -- in that shattered area, you could be pulling water from the -- inside of the salt mine that could be leaking from cracks and crevices and finding its way into these two wells. And this is probably within a mile from where these two wells have been proposed.

Now, as you can see the other thing -- okay. All right. Now, one thing I wanted to show you, I wanted to mention, the effect -- let me see if I can get my -- in this zone right here, this is the Gulf of Mexico, You see the line I drew right here? Look at the slope of that line coming down to these two wells. Compare that to the slope that exists from the drawdown cone in the Acadia Parish area. Look at the slope of this curve here, compare that to the slope of this curve right here, that's is the fearful part is drawing large volumes of water in a concentrated time,

so close to this red zone which is where the saltwater is encroaching, that's gradually creeping in from the Gulf of Mexico.

Okay. That's my presentation. Any questions from the members?

MR. ANGELLE:

Yes, sir.

MR. MAYS:

While Mr. Langlinais is there, can you kind of help me understand this entire item on the agenda, please?

MR. LANGLINAIS:

Sure.

MR. MAYS:

First, I think, as Mr. Langlinais is representing rice farmers, is against AGL putting wells in; is that what --

MR. ANGELLE:

Yes, sir, good question. I did poor job of setting this item up, and I appreciate you asking that question.

MR. MAYS:

And as -- does -- we have no real authority on that, unless the Commissioner has ruled something, and then we are the judicial officers to disagree or disagree with that?

MR. ANGELLE:

Right. So, as we say back at home, why am I sitting through this and hearing all of this if I don't have anything to do with it, right?

MR. MAYS:

Well, I'm asking that in a question, if that is why --

MR. ANGELLE:

Yes, right. And you're exactly right, okay.

Mr. Langlinais has requested an opportunity -- had requested an opportunity to be on the agenda, okay, and that request was made for the meeting, I believe, in Ruston. Because I thought we had a very robust agenda there and I knew we would be coming south, we made a decision to go ahead and allow the presentation here, okay. In a spirit of fairness, we thought it was appropriate to contact AGL, who has representatives here, will put on their testimony about it.

You are absolutely right. The responsibility to permit or not -- the failure to permit these wells is the responsibility of the Commissioner, and the Commission has no jurisdiction over it, other than it perhaps is a good learning opportunity for us, a teachable moment, for us to understand some of the issues that go into this.

This was not done at my request, but was done at the request to accommodate folks of the public.

MR. MAYS:

Okay. Just to follow, a couple of more questions, if you would. What -- the AGL Resources wells, what would they be used for?

MR. ANGELLE:

To leach out a salt dome to create a cavern in

the earth to store natural gas.
MR. MAYS:
Okay. And that is a one-time deal?
MR. ANGELLE:
Correct.
MR. MAYS:
One time, okay.
And just -- I guess the question would be to Mr. Langlinais, and I'm sorry.
MR. ANGELLE:
You're doing a good job.
MR. MAYS:
I'm having a problem with his name there.
If -- his comparative was that this was the equivalent of 35 wells. If 35 new rice farmers showed up tomorrow to drill wells on that, you wouldn't have the same concern about that, is that correct, although the effect would be the same?
MR. LANGLINAIS:
The 35 wells that I mentioned --
MR. MAYS:
I'm just asking a hypothetical.
MR. LANGLINAIS:
Okay.
MR. MAYS:
We're talking about the same amount of water, right?
MR. LANGLINAIS:
The same amount of water -- drawing large amounts of water from a concentrated area, and I would presume

that if 35 farmers would come into the area and drill 35 wells, those 35 wells would probably be spread over five miles here, two miles there, ten miles here in that area.

MR. MAYS:

So the concentration is what bothers you more than the amount of water?

MR. LANGLINAIS:

That's right.

MR. MAYS:

I got you.

MR. LANGLINAIS:

Because of the concentration of large volumes coming from a one-point source.

MR. MAYS:

Yes. All right. Thank you.

MR. LANGLINAIS:

And that's the problem.

MR. ANGELLE:

Good, okay. Very good.

Mr. Owen?

MR. OWEN:

Mr. Chairman, just to insert in the record, the subsidence -- with respect to subsidence, the study that I mentioned at LSU was by Raphael Kazmann. It was published as the Louisiana Water Resources Booklet No. 6, in 1970.

With respect to another question that you asked, and I have some interest in this question, because we own the water system in New Iberia, and we have more

than a passing interest in the effect that that would have on New Iberia. We have, over a period of time in New Iberia, detected no change in the chloride content in the water in New Iberia. However, I am aware that in this period, since the initial wells, whether this is accidental or non-associated, in Jeanerette, which is about ten miles south of New Iberia, the chloride content in the water, in the raw water, has changed from 110 parts per million to about 180 parts per million over this 10, 12-year, 15-year period. That's just information that I happen to be aware of.

MR. ANGELLE:

Thank you.

Okay. AGL representative?

MR. GOODSON:

Good afternoon, Mr. Chairman, members of the panel. Thank you having us this afternoon to talk with you a little bit about our project.

My name is Tim Goodson. I'm the managing director of Midstream Projects for AGL Resources. Prior to that, with AGL, I was the managing director of the environmental, safety, and (inaudible).

Today, I want to talk to you about the project we've proposed in the Iberia-Vermilion Parish area, our existing Jefferson Island facility that is in that area, and how we intend to move forward with responsible use of water as we expand our facility as we have proposed.

The Jefferson Island facility was designed and built in the mid-1990s, and has two operating salt

dome caverns that are designed and operated for natural gas storage.

AGL Resources, by way of background, is a 157-year-old company. Natural gas is our business, our only business. We're not an exploration and production company. We serve more than 2.4 million customers in ten states. We have about 2,400 employees, a long history of safety, community involvement, innovation, and as you can see, one of the two from a business standpoint.

Much like the other 43 salt dome storage locations in Louisiana, including the Strategic Petroleum Reserve, these caverns were leached, or solution mined, as it is known in the industry, using raw water which is generally fresh or slightly saline water that has not been treated, without deleterious effect on the aquifer or the environment from which the water was drained. Our current plans for expansion would add two caverns and associated equipment on the leased area of Lake Peigneur. For many of these caverns, we follow the State-required process, and will also involve local and Federal agency oversight.

The leaching of a cavern in a salt dome involves the drilling of a conventional well, after which the water is cemented -- is inserted into cemented casings and a string, and the brine is withdrawn as the cavern is created. Disposal of that brine is in a very deep, natural-occurring, saltwater formation at about 7,500' below ground surface. The leaching process does take

between 14 and 20 months per cavern on average, and results in a shape much like a 2-liter soda bottle.

The JISH caverns that are presently at Lake Peigneur are approximately 3,000' below the lake surface and extend to about 5,000' deep and are typically about 200 to 300' in diameter. They've been in gas service since 1994, without incident, and we intend to continue our safe operation of that facility.

The cavern wells are specifically designed by subsurface engineers and geologists. They are very closely monitored. They are permitted by the State and are inspected twice a year by State officials.

The leaching process and the flow rate are designed to control -- to create a very careful cavern shape, like the one I've described, until it efficiently leaves the salt formation. I'm telling you that because that leads to how we determine how much water is needed for the leaching process, for how long, and at what rates.

The Chicot Aquifer in the Jefferson Island area is a healthy, high-yield, water formation, as this chart depicts. It provides over 200 million gallons a day for many different users in those two parishes. It is composed of two sands in the Jefferson Island area. I'll show you a chart of that in just a minute that to better illustrate exactly what the aquifer looks like in the area. The aquifer has shown a rebound in its water elevation since the year 2000, and that is based on data from U.S. Geological Survey

monitoring in the immediate area.

This chart shows the breakdown of major usage, and we've heard that there are about 50 registered wells, or many more, in the area. Any two to four of those registered wells typically will withdraw the daily volume that JISH intends to use from the Upper Chicot to create its expansions for two more caverns. Our intended withdrawal from the aquifer would be about two percent of this 200 million gallons per day that are used already and would occur over a temporary, finite period of time of about four years.

Our intention is to honor the approach that has been described previously. We intend to use about three million gallons a day from the Upper Chicot, and the balance from the Lower Chicot Aquifer. The two aquifers are present in some sand.

And in this area, I am showing you a chart. The left side is the west, moving right is to the east. This is across Lake Peigneur. Lake Peigneur is shown in this illustration in the upper center. This is development area of Lake Peigneur (indicating).

The four vertical lines that you see are wells that have been drilled into this area, and the data that we have provided are combinations from Louisiana U.S. Geological Survey data and from the dome data taken from the drilling of these four wells, all of which penetrated each of these areas.

The Chicot Aquifer, composed of the upper and the lower sand, makes up that area, and then we've heard about the Evangeline Aquifer as well that exists in

this area. Importantly, the lower sand and the Evangeline are non-potable water zones. There's a thick layer of clay that separates the upper and lower sands in this region. It is depicted here. It's several hundred feet thick. We will point out that the upper sand is several hundred feet thick, 600 to 700' thick. And as I said earlier, it shows a great potential for many users.

The calculated drawdown that our professional hydrogeologists have made shows that the drawdown impact will be a few feet in this area from the operation of the two wells during this period. And the empirical evidence from the mid-1990s, when the first two caverns were created, shows that there has been no deleterious effect on the aquifer.

Wells in the area for domestic use are typically 100 to 200' deep into the aquifer, irrigation and industrial wells, some 300, 400' deep. And as you can see, this thickness provides an ample supply source.

The other piece of information we have on this is reviewed by the State. The hydrogeologists and the Office of Conservation has testified before the Senate Natural Resources Committee that they expected to have very little drawdown effect on the aquifer, and that there would be no material impact that would be long lasting in any way on the uses of the aquifer that presently serve or could be served in the future.

I won't go back into anything else about the aquifer recharge zone. I will advise that the data

that I have shows that about 900 to 1,300 million gallons a day recharge in that recharge zone that was shown earlier by Mr. Lovelace, that is about 60 to 90 miles north of this area. There is more diffuse recharge that occurs south of that area, and since the use in the aquifer is about 700 million gallons a day, that recharge is representing about -- the present-use volume represents about 25 percent of the total recharge volume that occurs per day. This recharge rate is one reason the Chicot is so prolific and able to sustain, on a sustainable basis, so many diverse users.

Water used in the leaching process of the well is not lost or destroyed. We all remember the water cycle. We saw a few things about it earlier. We learned about it very early in our educational lives. Most of the water used in the area is for irrigation, that water is primarily taken up by the crops or is lost to evaporation or surface runoff or reuse. The heavy floods in south Louisiana do not lend themselves to -- infiltration that results in recharge. The water on the surface area does flow into the surface springs, bayous, and other water bodies and reaches the Gulf of Mexico.

Now, this same thing occurs with the brine that is injected. Even though it is into a very deep aquifer and occurs over a long period of time, that water eventually does reach the mid-continental shelf in the Gulf and re-enter the water cycle, so even the brine that's produced is not lost as a total water

source.

Something I'd like to give you is, the Chicot system is a high-producing and recharging aquifer in the Jefferson Island area --

MR. ANGELLE:

Excuse me, if I could?

MR. GOODSON:

Yes, certainly.

MR. ANGELLE:

So, as you are drawing the water out of the Chicot and using it to create the caverns, will you simultaneously be injecting water -- or soon thereafter -- I don't know if "simultaneously" is the right word -- into an injection well?

MR. GOODSON:

Yes, that is correct.

The current wells that we have lie on the western edge and are in about the 400 to 450' zone. The injection wells are at about 7,500 to 8,200' deep, I believe, into either the FRIO or the Miocene Formation, a very deep, natural-occurring, saltwater aquifer, but that process occurs simultaneously, that is correct.

The proposed project will use about two percent of the rate of the water drawn in the area for a limited time and will source significant water from the non-potable zone. Once used, water, again, is not lost, but is returned via the water cycle after deep injection into these formations that I have discussed.

Ladies and gentlemen, that concludes my

statement.

I wish you well in your work and trust that your mission will be accomplished as you are setting a ground water policy and plans for sustaining water management. Thank you.

MR. OWEN:

Could I ask one question?

MR. GOODSON:

Yes, sir, please.

MR. OWEN:

What has determined -- how have you determined the proportion that you propose to take from the Upper Chicot as opposed to the Lower Chicot?

MR. GOODSON:

That proportioning was -- arose out of community input and concerns. It was also a part of the bill that was passed by the legislature in 2008, that bill subsequently was overturned by the Louisiana Court, but we understand the motion that has been made there and the process to balance water use, and so we decided we can -- after some study, and we still have to prove out the withdrawal from the lower sand, but there's only one well we're aware of in the lower sand, up near Broussard. I'm not certain of what it is used for or its depth, but if -- as far away as some 12 to 14 miles, it would not be an issue for us. We believe that we can get sufficient water from the lower sand, combined with the upper, to be able to accomplish our objective.

MR. OWEN:

Well, would you agree that it might be more desirable to take water from the lower sand than the upper sand as far as existing users are concerned, because the better water is in the Upper Chicot in that area?

MR. GOODSON:

I think the issue there is that the -- both of those sands provide water that's suitable, but the blended capacity of the raw water is what we really need for the leaching process. You do have some salinity and other factors that are at place in the lower sand, so the combination of the water is the better outcome for us.

MR. OWEN:

Well, it might be for you, but I'm not sure it is the -- I'm unsure it is the universal panacea that we might be seeking.

Would you consider -- and this is the question that I asked often with plants -- to take more or a higher proportion? Because what you seem to be saying is that the salinity in the Lower Chicot that is determining that blend as much as anything, and I think there's a lot involved that edge, the fresh water edge, of the Chicot than just the chloride content, because the Upper Chicot has a superior mineral content as far as use for potable water supplies.

MR. GOODSON:

Well, we've come this far looking at it, and we'll continue to -- we'll go through the State

process with the Commissioner and his staff on this on the permitting, that is something we'll come back to and we'll consider and look at. I can't give you an answer on it now, because with the lack of information, we really don't know how much can be yielded from that zone and whether it will be sufficient, but we'll work with the State process. We'll commit to doing that.

MR. HOLLINGSWORTH:

Is the two percent effective?

MR. OWEN:

Is the two percent you're talking about, is that two percent just in that area or two percent of the entire aquifer?

MR. GOODSON:

That two-percent calculation was just in that area, based upon the three million per day from the Upper, and then we can see the comparison in that chart. I can go back to it, if that would be helpful.

MR. HOLLINGSWORTH:

No, that's okay.

MR. GOODSON:

Industry, overall, uses about 3.3, by comparison, and the proposal we have is for 3. The public and rural supplies are about 17 million gallons per day in that area, so that's how we calculated two percent over this whole --

MR. ANGELLE:

Yes, sir?

MR. JOHNSTON:

Quick question. The previous presentation talked about four years. What is the time frame on this?

MR. GOODSON:

It would be about four years. It takes 14 to 20 months, depending on the nature of the salt, to leach the caverns to the appropriate size, that is correct. That would be done sequentially, one cavern after the other, based on our current plans.

MR. JOHNSTON:

Just for domestic use or for gas storage, there's enough --

MR. GOODSON:

The gas storage that we do are --

MR. JOHNSTON:

-- is that part of the Strategic Reserve?

MR. GOODSON:

It's not part of the Strategic Reserve, no. It is for our customers who are the interstate pipelines, intrastate pipelines, the local distribution utilities in the state, other municipal and industrial users of natural gas in Louisiana and elsewhere.

MR. OWEN:

I have one more question.

Did you -- in determining the feasibility of the project, did you look at any possible source of surface water for your leaching?

MR. GOODSON:

We did. We looked at Lake Peigneur, itself, and the lake, itself, presents some issues with its water quality. It is a shallow lake. There is a depressed

area in the lake that's used for recreation and other purposes, and we believe that those issues probably make ground water a better choice, especially the blended solution, as opposed to a surface water use.

MR. OWEN:

You're saying "a better choice," meaning a cheaper choice?

MR. GOODSON:

No, not necessarily cheaper. The drilling of these wells are pretty expensive, and for a surface water well, location would require an inlet of some kind in the lake, probably in the deepest portion of the lake, and appropriate pumps and things. We will have to lift water and pump out to the lake to reach our caverns, at any rate, in order to conduct the leaching process, and then bring that brine back to shore, much as we've done with the first two caverns.

MR. COLEMAN:

Are you all involved in an operation similar to this up near Arcadia, Louisiana?

MR. GOODSON:

No, sir. We haven't -- we do not have an interest in Arcadia, no, sir.

MR. ANGELLE:

Okay. Thank you very much. We appreciate you being here.

And that brings us to Item 8, and I'm looking for staff, in particular, Mr. Adams will take 8(a) and (b). My agenda does not indicate which staff member I should call on this.

MR. SNELLGROVE:

Yes, that would be Tony Duplechin, at first, Katrina and Rita water well damage assessment, the final report that was submitted.

MR. ANGELLE:

Okay. Mr. Duplechin?

MR. DUPLECHIN:

As most of you are aware, the Department of Natural Resources was one of the agencies that worked with the Louisiana Recovery Authority following the hurricanes in 2005, Rita -- Katrina and then Rita. And one of the things that we finally wound up deciding to do in the task force that we were working with was to do an investigation of the water wells in the areas impacted by the two storms -- storm surges that it was felt may have been damaged from those hurricanes, and wells we looked at were mostly wells that it would -- felt would not be addressed by anyone else. So we didn't look at industrial wells or municipal supply wells -- supply wells. Mainly, what we looked at were irrigation wells and domestic wells in these areas.

We contracted with a company in Baton Rouge, called GEC, and the scope of the services was to identify, locate, and assess the nature and extent of damage to the water wells caused by these hurricanes. It had been estimated that there were more than 3,600 wells out there that had been registered that may have been impacted in 13 parishes.

The deliverables would include a written report

containing a list of the wells visited, organized by hurricane and parish, detailed description of observations collected at each well, and any actions taken, detailed topographic maps showing where the wells were, discussion of all issues including difficulties encountered, techniques, and plots for locating the wells, et cetera, and categorizing the risks of the well, and taking any interim steps to seal off the wells that were broken off. They were also required to submit a CD containing all this information, along with pictures of each well, and give us monthly status reports.

GEC finished their work earlier this year, and in June or so, turned in their final report. This is not the final report. This is the condensed version of the final report (indicating). The final report consisted of some 18 volumes about three inches thick containing all the pictures and data sheets from that. Rather than have them make 20 or 25 copies of all that, we had them put the text of the report together, along with five CDs -- they may actually be DVDs which hold about four gigabytes a piece.

And what they did out in the field, their protocols, was to go out and do a site description of the site, locate each well, classify each well based on DOTD's well water classifications, give the condition of the well, and determine the risk level of that well.

In their proposal, they've come up with several risk levels, and they range from no risk, which was a

well that was operating in good condition and not damaged, through low risk, which was a well where the well was exposed, it was not protected, and they felt that -- it was out in the open and had the possibility being struck by equipment, say, farm equipment, or something else. Moderate risk was for a well that was exposed, again, and the casing or prop pipe might be broken or damaged permitting debris or liquids to enter into the well. And then high risk, which were wells where the casing was broken off and/or damaged at or below ground level. These wells -- the wells that were damaged, temporary seals were put on these wells, and that's all in the report which ones were like that.

I don't have any of this stuff on handouts, because we're still in the process of getting all this information condensed to where we can go to LRA and present our findings.

On the whole, some 3,807 wells were identified -- we are looking at DOTD's database -- that they were going to go out and investigate. An additional 87 wells that had not been registered were found when they went out in the field. Of these wells, 169 were never located due to one reason or another.

Okay. The total number of wells by type, 3,392 wells were domestic wells, 308 were irrigation, 44 -- an additional 44 were domestic wells that they classified as residential, and then the remainder making up the 3,800 were municipal, some fire protection wells, and other just abandoned wells.

MR. ANGELLE:

Mr. Duplechin?

MR. DUPLECHIN:

Yes, sir.

MR. ANGELLE:

In an essence of time, can you perhaps give us what the final report produced, not so much in numbers, but to request that, in general terms, if we have a problem, if we don't have a problem, two percent, ten percent, twenty percent, something. Because I don't know what 30,000 means, I don't know if that's 3,000. I don't know what that means, because it is not relative to me.

MR. DUPLECHIN:

I'll go over one more set of numbers, if that's okay, and that's the number of wells for each risk, if that's okay, sir.

MR. ANGELLE:

I'm only interested in -- in the essence of time -- the Commission members can get the entire copy to review it, the 18 volumes.

Do we have a problem, where is the problem, how big is the problem?

MR. DUPLECHIN:

The problem is not serious. Out of the 3,800 well, 20 were classified as high risk, okay.

MR. ANGELLE:

Okay.

MR. DUPLECHIN:

And 154 a moderate risk, so there are some issues

out there that need to be addressed. There are some wells that do need to be plugged and abandoned.

MR. ANGELLE:

Who is addressing those issues?

MR. DUPLECHIN:

We are addressing them, but we haven't gone out in the field and done anything yet.

MR. ANGELLE:

Do we have an inventory of the problems?

MR. DUPLECHIN:

An inventory of wells, what the problem is with each well. We're going to make a report, put together a report -- we're putting it together to give to our LRA, since they're the ones that kind of directed us to do this.

And come January 1st of next year, the Office of Conservation will be taking over some of the water well rules -- programs that are currently at the Department of Transportation and Development.

MR. ANGELLE:

So the report was to identify the wells that could be a problem. After they identify them to -- for public safety issues, come up with a game plan on those, and you will bring back to us a game plan on those that -- because we're really not interested in knowing what happened to the 3,860 that are not a problem. We're only interested in knowing what happened to those that are a problem and what is the game plan.

MR. DUPLECHIN:

The game plan right now is to present this report to LRA.

MR. ANGELLE:

Okay.

MR. DUPLECHIN:

And it was really -- when all this occurred, it was their -- they were the ones that were going to move forward with the next step, whatever they decided to do.

MR. ANGELLE:

Well, what is your recommendation for the next step? The LRA is a bunch of individual members of the public that are serving in a voluntary capacity. Is the next step to seek money?

MR. DUPLECHIN:

The next step will be to seek money to address the wells that do need to be plugged and abandoned.

MR. ANGELLE:

Does anybody have any questions for Mr. Duplechin?

MR. DUPLECHIN:

Mr. Bolourchi?

MR. BOLOURCHI:

These wells were in the surge area; is that correct? These wells were located in the surge area?

MR. ANGELLE:

That's correct.

MR. DUPLECHIN:

Correct.

MR. BOLOURCHI:

And so what percent were seriously damaged?

MR. DUPLECHIN:

Less than 200 out of 3,800 were moderate or high, high risk or moderate risk.

MR. BOLOURCHI:

That's five percent.

MR. ANGELLE:

20 high and 154 moderate.

MR. BOLOURCHI:

I think this speaks for the rules and regulations of water wells that has been in force since 1985, having surge five, six, who knows, ten feet of water, I think that's a very good job on the part of the drillers and the part of the State to inspect those wells making sure that they can withstand this type of forces. Thank you.

MR. ANGELLE:

Okay. Thank you very much.

MR. BOLOURCHI:

By the way, is that report going to be available to Commissioners?

MR. DUPLECHIN:

It will be available. I have to make some more -- get some more copies of it made.

MR. BOLOURCHI:

Just executive summary, please.

MR. DUPLECHIN:

Yes.

MR. BOLOURCHI:

Thank you.

MR. DUPLECHIN:
I'm not going to be bringing 18 copies (sic) to each of you all.
MR. ANGELLE:
Thank you very much.
Does that satisfy the Commission's interest in this issue?
(No response.)
MR. ANGELLE:
Hearing no questions, we'll go to Item B, which is presentation by Conservation attorney, John Adams, on the proposed Memorandum of Understanding, pursuant to Act 437, which is the transfer of authority for well drillers from DOTD to the Office of Conservation.
MR. ADAMS:
Thank you, Mr. Secretary.
Last year, the legislature did pass Act 437, which essentially does two primary things. First, it transfers the water well drillers programs, specifically, the drillers licensing and regulations program, the registration program, and the enforcement program, it transfers those programs from the Department of Transportation and Development to DNR, specifically, the Office of Conservation within DNR.
Part of the legislation requires that, by January 1st, DNR, DOTD, and the Office of Conservation have a Memorandum of Understanding in place setting out all the specifics of those -- of that transfer.
As of right now, the staff of the Office of Conservation has prepared that memo, has submitted it

to DOTD, and it is currently under review by their legal department. The point there is that we are well underway to having the Memorandum of Understanding in place by the January 1st deadline.

The other big thing that the Act does is that it gives the Commissioner enforcement authority over the provisions in the -- the provisions of the programs. Specifically, up to this point, there was no authority for anyone to issue a compliance order requiring enforcement of any of the provisions of those programs. In order to get something done, a separate lawsuit had to be filed through the Parish Attorney's Office in the area where the act took place, but the legislature fixed that by granting the Commissioner authority to issue compliance orders, follow up with civil penalties in the event that the compliance orders weren't taken care of.

Basically, that's the whole -- that's the current status.

MR. ANGELLE:

We're making process. Do we have any concerns that will create failure to execute this in the time we're trying to get that?

MR. ADAMS:

There were always concerns, but we're doing everything we can to make sure that things continue to progress smoothly.

MR. ANGELLE:

That's the right answer.

Any questions?

Yes, sir.

MR. BOLOURCHI:

Mr. Chairman, I think I need to make a correction of Mr. Adams.

MR. ADAMS:

Sure.

MR. BOLOURCHI:

DOTD had full jurisdiction and authority, not only in civil, but also criminal penalties, and hearings, and we did that -- many of them was done during the -- when the program was being instituted.

MR. ADAMS:

Right. Thank you.

MR. ANGELLE:

Thank you very much.

All right. Any questions for Mr. Adams?

(No response.)

MR. ANGELLE:

I appreciate your presentation, it means that we are continuing to sharpen our efforts in the state to have a streamline ground water management program.

We want to then move to Item C, Mr. Snellgrove to present the Statewide Water Well Notification Audit and Enforcement Update.

Mr. Snellgrove, while you are up, you'll take care of C and all items on D, as well.

In the essence of time, we are going to request that Mr. Jones make the water well evaluation presentation perhaps at another meeting. This meeting has probably gone beyond most folks' expectations, and

so I would ask, with all due respect to Mr. Jones, that we would just go ahead and get that one placed up on the next item (sic).

And if you would, Mr. Snellgrove, go ahead and take Items C and D.

MR. SNELLGROVE

Yes, sir. Thank you.

Real quickly, and I'll go through these slides and entertain any questions.

We had reported in previous Commission meetings that we had an audit process in place, and since we're in the Chicot -- in the area here, I thought it would be noteworthy to inform the public of where we're at with the Chicot Aquifer.

Currently, we have concluded through August, Acadia and Lafayette Parish, to date. We're currently working on Allen, Evangeline, and St. Landry Parish. We've concluded Calcasieu, Cameron, and Jefferson Davis, and Vermilion, as well.

Some statistics on enforcement actions that have been issued in this area are addressed somewhat for the public's knowledge. This is -- the audit is a process where our agency is reviewing the DOTD database in comparing their database to our file records and identifying water well owners who have not submitted the required notification to the Department of Natural Resources. I'll address, a little bit farther back in time, in 2008, the legislature gave the Commissioner the authority to -- or mandated that the Commissioner enforce the statutes and regulations

under our Department, with the issuance of compliance orders where applicable, and, of course, civil penalties if necessary.

So, with that being said, moving forward, the schedule, the staff created an enforcement auditing process which is a two-year process, thereafter, to be condensed into a one-year, annual review. And this is where we're at in the schedule. We implemented it in January of this year, and we're now, of course, at this point in time.

So, in the Chicot Aquifer parishes, we have a total -- we have issued, to date, from Calcasieu, as it's reported on in June, on the schedule here, to the end of August, which is to Lafayette, we've issued 561 enforcement actions for water well owners who have failed to provide our agency the required notification since our program has been in effect, from 2001 to current.

I can break that down by parish, if you would like. I guess I will go ahead and do that real quickly. Cameron, we have issued 54 total; Calcasieu, 83; Jefferson Davis, 88; Vermilion Parish, 161; Acadia, 114; and Lafayette at 91.

MR. ANGELLE:

So we have well owners who are failing to give us -- to report to us, and you're grabbing that information off of the DOTD database, because the well drillers are providing that information, and the well owners are not to us, so we're trying to merge those two things?

MR. SNELLGROVE:

Yes, sir, that is correct.

And in this slide right here moving -- I'll fill you in, if you will, on the public outreach and education efforts that we have recently engaged and have made contact with on several fronts -- two of the fronts, rather than several, but two of the fronts being the public supply water well owners and the agricultural community.

Both of which, we've identified as being problem areas for our program in regard to water well registration, so what we wanted to do -- understanding too that we've got two fronts opened up, one being the enforcement side, and the other being public outreach and education. What we're trying to achieve here is, concurrently, we want to, of course, enforce our rules and regulations, but at the same time, we need to outreach and educate those who are in the most need to understand that DNR does exist and that DNR does have these regulations that require prior notification for certain types of wells, and to, hopefully, get to the point where we're getting the water well owners who are delinquent providing the information that's required to our agency before we implement the enforcement screen that I showed earlier. In other words, it's more efficient for me to go out and educate and outreach and get the volunteer effort coming in to reconcile the problem as it is for me to -- in lieu of me going out and creating compliance orders and going through that whole process. So this

is what we're aiming to do, and that's our -- our goal there is to get voluntary compliance.

So, with that being said, the campaign that we started the public supply well owners, we collaborated with and partnered with the Office of Public Health. We contacted those folks. We tapped into their database as it is going to be probably the most accurate that we have in Louisiana to identify the public supply water well owners, who they are, and where they are located.

When we tapped into that database, we sent over 970 memos out that essentially expresses what I explained earlier, that we've got a process in place to enforce, but we want to have voluntary reconciliation, if you will, with any delinquent water well owners out there. And, of course, we provided in that memo this information, and more importantly, contact information, and the phones have been ringing, so -- and that's the way we want it. We want -- you know, that goal, that mission, is really moving forward in the right direction on that front.

And where we're at with that is, we first went out to the community public supply water well owners, and the next stop is going to be the non-community public supply water well owners, and we'll be getting to that here, probably, within the next couple of weeks.

The second aspect of -- for a more grassroots campaign, if you will, to public outreach and education efforts here, is for us to reach out to the

agricultural community. And in doing so, we've contacted the NRCS and we've also contacted LSU, the LSU Ag Center, and where we're going with this effort is collaborating with or partnering with the Natural Resources Conservation Services and going to their location to educate their field level staff and engineers.

As I appreciate, they have a process where the farming community -- that the agricultural community can receive funding through their agency, through funds and what have you, but in order to do so, it is important that -- it is required that the -- that the water well owner or the farmer demonstrate to this group that they've complied with the State's laws and regulations at the local and State level.

So what we want to do is, is make sure that the NRCS folks fully understand and grasp our rules and regulations and how they play into the regulatory scheme. And also, concurrently with that, is provide them with tools so that they can educate the agricultural community at the field level as they're coming in to receive funding, or even without receiving funding. This all came about as a brainstorm, from my prospective, from a conversation I had with a representative in the northwestern part of the state -- northeastern portion of the state, and my understanding of the fact that there were agencies out there that were assisting the farming -- the agricultural community that I really didn't know that were out here. So the light bulb went off, and I

said, well, we've got to train and educate those folks so we can get that message out from both sides, the agency's, as well as the water well owners. So that's where we're at with this effort. The LSU Ag Center, we're going to partner with those folks too, and we're going to give them the tools that they need to help us out, also.

This slide right here is showing the most recent cooperative agreement that was signed by our agency to provide funding for this fiscal year to continue a U.S.G.S. monitoring effort in the Sparta Aquifer that is showing -- or that was set up to show the effects of the efforts that were put forth by the Union County to end -- or to get off of the Sparta Aquifer up there in Union County, to go to surface water. So we wanted to -- this cooperative agreement was set forth to continue the monitoring of the Louisiana wells that were part of that effort.

MR. ANGELLE:

Mr. Snellgrove, at the last Commission meeting, I think we adopted a resolution, or certainly had discussion, upon the request of Mr. Coleman, and probably a motion whether we would move forward with this. In 30 seconds or less, where are we on this, where it says, "signed for Sparta," where are we in terms of the process?

MR. SNELLGROVE:

Okay. Where we at right now is with the Division of Administration and their approval.

MR. ANGELLE:

Okay. So we have done everything -- the Department of Natural Resources, Office of Conservation, has appropriated the money, has done everything we need to do. We're waiting on a contract, the Office of Contractual Review to sign off on it, and it's done?

MR. SNELLGROVE:

Yes, sir, that's my understanding of it.

MR. ANGELLE:

Thank you very much.

MR. SNELLGROVE:

Well, as the Secretary had mentioned earlier, Mr. Jones' presentation will be at another time.

MR. ANGELLE:

All right. Okay. So you have taken care of C and D. We will defer on E, and go on to F.

Mr. Snellgrove?

MR. SNELLGROVE:

Okay. Here we go. So the Statewide Ground Water Conservation Plan that has been the topic of discussion at previous meetings, also, we're reporting here that this is what we expect the timeline to be for us to go ahead and have conclusion of a Statewide Ground Water Conservation Plan, a management plan is what this -- is complete.

So, as the process goes through, the request for proposal, which is what the "RFP" acronym stands for, will be advertised in months one and two, and then we'll, of course, receive, you know, proposals in that time period, and we'll have to evaluate them by the

staff to make sure that they meet the intentions or the scope of services as detailed in the RFP. I believe Maureen is handing out, I believe, a draft of those scope of services?

MR. ANGELLE:

Yes. Let me address this issue.

Again, going back to the first presentation that we had today from Ms. Terrell and the duties of the Commission were to continue to develop, in conjunction with the Commissioner, a statewide ground water resource management program, we all felt very clearly the need to -- we discussed this at last month's meeting. We have again been able to obtain some financial resource to better do this.

Mayor Hollingsworth, at the last meeting, was very interested in seeing a timeline put together so we could hold ourselves accountable for that. We are, in my estimation, about two weeks away from beginning this process, okay, based on some recent correspondence that I received.

I have before you the scope of services that our staff handed out, and I'm going to just kind of run through it real quick. Number one, I think it is important that -- and I realize that some of this information is out there, but it needs to be put together and wrapped up in an easy-to-read packet.

Task No. 1 -- I'm reading on Page 2 of the document, it says, provide a historical review of ground water resources and surface water resources; 2, provide comprehensive statistics on number of

users, volumes of use, type of users, number of wells/intakes and similar statistical information for each aquifer and surface water source for the most recent five-year period and project the demand for the next ten years; No. 3 -- which I believe is the real meat and potatoes of this -- study, evaluate, and provide specific recommendations both long term and -- short term and long term, to enhance the sustainability and quality of ground water resources throughout the state. This task shall include but not be limited to the study and evaluation of surface water resources and reclaimed water, including treatment and transmission systems of same, as an enhancement to ground water sustainability. This task shall also include recommendations and all the component parts of a comprehensive management plan, including but not limited to registration, evaluation, conservation, education, enforcement, monitoring, auditing, and collaboration with water districts, local government, other State agencies, Federal agencies, and universities. Task 4 is to then prioritize some of those short and long-term recommendations above in No. 3, based on a cost-benefit analysis; 5 is to study, identify, and recommend sources of local, State, Federal, or other funding resources, such as grants, loans, to fund the prioritized long and short-term recommendations; 6 is to identify best management practice throughout the nation regarding effectiveness and feasibility of implementing tax incentives to offset development,

implementation, and/or completion costs of those recommendations; and 6 (sic), to issue an electronic version of a draft comprehensive report of Task 1 through 6, inclusive, conduct four public hearings for the purpose of informing attendees and receiving public comments on the details of said draft comprehensive report during a 30-day period at times and locations prescribed by the Office of Conservation, subsequently consult with the Office of Conservation on potential incorporation of public comments into a final comprehensive report. The format for the draft comprehensive report shall be in an easy-to-read format, with graphs, charts, and pictures all consistent with the business management of this type of publications, and finally, publish five originals of a final comprehensive report and an electronic version of said comprehensive report. Those versions shall include all reference information, appendices, resources information, et cetera; in addition, publish 30 original, hard, color copies of an executive summary and provide an electronic version of said executive summary in an easy-to-read format.

So this is what this Commission will be wallowing into with the selection of a contractor through a transparent, public process that should begin in about two weeks.

Any questions?

MR. COLEMAN:

I think it's commendable.

MR. ANGELLE:

Thank you, sir.

MR. LOEWER:

I take it, the Governor didn't cut those funds.

MR. ANGELLE:

No, the Governor did not cut those funds. The governor does not cut any funds -- since I worked for the governor, the legislature is the one that cuts funds. Let's make sure -- get that on the record, ma'am, okay (laughter).

Okay. So that's the timeline.

Any other concerns? Obviously, we wish we could have it all done tomorrow, but it does take time to put together the kind of plan that we will use to govern ourselves for the coming several years.

Item G is the Sparta Area of Ground Water Concern Update.

MR. SNELLGROVE:

Real quick, the big news, the highlight of this slide is that we have received information that states, from the mayor, Mayor Norris, we made reference to him earlier today, but he says, "Now we have sufficient funding to build the project to the original ten million gallons per day capacity." So, as of September 10th, we received this letter from the City of West Monroe that brought forth this good news, and we wanted to make sure that we highlighted that.

MR. ANGELLE:

Mayor Hollingsworth, didn't you address this -- at the last meeting, he made this presentation and the

announcement -- a subsequent announcement that he received some additional stimulus money, that at that time when he made that presentation, he had not yet received; is that correct?

MR. HOLLINGSWORTH:

I think that's right.

MR. ANGELLE:

So was it because we invited him to the meeting and he had such a good presentation that he got the money?

MR. HOLLINGSWORTH:

I hope.

MR. MAYS:

We'll take credit, yes, he got it.

MR. ANGELLE:

Motion by Mr. Mays to take credit for every good thing that happened here (laughter).

MR. COLEMAN:

Some members of the Sparta Commission encouraged him to pursue that route, he did, and it was successful.

MR. ANGELLE:

Great, great, great, that's a successful -- I heard earlier this represents the lowest-hanging fruit for us to impact -- positively impact the Sparta, okay.

All right. And, Mr. Snellgrove, you have Item H, as well?

MR. SNELLGROVE:

Yes. The latest update with the Haynesville

Shale, of course, area of concern -- back that up -- an area of the state where we have received a lot of inquiry about the Carrizo-Wilcox and the conditions up there and the use of water supplies for hydraulic fracturing to develop the natural gas flow.

Where we're going is -- what we've done here is to collect some data. We need to understand that -- where we are with our advisory, and, in fact, almost a year ago now, in fact, a little bit over a year, the Commissioner of Conservation issued a water use advisory for this particular area because of the use of -- the volumes of water that were going to be needed to be used for hydraulic fracturing. So in that advisory, you know, water -- the oil and gas industry would seek and utilize alternative resources in lieu of the Carrizo-Wilcox ground water.

So it's been a year and we were expecting some reports to come forth, but for one reason or the other, we weren't able to obtain that information. So we are no longer going to wait. We are going to now require the oil and gas operators, when they fill in these work history report forms, which they currently already have to do for hydraulic fracturing, anytime they do a hydraulic fracturing process, they are issued a work permit. And part of the work permit process is, is to provide this WH-1 Form to document what changes were made and what activity they did at the well. So on the back side of this form that I put a copy of in your information packets, is an -- is a section that would capture water well or water

resources -- water sources information that went into the development of the site -- or the actual rig supply water or the frac water supplies. So the operators will now begin to complete this information out and provide it to our agency so that we can now begin to establish by this information that will tell us, you know, what volume of waters are being used for what -- and from where -- the volume and the source used at oil and gas locations.

MR. ANGELLE:

I want to compliment the Commissioner for making this change on your form, sir. I think it is good for us to know where we have such an announced projected use of water in a particular area that we -- that while each individual well may not meet a current reporting requirement, that the cumulative impact of that will cause us to manage that resources perhaps in ways that we haven't thus far. I think it's important that you made that change, and I salute you for doing that, and that kind of, I think, begins to get our arms around it.

If one company is using, for instance, I think it was -- it was -- the example was, in a particular area, if you use ten million gallons of water a day, then you had to report to us. You had to meter. And I'm giving you a what if. If, on the other hand, you use three million gallons of water a day, you didn't need to report to us, but we could have a situation where -- in this situation, as we all have read the Haynesville Shale opportunities, because of multiple

users using three million gallons a day, which would be below the ten million, but cumulative would be a much greater impact than the ten, and so using that as an example, I think the Commissioner provided the right leadership in requiring that to be reported. Good job.

Okay. Any other questions for Mr. Snellgrove, any comments?

(No response.)

MR. ANGELLE:

Okay. Very good. The next meeting date to be announced.

MR. JOHNSTON:

Mr. Chairman?

MR. ANGELLE:

Yes, sir.

MR. JOHNSTON:

When you were doing the audit, did you check those wells that were looked at as well damaged, we heard from Mr. Tony Duplechin, did you get any kind of cross references to see how they would stack up?

MR. SNELLGROVE:

No, not specifically, we didn't. I haven't made that correlation, but we can certainly look into that. I think most of those wells that were reported as damaged, though, were domestic wells. And the scope of our audit is focused on wells that are non-exempt from prior notification, and domestic wells are required to report after they have been installed, so -- if there are some wells that are out there that are

industrial wells or public supply wells that are part of those damaged wells, we certainly can follow up and look into that and let you know.

MR. JOHNSTON:

Thank you, sir.

MR. WELSH:

You've got a question from Mickey.

MR. ANGELLE:

Mr. Mays?

MR. MAYS:

I would like to compliment the Secretary, the Commissioner, and staff on this scope of services. I think this is going to be very, very important, and I do think the selection of that engineering firm or whoever it is to do this is important, and I may have -- when I stepped out, you may have addressed it. How that selection process will be made, will that be a recommendation to this Commission or will be involved in the selection?

MR. ANGELLE:

Yes. The process is the Office of the Conservation is the recipient of those funds. The Office of Conservation will be the contracting agency, and the Office of Conservation will follow a standard procedure, where folks will turn in their responses, they will be evaluated, and the Commissioner will make a selection of who the contractor will be.

MR. MAYS:

Okay.

MR. ANGELLE:

Yes, it's all transparent. It's all transparent.
MR. HOLLINGSWORTH:
Mr. Chairman, in that scope of services, I would like to make one suggestion. It occurs to me that what we have seen this afternoon with the discussion of the leaching -- the wells use for leaching purposes is just a case in point. All of these requests for industrial usage, or put another way, in a request for the use of a well that is not a potable water use should be run through a filter that asks the simple question, have we considered the availability of surface water in lieu of ground water for that, and -- because all of these things come incrementally. In the aggregate, the effect is much greater than is apparent from any one request, and considering, I think, to ask three or four that were outlined in your outline, I hope that we will install some sort of criteria that will enable us to come to grips with the cumulative effect rather than the incremental effect of these decisions.
MR. ANGELLE:
That's a great suggestion. If you want to work with Mr. Snellgrove on any suggested language, we might want to amend this to capture that so that we can get, you know, real information that can help us in a reportable fashion that we can understand. I certainly would encourage you to do so, but I would ask that you do it before Friday of this week.
MR. HOLLINGSWORTH:
Thank you.

MR. ANGELLE:

Thank you. Okay. Let's see here.

Yes, meeting date -- in speaking to several of you, we're all very busy. I think many of you have suggested that we would go to some regular schedule, third Tuesday or fourth Wednesday or whatever. My staff -- I had asked Maureen to reach out to you all and kind of see what works best for you so that we can try to begin to put something on all of our calendars so that you're not subject to, you know, my calendar, but it's something that we can all agree to --

MR. LOEWER:

Are we going to meet in the fourth quarter?

MR. ANGELLE:

Yes, we are. Right. We have been meeting now -- this represents the fifth meeting of the reorganized Ground Water Commission in 12 months. We are required to have two. This represents our fifth one, one of which we didn't have a quorum, okay. Quorums have not been a problem since we got started, and I don't anticipate them to be a problem.

I am trying to get to, you know, at least monthly meetings as we can go through the backlog of work that we have, and I think we're making progress. I would be interested in your feedback on that, and it may be where we can start going to six meetings a year as opposed to 12. I'm confident that we've got the ball rolling. I'm confident that our timeline is going to be something that will govern us, and I'm not sure that over the next 30 days we will have a whole bunch

more to report to you that is critical for you to receive that could not wait for 60 days. So I'm interested in feedback. I know scheduling is a tough thing.

MR. BOLOURCHI:

Just a comment, Mr. Secretary, the procedure for setting up the meeting, I think it would help us all, after it is decided when the meeting is going to take place, that it will be sent to the Commissioners by electronic calendar, that way, we can reply, accept, or whatever.

MR. ANGELLE:

Sure.

MR. BOLOURCHI:

I think that would help.

MR. ANGELLE:

Anybody have any feedback on -- again, we're required to meet twice. I don't think that's enough. I think four is a minimum. Whether we need six, eight, ten, or twelve, I'm interested in hearing from you. I don't think there's a right or wrong answer to it. It is what it is.

Anybody want to --

MR. HOLLINGSWORTH:

Mr. Secretary, I want to commend you and your staff and Mr. Welsh for getting this together, because that's headed us in a direction that we need to go in.

Also, I want to comment on Mr. Owens' comments about the cumulative effect of small things. I think the state has been blessed with a lot of water

resources over the years, and I think we've gotten careless about how we do things, and it not only needs to be to look at another water source. We need to look at it, do we need to be doing this at all, as far as I'm concerned.

MR. MAYS:

I guess, to answer to your question, I think every 60 days would probably be okay to manage the agenda, but it would be a suggestion that we might want to meet a little more often until we get to the point of dealing with the selection of the -- and the development of the plan.

MR. ANGELLE:

I would like to propose -- anybody have any comment to the contrary?

MR. COLEMAN:

Mr. Secretary, could we maybe use the normal meeting time as every 60 days, and then if there is a need for a special meeting, it be called at your pleasure?

MR. ANGELLE:

Yes, that's what I was going to suggest, great suggestion.

MR. BOLOURCHI:

Is that a motion?

MR. ANGELLE:

Yes. I'm going to go ahead and suggest that we get into a 60-day rotation, and then subject to a special meeting by a call of the Chair, so that would mean that we would be looking at a meeting sometimes

in November, okay. And I'll have my staff work with you on a date for November, and I'll also have my staff, while they're working with you, find out what particular days of the month work better for you to be available so that we can say, November, then we'll say, you know -- we'll go ahead and pick the rest of the dates for 2010, starting with January and March and May and so forth, and have it on our calendar so we can make our arrangements as necessary.

MR. MILLER:

Mr. Chairman?

MR. ANGELLE:

Yes, sir.

MR. MILLER:

If we could avoid the CPRA meetings, because there was a conflict today, and I really needed to try to do both, and obviously, you can only do one, so…

MR. ANGELLE:

Yes. Well, we're glad to see that you picked the right one (laughter). I had the same problem.

Okay. Very good. Yes, sir?

MR. BOURQUE:

Are you going around the state in a timely manner, or are you all going to try to set it in a certain spot to have these meetings?

MR. ANGELLE:

Well, we have been rotating. We have been to Minden, we have been to Baton Rouge, we have been to Ruston, and we have been to Eunice, and it is my goal to try to continue bringing the Commission to the

various corners of the state. We will continue to try to do that. There are always challenges associated with that. I think today we found out that we have to do a much better job, and I take full responsibility and fault for meeting in a venue that did not have microphones, that had PowerPoint presentations to the rear of the members, but that won't happen again. I promise you that.

Okay. Next, public comments, do we have anybody that wants to make a comment?

(No response.)

MR. ANGELLE:

Very good. Move for a --

MR. BOLOURCHI:

I move to adjourn.

MR. ANGELLE:

Motion by Mr. Bolourchi.

MR. OWEN:

Second.

MR. ANGELLE:

Second by Mr. Owen to adjourn.

Any discussion?

(No response.)

MR. ANGELLE:

No objection, hearing none, this meeting is adjourned.

CERTIFICATE

I, MICHELLE S. ABADIE, Certified Court Reporter, do hereby certify that the foregoing meeting of the Ground Water Resources Commission was heard before the Honorable Scott Angelle, Secretary, Department of Natural Resources, on September 16, 2009, in Eunice, Louisiana; that I did report the proceedings thereof; that the foregoing pages, numbered 1 through 190, inclusive, constitute a true and correct transcript of the proceedings thereof.

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MICHELLE S. ABADIE, CCR #24032
CERTIFIED COURT REPORTER