BEFORE THE
FLORIDA PUBLIC SERVICE COMMISSION

In the Matter of:

DOCKET NO. 20170007-EI

ENVIRONMENTAL COST RECOVERY CLAUSE.
_____/

VOLUME 6
PAGES 784 through 968

PROCEEDINGS: HEARING

COMMISSIONERS PARTICIPATING: CHAIRMAN JULIE I. BROWN
COMMISSIONER ART GRAHAM
COMMISSIONER RONALD A. BRISÉ
COMMISSIONER DONALD J. POLMANN
COMMISSIONER GARY F. CLARK

DATE: Thursday, October 26, 2017

TIME: Commenced at 8:39 p.m.
Concluded at 12:39 a.m.

PLACE: Betty Easley Conference Center
Room 148
4075 Esplanade Way
Tallahassee, Florida

REPORTED BY: DEBRA R. KRICK
Court Reporter

APPEARANCES: (As heretofore noted.)

PREMIER REPORTING
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I N D E X

WITNESSES

EXHIBITS

NUMBER:		ID	ADMITTED
47	Previously identified		818
81-84	Previously identified		819
85	ASC-250	831	
86	Tetra Tech Groundwater Flow and Salt Transport Model of Biscayne Aquifer	870	
87	Panday Demonstrative 25	878	
88	Excerpt from the 2012 pre-uprate report dated October 31, 2012	899	
89	GeoTrends Feasibility Study August 11, 2010	908	
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86-89	Previously identified		964

P R O C E E D I N G S

(Transcript follows in sequence from Volume 5.)

EXAMINATION CONTINUED

BY MR. MOYLE:

Q And is that both horizontally and vertically?

A That is correct, it is intended to address both horizontal and vertical migration beyond the cooling canal system.

Q Okay. And the big problem with what was in place before, if I understood some of your testimony, was the canal is 18, 19, 20 feet deep, the aquifer is 90 to 100 feet deep, saltwater is heavier and it goes down and migrates, and you only have an 18-foot mechanism that would -- that would capture the water; is that fair?

A A very simplistic you view, yes, that is fair, though.

Q Right. And, again, the wells, you think, and not only you, but other scientists and folks -- I mean, I just want to try to get -- I know you were asked, can you assure us this? Can you guarantee us this? You can't assure us that this will work, right?

A I have reasonable assurance that this will work, and that's the -- the terminology I will use. I

undeniably cannot guarantee anything in this world, so I would not propose to try to guarantee that anything will work; but this is based upon good scientific technology, and a tried and true methodology.

Q Are you asking this commission to -- I mean, we spent a lot of time about -- on the science and all of this stuff, the testimony is replete with these well system. Are you asking this commission to make a judgment on this will work, or this won't work?

A No, I am -- I am not. The intent, as I understand it -- again, I am the not the PSC expert, but the intent of the ECRC is to identify prudent activities that are being conducted as a result of environmental obligations.

My testimony is to be clear that we believe these are very prudent activities, and they are absolutely required as a part of two consent -- or one consent agreement and one consent order.

Q And I -- I -- who's the FPL expert hydrologist that is providing testimony in this case?

A Mr. Pete Andersen will be providing testimony.

Q And I didn't see him this morning. He is only providing rebuttal testimony, is that right?

A That -- that is correct.

Q You used -- on page 12, line 14, you used a

colloquialism that -- that I thought was effective in communicating where you say the perfect is the enemy of the good, and I interpret that to mean, well, we should not study this forever, but get -- get -- get moving; is that fair?

A That is fair.

Q And there is a colloquialism that I am fond of that is let's get it right, not get it fast; and you think we got it right?

A I absolutely think we have it right.

Q And you understand that if you don't, this -- there is a transcript of this, and somebody might going to come back and drop it on you a few years from now and say, what -- what's up? You are asking us to pay again for this, assuming the Commission approves it?

A I understand that my testimony can be used in the future. I actually really do believe this is the right technology to address the hypersaline plume, and that I believe it will be successful.

CHAIRMAN BROWN: Everything you do and say can be used against you in a court of law.

THE WITNESS: Yes, ma'am.

MR. MOYLE: If I can just have a minute, I think I covered most of the bases.

BY MR. MOYLE:

Q Two more points, and this ties a little back -- back to the discussion with respect to timing and reviewing things, but there -- there are two points that were brought up about the reports and the filing of the reports, and there was a delay in filing reports.

You are aware, as an environmental expert, that the obligation to file reports is on the regulated entity, not on the regulator, you know, to call up and go, hey, where is your report? I mean, is that right?

A I abs -- yes, I agree with that.

Q Okay. And based on your review, it didn't happen, and I don't believe any time when you were there, but these reports were not timely filed with respect to salinity data as was agreed to in an agreement with the water management district, I believe; is that right?

A That is correct. The monitoring was conducted, but the reports were filed late.

Q And you weren't able to figure out exactly what happened. Did you talk to people and get, you know, I told John, and John said this, or did you get -- did you get any kind of story as to what happened on this, or it was just kind of everyone was not there, or no information? Just expand a little bit on that, if you would.

A No, I did inquire to try to understand why these reports were not filed timely. Was it -- and don't laugh, was it as a result of the '04-'05 hurricanes? What -- what transpired that didn't result in the reports being filed timely?

I never could get a answer. There is turnover at some of the folks at Turkey Point that run the environmental program, as a result, getting a clear answer as to why they weren't submitted, other than they affirmatively were not submitted until late in 2 -- in early 2008.

Q Okay. And Mr. Rehwinkel asked you about the use of the phrase unintended consequences, and I think you admitted there is no documents anywhere that say, you know, this is a unintended consequence; correct?

A No, that -- that is my description of the circumstance that is in front of us.

Q And -- and just to be clear, you have no -- you have no firsthand knowledge about any intent with respect to the consequences of the design or the operation that evolved slowly? I am referencing page 12 of your rebuttal, line 22.

A Thank you.

Q You say: The combined projects address an unintended consequence of the CCS design and operation

that evolved slowly over many years. So the CCS was designed when?

A In 1973. I think required it, but '72, '73.

Q So with respect to what was going on in 1973, you weren't -- you had no firsthand knowledge. You weren't in any meetings. You were probably still being educated at that point in time, is that right?

A I believe that is correct.

Q And the same thing with respect to the operation that evolved slowly over time, you didn't begin working with FPL until 2010, so with respect to the comment about -- about operationally unintended consequences, you don't have firsthand knowledge about that either; correct?

A No, I kind of disagree with that, Mr. Moyle. Again, this is -- this is reviewing the record and making an opinion of the circumstance of the record. You -- you question whether I have firsthand knowledge. I have an opinion on that record, and it's very clear that what has transpired over the years -- and I am going to just say that, because I have already testified. It's also clear when you review the record, when you look at the data, the data speaks for itself as to what transpired over the years.

Q Well -- well, just to venture into that a

little --

A I did not take the monitoring -- I didn't -- I didn't sample the wells, if that's what you are asking.

Q Yeah, no. I -- I just want to explore a little bit further with respect to --

A Yes, sir.

Q -- your use of unintended consequence.

My understand is is that these cooling canals, they are not -- they are not lined, are they?

A They are not.

Q And like in landfills, you know, they put double liners in, and you don't want things to go down because it's leachate, and you got to recover it; isn't that right?

A That is correct. And what's similar here, and the analogy that I use is perfect. The analogy is the interceptor ditch is your liner. So the interceptor ditch was designed to be the liner so that groundwater would not migrate to the west.

Q But you people --

A And just like a liner, it's an unintended consequence when there is a breach in the liner and suddenly you have excess of leachate, if it's a double lined facility, or you have groundwater contamination, even though you lined it.

Q Right. And there are people in this room much smarter on engineering matters than me, but -- but the people designing that at the time, don't you think they knew that -- that saltwater was heavier than freshwater?

A I do.

Q And if you have an unlined canal system, and it accumulates saltwater and it's not -- it's not lined, isn't it -- where is that watering going to?

A Again, the people that designed this, when you review the record, especially both the U.S. Department of Justice settlement agreement as well as the subsequent agreement with the water management district, actually contemplated that issue, and that was part of the record; and they identified the need to potentially open up the cooling canal system to the bay if salinities got too high. Unfortunately, several years later, agencies -- regulatory agencies eliminated that opportunity.

Q Right, but I guess my point is, is that if you have an unlined canal, and you know that saltwater is heavier than freshwater, wouldn't -- wouldn't you think it would be part of the -- of the engineers' thinking that, yes, well, this will capture it down to 18 feet, and if it becomes too much, it will -- it will flow downward, but it will stay on our property, we will be

okay?

A So the -- the good news is the way you asked the question, I -- I feel I have a little liberty to say, yes, this is what I think the engineer was thinking, because I avoided testimony in this because it is nothing but speculation.

But I do think what they were thinking was, is we need to protect the upper lens, the freshwater lens adjacent to the cooling canal systems. The groundwater in the deeper portions of the cooling canal systems are already non-potable. They are already saltwater intruded, and that is not the focus of our concern. The focus of the concern is to protect that freshwater lens that lays on top of the saltwater intruded environment.

That's what I speculate they were thinking at the time, Mr. Moyle; but it is speculation, even though when you look at the data, it's clear that those were areas where there was a lot of focus, that freshwater lens on top of the saltwater intruded aquifer.

Q And it could have been intended that they said, let the -- let the heavier saltwater go on down, we don't have to worry about that?

A When you look at the record -- again, you are asking me what people are thinking. When you look at the record and you look at the 1978 report, and it's

very clear that, yes, the -- the saltwater wedge is going to move and act just like the coast was moved to the -- to the edge of the cooling canal system, it's very clear what is -- what they show is going to happen. The benefit there, though, was the upper part of the aquifer was not impacted by that, and as a result of continued monitoring and documentation of the data, and without any direction from the water management district, or Flood Control District at the time, I believe they were more focused on ensuring protection to the upper portions of the aquifer, I believe, is -- but I cannot testify, because that is definitely something I don't have personal knowledge of.

Q Right. Right. And I appreciate that.

One -- one final point. There's been some reference to the 1978 Department of Justice agreement, but there hasn't been much discussion about that.

What did the Department of Justice, what -- what got them involved? Was it -- was it DOJ? Was it EPA? What was their beef, and tell us about that just briefly.

A Sure. First, it's the 1971 Department of Justice settlement agreement.

Again, when we started the project for Turkey Points 3 and 4, as I opened up in my test -- in my

summary, the original design was once-through cooling. We were going to use the Biscayne Bay as the source of cooling water and return the warm water back to the bay. This is similar to what was already there for Units 1 and 2.

Because of concerns associated with impacts to seagrass as a result of the operations of Units 1 and 2, EPA -- I believe it was EPA, Mr. Moyle, raised concerns and objected to the use of once-through cooling at the facility. In order to move forward, a consent agreement, or a settlement agreement was entered into that required FPL to move forward with a new design using the cooling canal system.

Q Okay. Thank you.

MR. MOYLE: That's all I have.

CHAIRMAN BROWN: Thank you, Mr. Moyle.

Mr. Cavros.

EXAMINATION

BY MR. CAVROS:

Q Good evening, Mr. Sole. I will try to be brief.

You make reference to independent investigators in your rebuttal. Are you referring to -- to Tetra Tech, to GeoTrends, to Dames & Moore, Golder; is that who you are referring to?

A I am. I use that terminology, they are independent consultants that are hired by FPL and FPL uses.

Q Okay. I want to turn your attention to page nine, the first sentence there, where you say: I don't think it had been reasonable for FPL to undertake expensive corrective actions unilaterally. You would agree that expensive is a relative term?

A I would agree that expensive is a relative term, but I also would like to finish the statement because it is -- FPL should not undertake expensive corrective actions unilaterally without a clear understanding of the environmental impacts and regulatory approval or direction to do so. It's -- it's not that it's just expensive. It's understanding what the impacts are.

Q I understand.

A Thank you.

Q And would you agree generally that, you know, the old adage, an ounce of prevention is worth a pound of cure?

A I am a firm believer in that, yes.

Q Okay. So you would agree, then, that sometimes early action can be more -- certainly less expensive than action later?

A I actually agree that is true in many cases, yes.

Q Okay. You had a couple dry seasons in 2013 and 2014. You went to the NRC to get your permit modified, is that correct?

A That is correct. The operating temperatures, or intake temperatures were beginning to get close to the threshold requirements of the NRC.

Q Okay. So the -- the temperature and the salinity spiked in those years, correct?

A They did, yes.

Q Correct, okay.

And then you also went to the South Florida Water Management District to request water to freshen canals from the L-31, is that correct?

A That is correct.

Q Okay. And you went to both those agencies unilaterally, right, on your own, proactively?

A As it related to the NRC, I believe that is correct. There was an internal operational assessment that the operating temperature threshold that we were working under could be legitimately increased without any risk, and that was a decision that FPL made to move forward.

As it relates to the freshening, again, this

is a time after consultation had been initiated with the water management district. FPL had already been notified of their concerns, the belief that harm had occurred. And one of the discussions as a solution that immediately was identified is the need to freshen the cooling canal system.

So I kind of disagree that that action was unilateral. Was it as a result of a final administrative order, or a consent agreement, or a consent order? No. But when you look at the provisions of the permit that we were operating under, in the conditions of certification, it -- it basically says if -- FPL, if you are directed to come and take actions to abate harm, so we were operating under the permit obligation.

Q And you went to them first, correct?

A We did go to the water management district first --

Q Thank you.

A -- but subsequent to the consultation.

Q I am still struggling with, you know, some of the words you use in here regarding a robust regulatory process, and -- and -- and working collaboratively, especially as it relates to -- to state agencies.

You have -- you have testified that there were

at least three years where monitoring reports were submitted late. We -- we -- we talked earlier about the -- well -- well, let me step back.

I mean, I think that collaboration -- well, it doesn't really matter what I think, but collaboration, would you agree, works best when the entity that is being regulated is not trying to limit or avoid compliance requirements?

A It depends whether the compliance requirements are real and required. I think the -- you can collaborate and have healthy conversations about what is needed and prudent in order to move forward with environmental remediation. That means you may disagree with the agency and still be collaborative.

Q We discussed earlier the administrative order, and that FP&L provide -- provided substantive text to -- to that order. And that order did not include an enforcement action. It did not include a charge according to the -- to ALJ Canter in his recommended order, is that correct?

A That's correct. In -- in discussing and negotiating the administrative order at the time, and even during the hearing with Judge Canter, it was difficult based upon the data that DEP had, and their analysis of them determining it that a specific

violation had occurred, to include a violation of the minimum criteria. Judge Canter found differently, and later on DEP adopted Judge Canter's view on that subject.

Q And it was your position at FP&L that a violation had not occurred, correct?

A It was our position that, at that stage, insufficient information had been provided to demonstrate a violation had occurred.

Q And that opinion made it into the administrative order, correct?

MS. CANO: Madam Chairman, we seem to be being quite repetitive with prior lines of Q&A.

CHAIRMAN BROWN: Agreed.

Mr. Cavros, can you please move along with your questions?

MR. CAVROS: Sure.

BY MR. CAVROS:

Q I guess, you know, again, referencing sort of this collaboration, FP&L tried to, you know, keep tritium as -- as a tracer to be measured out of the 2015 administrative order; is that correct?

A That's correct. I know I was asked that earlier, and asked if I remembered; and at the time, no, I didn't. I remembered actually saying it had to be in

when I was Secretary. After the break, I actually started thinking about it. No, I do recall that, you know, we felt that the continued monitoring of tritium provided little value. And I would testify sitting here that I think it does provide little value at this stage.

The hypersaline plume has been identified. The threshold -- the specific threshold of the obligations of DEP and FPL to remediate this has also been identified. We now have a clear requirement to withdraw hypersaline water, that which is greater than 19,000 milligrams per liter, back to the boundaries.

Tritium does nothing but act as a tracer, and it holds no value now that we have established here are the remedial requirements. And it has no value, and it's a very costly and expensive substance to monitor for.

So, yes, we did recommend that we not continue monitoring tritium. And even sitting here today, I would say that very little value for the expense of monitoring it.

Q You would agree, though, that that is a valuable tracer to determine whether the water is escaping or migrating outside of the boundary of the CCS, right?

A It is a tracer. Valuable is a term that I

would argue. It's also a confusing tracer in light of the fact that it occurs through air deposition as well as through groundwater transport.

MR. CAVROS: I think that might be it for me.

CHAIRMAN BROWN: Thank you.

MR. CAVROS: Great. Thank you.

CHAIRMAN BROWN: Thank you.

And before we move to staff, I just want to reminds everybody to avoid repetitious questions that have already been asked, and also to focus on the rebuttal testimony rather than taking a second bite at the apple on direct.

So with that, staff.

MS. CUELLO: Staff has no questions.

CHAIRMAN BROWN: There you go.

Commissioners. Commissioner Polmann.

COMMISSIONER POLMANN: Thank you, Madam Chairman.

Good evening, Mr. Sole.

THE WITNESS: Good evening, Commissioner.

COMMISSIONER POLMANN: I believe, in answering a question Mr. Cavros posed, and you mentioned it here a few moments ago, the term harm, and you made reference to G-II and G-III waters. Is harm a specific regulatory term?

THE WITNESS: Actually, there -- there is a regulatory term in harm.

COMMISSIONER POLMANN: Okay. Let me -- let me just take that answer.

THE WITNESS: Yes, sir.

COMMISSIONER POLMANN: Is -- is the term harm used anywhere in either your direct testimony or your rebuttal testimony? I didn't find it, but do you -- do you recall?

THE WITNESS: Commissioner, I apologize, I don't recall.

COMMISSIONER POLMANN: Okay. And that word harm, to the best of your knowledge, does that appear in -- in operating permits, or in the consent order, or the CA as a determinative --

THE WITNESS: If you let me check real quick.

COMMISSIONER POLMANN: -- requirement?

THE WITNESS: I believe it is in the conditions of certification but I want to verify, which is in my direct testimony as Exhibit -- Exhibit 5.

CHAIRMAN BROWN: Mr. Sole, is there anything I can do to help you out there?

THE WITNESS: Oh, no I am trying, Madam Chairman.

CHAIRMAN BROWN: Okay.

THE WITNESS: I will try to be real brief, but I do want to answer the question, and I do believe it's actually in the fifth supplemental agreement, Chairman. It is not in the conditions of certification, but I believe the term is used in the fifth supplemental agreement.

COMMISSIONER POLMANN: Let me ask a related question --

THE WITNESS: Yes, sir.

COMMISSIONER POLMANN: -- maybe this addresses the issue.

Is the utility continuing to operate the facility pursuant to the supplemental agreement?

THE WITNESS: Yes, sir.

COMMISSIONER POLMANN: And is the utility undertaking mitigation, remediation, containment pursuant to the supplemental agreement?

THE WITNESS: No, Commissioner, the --

COMMISSIONER POLMANN: Is that activity related specifically to the CO and the CA?

THE WITNESS: Yes.

COMMISSIONER POLMANN: Is the concept of harm used as a requirement of performance, or a criterion to be met in either the CA or the CO as

to completion of the activity required?

THE WITNESS: No.

COMMISSIONER POLMANN: Thank you.

There was a discussion here a few moments ago in Exhibit 82.

THE WITNESS: I have it.

COMMISSIONER POLMANN: It escapes me at the moment. Let's see if we can do this.

Okay, I have some questions --

THE WITNESS: Is this it?

COMMISSIONER POLMANN: Okay. Let's come back to that.

THE WITNESS: Okay.

COMMISSIONER POLMANN: You have represented -- and just let me set a predicate here -- that you have been in compliance for years. There was a warning letter, a notice of violation, consultation and signed the CO with the Department. From your years of experience with -- with DEP and especially as a secretary, does compliance with the consent order constitute permit compliance?

THE WITNESS: No. The consent order is a -- is a separate document, and the company will be obligated to comply both with the permit as well as the consent order.

COMMISSIONER POLMANN: In terms of the notice of violation, compliance with the consent order, does that resolve the notice of violation?

THE WITNESS: It does. Yes.

COMMISSIONER POLMANN: If you are in compliance with the consent order, are you considered to still be in violation?

THE WITNESS: No.

COMMISSIONER POLMANN: So compliant with the consent order and the remaining -- and all the conditions of the permit brings you into compliance?

THE WITNESS: That is correct. That is the intent of the consent order.

COMMISSIONER POLMANN: Thank you.

There has been a lot of discussion regarding a three-dimensional model. There was testimony by Dr. Panday. In your rebuttal you recognize you are not an expert in hydrology. I have some comments on that, I would like to get some clarification here.

I believe you had -- had indicated earlier -- and again, back to the -- to the consent order and the activities that are going to be undertaken, and I am trying to find out with regard to what's the

actual costs, and when you meet the criterion, the use of the three-dimensional numerical model, is the use of that model for assessment and compliance analysis, is that memorialized in the consent order or the consent agreement? Is that use of the model for compliance evaluation specifically identified in there?

THE WITNESS: I believe I understand the question.

The use of the model is specifically identified in the consent agreement as a tool to validate the remedial strategy, to assert that, yes, what you propose is anticipated to be effective at achieving bringing the hypersaline plume back to the cooling canal system.

CHAIRMAN BROWN: Mr. Sole, I believe you mentioned that previously on direct. Just a reminder, Commissioner Polmann, that that question was asked and answered previously on direct.

COMMISSIONER POLMANN: Thank you.

Okay. I have Exhibit 82 here. Let's look at Demonstrative 5 in that exhibit. This is the graphic that was referenced earlier.

THE WITNESS: I have it, yes, sir. I apologize.

COMMISSIONER POLMANN: There was discussion regarding blue dots on this page. If you look in the upper left corner of the graphic, this refers to the blue dots that are labeled NPDES permit. Can you tell us what that means?

THE WITNESS: The pre -- I believe so. The presumption is the source of the information that Dr. Chen used was from the data that we provided to the Department of Environmental Protection under the NPDES permit. That's the presumption of --

COMMISSIONER POLMANN: Okay.

THE WITNESS: -- what Dr. Chen is saying.

COMMISSIONER POLMANN: And is the -- I just want to confirm, the CCS is a facility permitted through NPDES --

THE WITNESS: The --

COMMISSIONER POLMANN: -- is that correct?

THE WITNESS: Yes.

COMMISSIONER POLMANN: All right. So -- and that's a discharge permit?

THE WITNESS: It is a discharge permit that has no authorized discharge to --

COMMISSIONER POLMANN: Yes.

THE WITNESS: -- surface waters.

COMMISSIONER POLMANN: To off -- off-site?

THE WITNESS: That's right.
COMMISSIONER POLMANN: It's all self-contained now?
THE WITNESS: Yes, sir.
COMMISSIONER POLMANN: In terms of -- this is a graph of salinity within -- and I am assuming that these data are collected under this permit because it's required by the permit, is -- is that --
THE WITNESS: Again, this is Dr. Chen's data. Your assumption is as good as mine, yes.
COMMISSIONER POLMANN: Okay. Thank you.
Do you have knowledge of whether there is a limit on salinity within the cooling canal system?
THE WITNESS: There -- there -- I understand. There is no limit on salinity within the cooling canal system until -- or not until entry into the consent order with the Department. Now there is a limit and an obligation for FPL to bring salinity down to an average of 34 PSU.
COMMISSIONER POLMANN: Within the canal system?
THE WITNESS: Within the canal system, yes, sir, Commissioner.
COMMISSIONER POLMANN: Thank you.

If we could look at Exhibit 74 for a minute. Madam Chairman, I apologize, I don't know when this was entered; this morning, this afternoon or what? And I recognize it's out of order.

THE WITNESS: I have it.

COMMISSIONER POLMANN: Mr. Sole, I believe there was some discussion about -- and this relates to costs -- the project. And this term -- I have heard the use of the term Project 42 and, you know, we've got the TP-CCMP project, and so forth. And you had used the phrase, when we refer to the project that includes, and we being FPL?

THE WITNESS: Yes, sir.

COMMISSIONER POLMANN: And I take that to mean -- or I may infer from -- from that that you may have a different bucket of things that you include in the project, and I am concerned that that may differ from others in that in your request for recovery.

I would like to get some explanation on what it is that the utility thinks is included in the opportunity for cost recovery. When you say, when we use the term the project, we think that includes XYZ. And I don't need the list of XYZ, but kind of just generally.

THE WITNESS: I think I do, Commissioner. Let me try to be succinct, because there was a lot of discussion in my direct on this.

The -- the Turkey Point Cooling Canal Monitoring Plan project, or Project 42 -- they are the same project -- was initiated as a result of conditions of certification, which included the obligations of FPL to conduct significant monitoring, and if that monitoring showed an adverse impact, to abate or remediate or mitigate that impact.

There has been testimony provided beginning in 2009 that outlined that it could go from monitoring to these additional requirements if -- and I keep using the term harm, but if there is impairment of water quality.

So that has been our interpretation of this project. There have been updates on an annual basis to the Commission that have outlined the activities that FPL have taken since 2009 on an annual basis --

COMMISSIONER POLMANN: Okay.

THE WITNESS: -- that have shown that these other activities --

COMMISSIONER POLMANN: I believe we have

testimony for that.

THE WITNESS: Yes, sir.

COMMISSIONER POLMANN: Thank you for the explanation.

I just want to confirm I don't have anything else, Madam Chairman.

That's all I have, Madam Chairman. Thank you.

CHAIRMAN BROWN: Thank you.

We've had extensive testimony on this witness. Is there any redirect?

MS. CANO: A few questions, yes. Thank you.

FURTHER EXAMINATION

BY MS. CANO:

Q Mr. Sole, Mr. Rehwinkel pointed you to several statements in the Exhibit 70, 1978 Dames & Moore report -- you don't have to open it -- and also a conclusion on page six of your rebuttal that quotes this 1978 report; and in each instance, he asked you whether those conclusions or expectations turned out to be incorrect. Do you remember those types of questions?

A I do.

Q Okay. What's your understanding of the term hindsight?

A Hindsight is a scenario where you already know the outcome but then you are asked to speculate on what

is going to transpire, and that's my understanding.

Q Thank you.

Also in discussions with Mr. Rehwinkel with respect to the CO and CA requirement for the recovery well system, he asked whether there was no document approving the design of the recovery well -- of the recovery well system, but just that it was approved because that's what FPL was required to do, and you took issue with that characterization.

Is there a document specifically approving the design of the RWS?

A Yes. Miami-Dade County did write a letter approving the recovery well system and authorizing FPL to move forward.

Q Is that included as an exhibit to your testimony?

A It is Exhibit -- it is at the end of Exhibit 13, which is the Miami-Dade County -- well, that's the amended -- hold on. I apologize. Exhibit 9.

Q Thank you.

In speaking to Mr. Moyle, he asked you whether you were aware of any examples of a utility seeking cost recovery that resulted from a violation of law. Do you recall that question?

A I do.

Q At the time that the DEP issued the 2014 administrative order, had either MDC DERM or the FDEP issued a notice of violation to FPL?

A They had not.

Q Was FPL prepared to move forward with the corrective actions identified in the administrative order?

A Yes, we were.

Q So were the DERM or DEP notices of violations needed to move forward with the corrective actions that would be similar to those we are undertaking today?

A No, they were not.

Q A final question. Mr. Moyle also asked you with respect to the role of the Commission in reviewing the prudence of costs, whether you think FPL got it right. Do you recall that?

A I do.

Q And you expressed some confidence in your position?

A I did.

Q Is that a conclusion that FPL arrived at unilaterally?

A No, it is after consultation with numerous experts, both Tetra Tech, Golder, ENE, multiple consultants were involved in identifying and ensuring

that the strategy FPL moved forward was a thoughtful and scientifically valid strategy, in addition to consultation with the regulatory agencies that have oversight.

Q There's been quite a few questions about the work that is to be done under the consent order and the consent agreement, and benefits to customers generally. Do customers benefit from the work being performed at the CCS, and if so, how?

A Absolutely.

MR. MOYLE: I am not sure that was asked during the questioning.

CHAIRMAN BROWN: I am going to let the witness answer it.

THE WITNESS: Chairman, I will try to be brief, but in short, the cooling canal system has provided tremendous value to its customers over the last 40 years of its operation. It's been a critical element of the cooling infrastructure for Turkey Point, which is a critical part of FPL's generation, especially in the Miami-Dade area.

The project that's in front of us, while, yes, addressing an environmental harm, also addresses basically what was a design flaw from the beginning. And by installing the recovery well

system, and freshening the system, we can ensure that the continued operation of the cooling canal will provide that value to our customers for over the next 20 years or the life of the cooling canal itself.

MS. CANO: Nothing further.

CHAIRMAN BROWN: Thank you.

And thank you, Mr. Sole. You have been on the stand for many, many hours today. I appreciate your patience with all of us here.

THE WITNESS: Thank you, Chairman.

CHAIRMAN BROWN: All right. So we have some exhibits associated with this witness. 47 is a attached to his rebuttal, would you like that moved in?

MS. CANO: Yes, please.

CHAIRMAN BROWN: Is there any objection? Seeing none, we will go ahead and move in 47 into the record.

(Whereupon, Exhibit No. 47 was received into evidence.)

CHAIRMAN BROWN: We also have, from Public Counsel, 81 through 83. I struck 84 because you didn't use it at all.

MR. REHWINKEL: Yes, I asked him if both of

these dockets were used in the enforcement process.

CHAIRMAN BROWN: Okay. I thought were you focused more on the 83.

MR. REHWINKEL: Yeah, but I asked him about both. He said that they are used together.

CHAIRMAN BROWN: Okay.

MR. REHWINKEL: And I would move them both -- I mean, all four documents.

CHAIRMAN BROWN: Is there an objection?

MS. CANO: No objection.

CHAIRMAN BROWN: All right. I will go ahead --

MR. REHWINKEL: Thank you, Madam Chair.

CHAIRMAN BROWN: -- and move 81 through 84 into the record seeing no objection.

(Whereupon Exhibit Nos. 81 - 84 were received into evidence.)

CHAIRMAN BROWN: Mr. Sole, you are excused for the night. I hope you get some rest.

THE WITNESS: Thank you, Chairman. Thank you, Commissioners.

CHAIRMAN BROWN: Thank you.

(Witness excused.)

CHAIRMAN BROWN: All right. The next rebuttal witness is Mr. Ferguson. Would you like a brief

break, or are you ready to go?

MR. BUTLER: Why don't we go with this and maybe see if we take the brief break before we get to Mr. Andersen, if that's okay.

CHAIRMAN BROWN: Sounds good.

MR. BUTLER: I'm hopeful this will be short.

CHAIRMAN BROWN: His -- his testimony is pretty short.

MR. BUTLER: That's the starting point of my hope.

CHAIRMAN BROWN: Not that short.

MR. BUTLER: Fair.

Whereupon,

KEITH FERGUSON

was recalled as a witness, having been previously duly sworn to speak the truth, the whole truth, and nothing but the truth, was examined and testified as follows:

EXAMINATION

BY MR. BUTLER:

Q Mr. Ferguson, you have previously been sworn, correct?

A That's correct.

Q Would you please state your name and address for the record?

A Keith Ferguson, 700 Universe Boulevard, Juno

Beach, Florida, 33408.

Q By whom are you employed and in what capacity?

A Florida Power & Light Company, Comptroller.

Q Have you prepared and caused to be filed on September 25, 2017, only three pages of prefiled rebuttal testimony in this proceeding?

A Yes, only three pages.

Q Do you have any changes or revisions to your prefiled rebuttal testimony?

A No.

Q If I asked you the same questions contained in your rebuttal testimony, would your answers be the same?

A Yes.

MR. BUTLER: Mr. Chair -- or, Madam Chairman, I would ask that Mr. Ferguson's prefiled rebuttal testimony be inserted into the record as though read.

CHAIRMAN BROWN: Madam Chair -- we will go ahead and insert Mr. Ferguson's prefiled testimony as though read.

MR. BUTLER: Thank you.

(Whereupon, prefiled testimony was inserted.)

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

FLORIDA POWER & LIGHT COMPANY

REBUTTAL TESTIMONY OF KEITH FERGUSON

DOCKET NO. 20170007-EI

SEPTEMBER 25, 2017

Q. Please state your name and business address.

A. My name is Keith Ferguson, and my business address is Florida Power & Light Company, 700 Universe Boulevard, Juno Beach, Florida 33408.

Q. Have you previously provided testimony in this docket?

A. Yes.

Q. Are you sponsoring a rebuttal exhibit in this case?

A. No.

Q. What is the purpose of your rebuttal testimony?

A. The purpose of my testimony is to address a recommendation made by Office of Public Counsel ("OPC") witness Dr. Sorab Panday with regards to the allocation of costs between containment activities (prevention) versus retraction activities (remediation) associated with the Recovery Well System ("RWS") that is part of FPL's Turkey Point Cooling Canal Monitoring Plan ("TPCCMP" or "CCS") Project.

Q. On Page 45, Lines 9 through 14 of OPC witness Panday's testimony, he recommends that the initial allocation of RWS costs be based on the projected relative contribution of the RWS to containment and retraction

for the first two years of operation and then revisited and adjusted as needed over the remaining operational life of the project. Is this appropriate treatment under generally accepted accounting principles ("GAAP")?

A. No. OPC witness Panday is proposing an approach that would not be consistent with GAAP. As I explained in my direct testimony in this docket, the RWS has a 20-year expected operating life. FPL utilized the report provided by Tetra Tech (Exhibit KF-1 attached to my direct testimony filed April 3, 2017) to estimate the cost allocation between operations and maintenance expenses ("O&M") and capital based on the relative contribution of the RWS to containment and retraction that is projected over its full operating life. GAAP[1] requires that a long-lived asset be recorded at *historical cost*, which includes "the costs necessarily incurred to bring it to the condition and location necessary for its intended use." Those costs are known, and their allocation accordingly should be determined, at the time that the asset goes into service. There is no provision in GAAP for re-allocating costs already incurred for a long-lived asset between O&M and capital over time, as those relative contributions evolve. FPL conservatively chose a 74% / 26% split to allocate RWS costs between capital and O&M (the Tetra Tech report could have supported an 83% / 17% split). That allocation is reasonable, can only be made once, and should be approved.

[1] Accounting Standards Codification No. 360-10-30-1, Property, Plant, and Equipment

Q. Does this conclude your testimony?

A. Yes.

MR. BUTLER: And Mr. Ferguson has no exhibits to his rebuttal testimony. I would ask that he provide a brief summary of it.

CHAIRMAN BROWN: Briefly.

THE WITNESS: Good evening, Commissioners. Thank you again for the opportunity to speak with you.

The purpose of my rebuttal testimony is to address a recommendation made by Office of Public Counsel Witness Panday with regards to the allocation of costs between containment activities considered prevention versus retraction activities considered remediation associated with the recovery well system that is part of FPL's Turkey Point Cooling Canal Monitoring Plan project.

OPC Witness Panday is proposing an approach that would not be consistent with Generally Accepted Accounting Principals. OPC recommends that the initial allocation of recovery well system costs be based on the projected relative contribution of the recovery well system to containment and retraction for the first two years of operation, and then revisited and adjusted over the remaining operational life of the project.

As I explained in my direct testimony, the

recovery well system has a 20-year expected operating life. GAAP requires that a long-lived asset be recorded at historical costs, which includes the costs necessarily incurred to bring it to the condition and location necessary for its intended use.

Those costs are known, and accordingly their allocation should be determined at the time that the asset goes into service. There is no provision in GAAP for reallocating costs already incurred for a long-lived asset between O&M and capital over time as those relative contributions evolve.

FPL conservatively chose a 74 percent capital, 26 percent O&M split, to allocate the costs, although the report from Tetra Tech would have supported a higher capital split. The costs allocation is reasonable, can only be made once, and should be approved.

This concludes my rebuttal summary.

MR. BUTLER: Thank you, Mr. Ferguson.

I tender the witness for cross-examination.

CHAIRMAN BROWN: Thank you.

Mr. Rehwinkel.

MR. REHWINKEL: Yes. Thank you, Madam Chairman.

EXAMINATION

BY MR. REHWINKEL:

Q Mr. Ferguson, your testimony is short, but you are not willing to withdraw it to save time, are you?

A No.

Q Okay. So on -- can I get you to turn to --

MR. REHWINKEL: And, Madam Chairman, I just have a few questions, so I don't think this will take long.

BY MR. REHWINKEL:

Q Dr. Panday's testimony -- do you have Dr. Panday's testimony with you?

A I do.

Q Page 45, lines nine through 14.

A I am there.

Q Okay. You would agree with me that your representation of Dr. Panday's testimony is a paraphrase and not an exact quote?

A I would agree it's a paraphrase.

Q Okay. Dr. Panday's testimony does not state that the initial allocation of a recovery well system cost should be based on the projected relative contribution of the RWS to containment and retraction for the first two years of operation and then revisited and adjusted as needed over the remaining operational

life of the project, does it?

A It doesn't say that exactly, but that is what is inferred.

Q Okay. You would agree with me that Mr. Sole testifies in his rebuttal that FPL can move forward now with a functional project which can always be refined later if warranted by actual operational data, correct?

A I agree that's what he said, but that has nothing to do with the accounting for these costs.

Q Okay. So let me ask you this: If the Commission, at the end of the day, allows FPL to allocate costs between remediation and prevention in a given percentage -- and let's just pick 50-50 -- for 2017 and 2018, and then FPL, along with the DEP, discover in late 2018 that the actions taken by FPL do not perform as modeled, and additional actions and costs are required to remediate the saline with a hypersaline plume; are you suggesting that any additional actual new costs will have to be allocated using the same percentage as was allowed by the Commission in 2017 and 2018?

A No, I am not saying that, but I think it depends on the nature of the costs themselves.

Again, this allocation was somewhat unique to the recovery well system in that it performed dual

function. I don't know what the -- the costs that you are talking about, or the nature of those costs might be. If it's additional freshening, I would argue that's containment in nature because it's within the cooling canal system, but I can't speculate on what those costs might be.

Q Okay. So I think I understand your answer, but let me ask -- ask you to look at it this way. Let's say that the -- that FPL comes back and they say that they need -- and this is purely hypothetical -- that they need to increase the number of wells to both retract and freshen -- or no, forget about the freshening -- to retract, and it increases costs another $30 million. Would you say that those costs would have to stay with the old allocation, or could they be revisited based on new information for new costs?

A Again, I think it depends, if something has changed fundamentally in the nature of those -- of how those costs, you know, how those recovery well systems act at that point in time, maybe we would have to revisit it if there is new facts in that respect, for just new costs, not for the costs that you have already incurred.

Q Okay. And so if that scenario played out and there was new costs, and an analysis supported 40-60 or

70-30 in either direction, GAAP would allow you to, for those new costs, to record them based on the new allocation procedure; is that correct?

A That's correct. GAAP -- GAAP requires you to do an analysis at the time that the costs are incurred. It's based on your best available information at that point in time. You don't go backwards to then reassess the costs after-the-fact.

Q Okay. And are you reading Dr. Panday's testimony to say that you would go backwards?

A My understanding of what Dr. Panday is recommending is -- is a review of the allocation after a two-year period then to revisit what that allocation would be over time.

Q You have either heard testimony today or already aware that there are several opportunities for FPL to meet regulatory compliance requirements by revising the plan based on projected success or failure, is that right?

A Yes, I have heard -- I have heard testimony that -- that the plan could be revised over time.

Q Okay. And you have heard testimony that that revision could come as early as the next five years, right, starting with March of 2018?

A I don't recall exactly, but that sounds about

right.

Q Okay. So it would be fair for the Commission -- it would be fair -- strike that.

It would be allowable under GAAP for the company to, at the end of five years, or based on an analysis of modeling that said what the company should do that would require additional costs in that five-year timeframe for the company to revise the allocation procedure if warranted by an analysis, right?

MR. BUTLER: I'm sorry, Mr. Rehwinkel --

MR. REHWINKEL: I withdraw that question.

MR. BUTLER: Thank you.

MR. REHWINKEL: I passed out an, Exhibit ASC-250, for Mr. Ferguson on his direct intending it for cross on his rebuttal, and I would ask, Madam Chairman, if this could be given a number.

CHAIRMAN BROWN: Yes. Yes. Let's give it 85.

MR. REHWINKEL: Okay.

THE WITNESS: And we are going to title it ASC-250.

MR. REHWINKEL: Thank you.

(Whereupon, Exhibit No. 85 was marked for identification.)

CHAIRMAN BROWN: Mr. Ferguson, do you have a copy of it?

THE WITNESS: I do.

BY MR. REHWINKEL:

Q Did you have an opportunity to look at this between your direct and rebuttal?

A Yes.

Q Would you agree that -- well, does this GAAP -- first of all, accounting -- ASC stands for what?

A Accounting Standards Codification.

Q Okay. It's the old FASB?

A Yes.

Q Okay. And would you agree that this accounting standard could be implicated in the scenario of new costs that were incurred by FPL in this -- for the RWS, and requiring you to restate those costs on a prospective basis for new costs?

A No. This accounting standard doesn't have anything to do with that -- that particular thing that you are talking about. This is -- this is related to changes that occur on items that have already been incurred in the past.

Q Okay.

A So for new costs, you would just follow kind of general capitalization criteria or expense criteria.

Q Did this provision have any bearing on the adjustments that are being made in 2017 based on your

analysis from the projected costs in 20 -- for 2017 and now the estimated actual costs?

A Not -- not for 2017. Again, as I explained in my earlier testimony, accounting is around incurred costs, and so we -- we did make a change in 2016 relative to our -- our conclusion on -- on the treatment of these costs, but that was made to the actual incurred costs for 2016. It -- it applies going forward, but we did not change our accounting in terms of what we recorded for 2017 because it hadn't been incurred yet.

Q Okay. Final question, would you agree that the allocation of costs --

CHAIRMAN BROWN: I didn't mean to do that.

MR. REHWINKEL: It is my last question.

THE WITNESS: Wow --

CHAIRMAN BROWN: I pushed one button.

THE WITNESS: -- the master switch.

CHAIRMAN BROWN: It was very fun.

MR. REHWINKEL: The very first hearing I was in in 1985 here, I think the chairman turned the air conditioner off to make me stop, which was effective.

BY MR. REHWINKEL:

Q Mr. Ferguson, would you agree that the shareholders received a benefit -- or would receive a

benefit by allocating costs that were expensed -- initially projected to be expensed related to 2017 by having them being capitalized, thereby giving the shareholders an earning stream of -- of equity?

A No. Again, I -- we -- do we earn a return on the capital that we invest? Absolutely. The -- the change that we made in the accounting was to get the accounting right.

I am not concerned with what the shareholders' benefits or not is. I want to make sure -- my job is to make sure that we do it the right way, and so that was what we concluded on when we got it at 2016 was here is the appropriate accounting associated with this project.

MR. REHWINKEL: Thank you, Mr. Ferguson.

THE WITNESS: Thank you.

CHAIRMAN BROWN: Thank you, Mr. Rehwinkel.

Mr. Moyle.

MR. MOYLE: Just a couple questions.

EXAMINATION

BY MR. MOYLE:

Q There is a difference between GAAP accounting and regulatory accounting, correct?

A There are differences between those, but they intersect quite considerably.

Q All right. But you are not suggesting that

this commission is bound by GAAP? That they -- they can't take the experts' testimony and do whatever they feel is the right thing to do, are you? The Commission is free to make its decision based on the evidence in this case?

A I believe the Commission does follow the FERC accounting, which is the Uniform System of Accounts, which is absolutely very consistent with GAAP in -- in terms of how these types of costs would be treated.

MR. MOYLE: Okay. That's it.

CHAIRMAN BROWN: Thank you, Mr. Moyle.

MR. CAVROS: I have no questions.

CHAIRMAN BROWN: Thank you.

Staff.

MS. CUELLO: Staff has no questions.

CHAIRMAN BROWN: Commissioners.

Commissioner Polmann. You don't have a question? That's okay, you can ask one. Okay.

COMMISSIONER POLMANN: I can force it.

CHAIRMAN BROWN: No.

Redirect.

MR. BUTLER: No redirect.

CHAIRMAN BROWN: All right. We have one exhibit associated with this witness proffered by OPC, which is 85.

MR. REHWINKEL: I will not offer that into evidence.

CHAIRMAN BROWN: All right. Mr. Ferguson, you are excused. Have a good night.

THE WITNESS: Thank you.

MR. BUTLER: Thank you, Madam Chairman.

(Witness excused.)

CHAIRMAN BROWN: You want to take about a five-minute break or so?

MR. BUTLER: That would be great.

CHAIRMAN BROWN: Let's take a five-minute recess before the last witness. Thank you.

(Brief recess.)

CHAIRMAN BROWN: All right. We are going to begin, so let's get to our seats if we can.

The fun part about being chairman, and I say that tongue-in-cheek, is that you have to facilitate these type of proceedings. And, yes, you can sit all day, but there is -- there is a balance to it. And so if I am rushing you all, it's just to make the progress smooth and efficient.

So it is quite a balance. This is probably -- I don't even know how many hearings I have presided over, but trying to accommodate a lot of different

factors, and time is, of course, always of the essence, because time is money. So with that being said, FPL, your last witness.

MR. BUTLER: Thank you, Madam Chairman.

Whereupon,

PETER F. ANDERSEN

was called as a witness, having been first duly sworn to speak the truth, the whole truth, and nothing but the truth, was examined and testified as follows:

EXAMINATION

BY MR. BUTLER:

Q Mr. Andersen, were you sworn at the beginning of the proceeding?

A I was.

Q Would you please state your name and business address for the record?

A My name is Peter F. Andersen. My business is address is 1165 Sanctuary Parkway, Suite 270, Alpharetta, Georgia.

Q By whom are you employed, and in what capacity?

A I am employed by Tetra Tech, Incorporated, and I am a Principal Engineer and Operations Manager of the Alpharetta office.

Q Have you prepared and caused to be filed on

September 25, 2017, 27 pages of prefiled rebuttal testimony in this proceeding?

A I have.

Q Okay. Do you have any changes or revisions to your prefiled rebuttal testimony?

A I have one, on page 11, line 11, the testimony says two years and that should be four years.

Q Okay. With that change, if I asked you the same questions contained in your rebuttal testimony today, would your answers be the same?

A Yes.

MR. BUTLER: Madam Chairman, I would ask that Mr. Andersen's prefiled rebuttal testimony be inserted into the record as though read.

CHAIRMAN BROWN: We will go head and enter into the record Mr. Andersen's prefiled testimony.

(Whereupon, prefiled testimony was inserted.)

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

ON BEHALF OF FLORIDA POWER & LIGHT COMPANY

REBUTTAL TESTIMONY OF PETER ANDERSEN

DOCKET NO. 20170007

SEPTEMBER 25, 2017

BACKGROUND/QUALIFICATIONS

Q. Please state your name and business address.

A. My name is Peter Andersen and my business address is: 1165 Sanctuary Parkway, #270, Alpharetta, Georgia 30009.

Q. Who is your current employer and what position do you hold?

A. I am employed by Tetra Tech, Inc., an environmental consulting firm, where I am a Principal Engineer and Operations Manager at the Alpharetta Georgia office.

Q. Please describe your educational background beginning with your undergraduate degrees.

A. I obtained my Bachelor's of Civil Engineering ("BCE") in 1977 from Auburn University and a Master of Science Degree in Civil Engineering from Auburn University in 1980.

Q. Please describe your professional work experience since obtaining your last academic degree.

A. Following graduation with my BCE, I was employed by the Alabama Water Resources Research Institute as a field engineer. I aided in the design, construction, operation, and data analysis for an aquifer thermal energy storage and recovery project near Mobile, Alabama. Field work included operating production and injection wells and a hot water boiler as well as collecting temperature, water level, and flow rate data in a coastal aquifer.

Following graduation with my Master's Degree, I was employed as an instructor in the Civil Engineering Department at Auburn University. I taught undergraduate courses, including computer programming, hydraulics, and hydrology.

I then worked for the South Florida Water Management District in the Water Use Department. There, I was involved with permitting of water use for agricultural and municipal entities and establishment of saltwater intrusion monitoring programs.

Later, in 1982, I accepted a position with GeoTrans, Inc in Reston, Virginia. I have worked for GeoTrans since that time in positions of progressively greater responsibility. GeoTrans was acquired by Tetra Tech and is now fully integrated into Tetra Tech and goes by that name. My duties included development and testing of groundwater and solute transport models, application of these models to characterize natural systems and evaluate

conceptual designs of engineered systems, report preparation and presentation to clients, and teaching. An example project included evaluation of the causes of and potential mitigation measures for saltwater intrusion at a public supply wellfield in south Florida. The analysis was performed using a sophisticated numerical model of density dependent groundwater flow and solute transport. The analysis was of significant complexity, enabling publication in a professional journal. Also during this period, I worked with other GeoTrans engineers and scientists to prepare conceptual designs of groundwater remediation systems, involving low-permeability covers, slurry cut-off walls, drains, and extraction wells. In 1994, I moved to Atlanta Georgia to open a branch office. As a Principal Engineer and Operations Manager, my duties include project management, technical analysis and design, as well as administrative tasks such as business development and office management. My technical duties include project management, conceptual designs of remedial engineering systems for hazardous waste sites, analysis of subsurface systems using numerical models, evaluation of water supply potential and prediction of impacts of water supply development, and teaching of short courses.

I have been involved with water resource problems in Florida throughout my career and have provided services to a broad range of clients, including the water management districts, counties, agricultural interests, utilities, and industry.

I have taught approximately 65 short-courses to working professionals at the International Ground Water Modeling Center, the U.S. Army Corps of Engineers Hydrologic Engineering Center, Florida Water Management Districts, and other commercial entities.

Q. Please describe any professional registrations or certifications that you hold in your field of expertise.

A. I am a Professional Engineer in the State of Florida, as well as in Georgia, Alabama, and Virginia.

Q. Please describe any professional or technical publications you have published.

A. I have authored or co-authored over 50 technical papers, either as peer reviewed journal articles or conference proceedings. Nearly all of these deal with groundwater hydrology and modeling. Two notable peer-reviewed publications involved modeling of saltwater intrusion in the Biscayne Aquifer near Hallandale Florida and a post-audit of a groundwater model I used to design a contaminant extraction/injection system. I authored "A Manual of Instructional Problems for the USGS MODFLOW Model," a training manual sponsored by the USEPA.

Q. Have you had prior experience in evaluating the impacts of the movement of contaminants from a facility or water body, and if so could you describe that experience?

A. Much of the work I do involves assessment of the migration in groundwater of constituents from source areas that are either natural or industrial in nature.

These source areas include basins, sumps, ditches, pits, landfills, injection wells, etc. The evaluation usually involves determination of the water and mass being added to the natural system and computing the impact of this addition. Although the evaluations are all different in complexity, hydrogeological setting, and analysis objectives, they share similar analysis methods, which include a combination of data processing and some form of modeling.

Q. Have you had prior experience in designing methods of abatement and remediation of contaminants in groundwater, and if so could you describe that experience?

A. Yes. Like the evaluation of impact I described in my previous answer, the design of methods for abatement and remediation of contamination in groundwater is something I have done for my entire career. My experience in this type of work began in 1982 with developing the conceptual designs of remedial alternatives for prevention of contamination from the Lipari Landfill, which was at the time the number one site on the Superfund National Priorities List ("NPL"), and has extended to the present. I have been involved with the design of remedial systems in over 10 states and a variety of hydrogeological environments including the fractured and karst system of the Anniston Army Depot.

Q. What role have you had with assessment of the operation of and environmental effects of FPL's Turkey Point Plant cooling canal system ("CCS")?

A. I have been involved with assessment of the operation of the Turkey Point Plant from a water use perspective since 2004, when I was involved with the permitting and site certification of Unit 5. During the past 10 years, I have worked on a number of projects at the Turkey Point Plant that have dealt directly or indirectly with the cooling canal system. Starting in 2008, I assessed the feasibility and permitting of the Units 6 and 7 125 million gallons per day (mgd) backup water supply that consisted of radial collector wells extending beneath Biscayne Bay. Although this system is intended to be independent of the CCS, the design and analysis nevertheless had to consider and avoid impacts to the CCS. I testified at the Site Certification hearing for Units 6 and 7 in 2013.

In 2009, I served as an advisor to FPL on the development of a monitoring plan for the Extended Power Uprate ("EPU"). This plan involved locating water level and salinity monitoring points to understand and evaluate the effect of increasing temperature in the CCS by a maximum of 2.5 degrees Fahrenheit. In 2010, I was involved with a feasibility study regarding methods of lowering the salinity of the cooling canal system and preventing further saltwater intrusion west of the CCS. These alternatives included a means of lowering the salinity of the CCS and others that involved stopping or reversing the landward migration (intrusion) of saltwater. Analysis of these alternatives included the development of a cross-sectional groundwater flow and solute transport model and a water and salt balance. This analysis was

refined with additional data that was collected from the CCS Uprate Monitoring Program. FPL chose to address the source of contamination, the CCS, by lowering its salinity through addition of fresher water from the Upper Floridan Aquifer ("UFA"). In 2015 I was involved with further "proof of concept" of what became known as "the freshening alternative." The analysis further evolved to include the "Fukushima well," which is intended to be a reliable emergency backup supply of water, and is a recent requirement by the Nuclear Regulatory Commission. Following the conceptual design, I was involved with more detailed well layout. I was involved with documenting our work and presenting it as a part of the Request for Modification of the Site Certification.

As a part of the Site Certification, I was involved with a series of Florida Department of Administrative Hearings ("DOAH") hearings that have shaped the agenda for future work at the CCS. In the aftermath of those hearings, FPL entered into a consent agreement Miami-Dade County (the "MDC CA"). Part of that agreement included a requirement to develop a three-dimensional density dependent groundwater flow and transport model to design a recovery well system ("RWS") to retract the hypersaline part of the groundwater to FPL boundaries. I, along with my team of modelers, developed the model and evaluated alternative designs for the RWS subject to the constraints set forth in the agreement. We used a decision matrix approach to determine the best design. Since selection of Alternative 3D, we have modified the model in an

attempt to improve its accuracy and certainty. Most recently, we also used the model as a tool to provide FPL a basis to apportion costs for the RWS between remediation (retraction of the plume) and maintenance (containment).

Q Have you ever testified as an expert witness before and if so, please describe those proceedings and the nature of your testimony.

A. Yes. I have testified as an expert in 13 proceedings, in the fields of groundwater hydrology, groundwater modeling, and water resource engineering.

Q. Are you sponsoring an exhibit in this proceeding?

A. Yes, I am sponsoring the following exhibits:

- Exhibit PFA-1 -- Resume of Peter F. Andersen
- Exhibit PFA-2 -- Simulated Relative Salt Concentrations in Model Layer 8 after 10 years for Alternatives 1, 2, and 3D
- Exhibit PFA-3 -- Revision of OPC Witness Panday's Demonstrative 23
- Exhibit PFA–4 -- Comparison of 2015 Modeled Freshwater-Saltwater Interface with CSEM data
- Exhibit PFA-5 -- Location of CCS Monitoring Stations Relative to Plant Cooling Water Intake and Biscayne Bay
- Exhibit PFA-6 -- Saltwater Intrusion as Mapped by the USGS, 1984 and 1995

REBUTTAL OF OFFICE OF PUBLIC COUNSEL ("OPC") WITNESS PANDAY'S TESTIMONY

Q. Could you please describe the purpose of your testimony in this proceeding?

A. The purpose of my testimony is to focus on and rebut two faulty conclusions offered by OPC witness Panday: 1) that the RWS is ineffective at retracting the hypersaline plume, and 2) that the apportionment of costs proposed by FPL is incorrect. In addition, I will respond briefly to his erroneous assertion that FPL should have known since 1992 that the CCS was causing salinity intrusion. My opinion regarding this assertion is based on my own historical involvement with the CCS starting in 2004.

1. The RWS is an Effective, Necessary Component of FPL's Agency-Approved Corrective Actions

Q. On Page 33, OPC witness Panday states that Tetra Tech's methodology involving simulating the combined impact of both the project components (freshening and remediation wells) hinders the ability to establish the impact of one project component versus that of the other. Why were the two projects simulated simultaneously?

A. The approved alternative for corrective action incorporates the requirements of both the MDC CA and the Florida Department of Environmental Protection

consent order (the "FDEP CO") (i.e., freshening, remedial wells pumping, underground injection of pumped water, interceptor ditch operation) by design to address cumulative impacts of the components of the CA and CO. All elements of the approved alternative are intended together; none of them is intended to be sufficient by itself. However, OPC witness Panday is wrong in his assertion that we have not evaluated the impact of one project component isolated from the others. On pages 16 and 17 of our initial modeling documentation (referred to as Tetra Tech, 2016c in the Office of Public Counsel's Notice of Substitution of Exhibit SP-2 to the testimony of OPC witness Panday, filed September 14, 2017) we describe Alternative 1, which is a No Action case; Alternative 2, which is the Salinity Abatement case (or freshening case); as well as five other alternatives that include recovery wells. This documentation is my Exhibit PFA-2. In it, I show map views of simulated salinity distributions for three alternatives. The impact of both elements of Alternative 3D (recovery wells and freshening) can be seen by comparing it to Alternative 1, the No Action Case. In contrast, the impact of only the recovery wells can be seen by comparing the impact of Alternative 3D to that of Alternative 2, the Salinity Abatement case (or freshening case). As designed, the freshening primarily addresses the source while the recovery wells contain and retract the hypersaline plume.

Q. In the next paragraph of page 33, OPC witness Panday says he ran Alternative 3D without the retraction well component and compared these results to Alternative 3D with the retraction wells. Is his a valid

comparison?

A. Generally, yes, but not for evaluating the retraction wells in the context of the overall regulatory requirements for the CCS. OPC witness Panday's comparison is intended to show the net effect of the recovery wells. He does this by comparing a simulation with a background condition of a hypersaline CCS without recovery wells pumping to one with the same background condition with recovery wells pumping. This is one way of approximating the independent effect of the recovery wells. However, OPC witness Panday's case is unrealistic based on the performance objectives for the freshening of the CCS, which includes a requirement to reduce CCS concentrations to 34 PSU within 2 years of commencement of freshening. Another unrealistic aspect of his comparison is that it does not account for the additional seepage that will occur as a result of adding 14 mgd to the CCS as a part of the freshening. Thus, OPC witness Panday's method of approximating the effect of the recovery wells is flawed in two ways: (1) it represents a case that will not occur if the elements of the CA are followed because (2) his method underestimates the flow that must be handled by the recovery wells.

Q. OPC witness Panday goes on to say (lines 11-15) that "[t]he simulation results in layer 8 after 1 year for this case without pumping the retraction wells versus the case of with pumping the retraction wells…showed that the simulated concentrations are not materially different between the two cases." Does this show that the recovery wells are ineffective?

A. No. The ten recovery wells pumping along the interceptor ditch ("ID") are

not slated to pump until *after* year 1. Therefore, the only difference in this comparison *at* 1 year is whether the recovery well beneath the CCS, which operates as a requirement to test the Underground Injection Control ("UIC") well, is operating or not. The recovery well beneath the CCS merely supplies water to the UIC well, and there is no expectation that it will contribute to plume retraction.

Q. Further on in this discussion, OPC witness Panday makes a similar comparison in layer 8 after 10 years and says that the impact of the retraction wells is minor. Do you agree with that conclusion?

A. No. To support his conclusion, OPC witness Panday uses his Demonstrative 23, which shows map views of the simulated distribution of salinity in the vicinity of the CCS for conditions of a) no RWS pumping and b) RWS pumping. In reviewing Demonstrative 23, one should focus on the unlabeled contour between contour lines 1.2 and 0.8. This unlabeled contour line corresponds to a 1.0 concentration, which is the dividing line between saline and hypersaline water. Retraction of this line, which is the boundary between saline and hypersaline water, is the objective of the RWS. To clearly illustrate the difference in salinity distributions resulting from no pumping and pumping conditions, I have modified OPC witness Panday's Demonstrative 23 by highlighting in red the 1.0 concentration unit lines, representing the boundary between hypersaline and saline water. The modified Demonstrative 23 is my Exhibit PFA-3. It shows that without pumping of retraction wells, the 1.0 contour line is located approximately 1.5 miles west of the CCS after 10

years. In contrast, Exhibit PFA-3 shows that with pumping of the retraction wells, the 1.0 contour line is located within the FPL property, as represented by the ID, for most of the 5 mile length of the CCS after 10 years. Thus, OPC witness Panday's own demonstrative exhibit illustrates clearly that the RWS makes a significant contribution to achieving the intended purpose of retracting the hypersaline plume.

Q. If the 1.0 concentration contour is so important to this demonstration, why has OPC witness Panday chosen not to label it?

A. I cannot tell, but certainly it is an important contour line to feature, considering that it defines the extent of the plume that FPL is required to retract.

Q. OPC witness Panday then concludes that the impact of the retraction (recovery) well system is minor in layer 11, the lowest layer in the model. Do you agree with this conclusion?

A. FPL has acknowledged that the effectiveness of the RWS in the deepest layers of the Biscayne Aquifer is not as great as in the other layers. However, it should be noted that the modeled hydrogeologic characteristics were based on best available data and optimized as described in model documentation. It is possible that aquifer characteristics could vary from those estimated using standard modeling practices. This could also explain why the model overstates the extent of the hypersaline water in the deepest layers by approximately 1 mile as compared with groundwater quality data produced by the CSEM geophysical survey, as illustrated in my Exhibit PFA-4. Because

the modeled hypersaline water in layer 11 is further from the recovery wells than supported by the CSEM data, the model shows the effect of pumping on hypersaline plume retraction to be less than it would be based on the data-supported location of the hypersaline plume edge. The MDC CA requires FPL to revisit and revise the model (as necessary) after the RWS wells are constructed and operated for a year, to incorporate new hydrogeologic data produced from construction and operation of the system.

Q. OPC witness Panday presents two plots (Demonstrative 25) that show the difference in simulated salinity between the recovery wells pumping and not pumping after 10 years. Is this a useful way of looking at the effectiveness of the recovery wells?

A. No. These plots are developed by subtracting (1) salinities under a simulation with RWS pumping from (2) salinities under a simulation with RWS wells not pumping. The subtraction, or difference, indicates the net change in salinity between pumping and non-pumping conditions. I do not believe that the difference plots are particularly useful. This is because FPL is required to reduce salinity in the hypersaline plume north and west of the CCS to that of seawater (35 PSU) or less. The required reduction in salinity is not a constant number—in some areas lowering salinity by 1 PSU is all that is required; in other areas lowering salinity by 10 PSU or more may be required. In addition, the hypersaline volume outside the CCS is all that needs to be addressed by the RWS; not the entire area that is shown in Demonstrative 25. Showing the effect on the entire layer, without indicating the area that FPL has a regulatory

requirement to address, invites a visual conclusion that is misleading. For these reasons, the concentration difference plots are not useful in assessing the effectiveness of the RWS.

Q. Do you believe that the RWS is an effective component of the Alternative 3D measure?

A. Yes. OPC witness Panday appears to have misinterpreted his own figure in Demonstrative 23, which clearly shows retraction of the hypersaline plume (depicted by the 1.0 contour line) to the FPL boundary. The impact of pumping versus no pumping is highlighted by the fact that the pumping is shown in Figure 22 of our modeling documentation (Tetra Tech, 2016c) to remove 24 x 10^9 (24 billion) lbs of salt mass over 10 years of operation.

Q. On page 35 of his testimony, OPC witness Panday describes the use of a steady-state spreadsheet-based water and salt balance to evaluate the impacts of adding 14 MGD to the CCS. Is this an appropriate way to evaluate those impacts?

A. No. FPL initially used a steady-state water and salt balance in the feasibility analysis conducted in 2010. That model was based on limited data and simplifying assumptions. One of these assumptions was that the CCS water balance could be simplified into an "average" number for the components of precipitation, water level, salinity, inflow, outflow, evaporation, and temperature. Since 2010, however, FPL has collected information on these parameters on an hourly basis and developed a transient water and salt balance that is much more sophisticated than the original steady state model. The new

model is closely calibrated to monitoring data and has been demonstrated to match historical long- and short-term trends in salinity and water level. It has also been reviewed and accepted by the South Florida Water Management District. The steady-state water balance model is now obsolete and should not be used.

Q. Did FPL provide OPC witness Panday with the transient water and salt balance?

A. Yes.

Q. Did the CCS freshening analysis, as OPC witness Panday asserts on page 36, line 2 and 3, "[d]epend on (and assumes) groundwater salinity being at 35 PSU's to simulate total added water of about 14 MGD"?

A. The steady state balance, for the reasons described below, does assume the groundwater inflow salinity is 35 PSU—however, we no longer use this model. The groundwater inflow component of the steady-state water balance is made up of water flowing into the CCS from the east (Biscayne Bay, via the Biscayne Aquifer) and smaller amounts from the west, south, north, and beneath the CCS. At the time the steady state water balance was formulated, the groundwater inflow was a single lumped parameter that included the Biscayne Bay and smaller flows. Also, it was generally assumed that the CCS water seeped to the groundwater system, not vice versa. Thus the groundwater input term in the steady-state balance was assumed to be predominantly Biscayne Bay water at 35 PSU.

The more sophisticated transient water and salt balance, upon which FPL now relies, splits the directional components (east, west, north, south, and beneath CCS) into individual inputs that have salinities that are representative of their respective water sources. Inflow from the east, from Biscayne Bay, at 15.37 MGD, is assigned a salinity of 35 PSU, equivalent to Biscayne Bay water. Inflow from beneath the CCS is 11.47 MGD and is assigned temporally and spatially (specific areas of the CCS) varying salinities of based on time series data from the shallow screens of nearby monitoring wells Turkey Point Ground Water (TPGW)-1, -10, -12, and -13. The measured salinities from these wells are conservatively not adjusted downward for simulations involving freshening.

Q. Is OPC witness Panday's assertion that freshening the CCS will require 31 MGD of Floridan Aquifer water reasonable?

A. No. OPC witness Panday assumes that *all* groundwater seepage comes from beneath the CCS and therefore has a salinity of 55 PSU. This is clearly not valid. The largest component of groundwater seepage to the CCS comes from Biscayne Bay at a salinity of 35 PSU. The inflow of Biscayne Bay water to the CCS is a fundamental component of the CCS water balance: it is the "makeup water" that replaces water that is lost to evaporation as a part of the cooling process. The fact that a large volume of groundwater seepage comes from Biscayne Bay is confirmed by water levels in the most easterly canals of the CCS being less than the water level in Biscayne Bay. My Exhibit PFA-5 shows the locations of three key measuring points along the CCS: the plant

intake, CCS-6 and CCS-5. The plant intake has, on average, the lowest water level in the system, indicating surface and groundwater flow towards the intake. The water level at CCS-6 is, on average[1], 0.3 feet less than that of Biscayne Bay. The water level at CCS-5 is, on average[1], 0.1 feet less than that of Biscayne Bay. Thus, the data show that there is a large component of groundwater seepage from Biscyane Bay to the CCS. Moreover, erroneously assuming that makeup water comes from beneath the CCS at a high salinity of 55 PSU, as OPC witness Panday has done, will lead to computation of an erroneously high amount of water required for freshening.

Q. Does FPL have data on actual CCS conditions that suggest that 31 MGD will not be required to freshen the CCS to 35 PSU?

A. Yes. In late September and early October 2014, FPL discharged into the CCS over a three week period an average of 43.5 MGD of water from Canal L31-E, with salinity similar to that of the Floridan Aquifer. The addition had an immediate effect on CCS salinity, reducing salinity from 90 to 62 PSU, a 28-PSU reduction. The freshening design is to reduce the CCS salinity from 60 to 34 PSU, a 26 PSU reduction. The observation that an influx of 43.5 MGD over a 3 week period reduced the CCS salinity by more than the design amount and that this occurred immediately, rather than over the 2 year design period, suggests that 31 MGD will not be required to freshen the CCS to 35 PSU.

[1] Based on 2010 through 2016 Uprate Monitoring data from these CCS stations.

In addition, the water level and salinity response of the CCS to the addition of a known quantity and quality of water was used to further calibrate the model. Based on the model calibration and data from the water addition, we believe that 31 MGD will not be required to freshen the CCS.

Q. OPC witness Panday states on line 13 of Page 41 that "[t]he retraction well component of FPL's proposal is not reasonably effective at retracting the hypersaline plume." Do you agree with this summation?

A. No. OPC witness Panday's summation is based on his prior statement that "[t]he retraction wells do not meet their stated objective of retracting the hypersaline plume west of the CCS footprint, as I have shown in my analysis above." As I have just explained, OPC witness Panday has misinterpreted his own results and erroneously concluded that the wells did not retract the plume. Because his summation is based on an erroneous conclusion, it too is erroneous.

Q. OPC witness Panday states on Page 40, line 19 that he is not aware of any system where this combination of corrective actions (i.e., freshening of the CCS and pumping from extraction wells) has been deployed. Does Alternative 3D rely on an unusual or unproven corrective action strategy?

A. No. Alternative 3D relies on a basic concept that has been demonstrated time and again at all manner of environmental cleanup sites: 1) source control/removal, followed by 2) plume containment or remediation. The fact that source removal is accomplished by "freshening" should not be

misunderstood to indicate that this technique is novel or outside the mainstream of conventional groundwater cleanups. Freshening has been demonstrated by FPL to be effective in their transient water and salt balance as well as measured CCS response to the addition of L31E water. Pumping of recovery wells is perhaps the most basic and understood method of plume containment and plume removal.

2. FPL Has Properly Allocated RWS Costs between Containment and Retraction

Q. Regarding the cost allocation in the FPL proposal, OPC witness Panday states that the proposed remedial alternative does not consider retraction of the saline water further west of the hypersaline plume. Is this a valid criticism?

A. No. The MDC CA only requires retraction of the hypersaline part of the plume. Addressing a larger and less concentrated plume would be considerably more costly than the proposed remedy. FPL's cost allocation is appropriately based on the actions FPL is required to take, not on ones it is not required to take.

Q. OPC witness Panday also takes issue with the suggestion that the lower two layers of the model may not actually be a part of the Biscayne Aquifer. Is this a valid criticism?

A. No. OPC witness Panday claims that he has "noted that the lower two layers

have hydraulic conductivities in excess of 500 ft/d in the model" and that this "does not reflect confining or aquitard-like conditions." However, aquifers are not defined by an absolute value of hydraulic conductivity for a particular layer. Rather, they are defined by their ability to transmit water, which is a function of the *relative* conductivity of adjacent layers. In the most recent update to the Tetra Tech model, the lower two layers have a hydraulic conductivity of 389 ft/d and are adjacent to a high flow zone, which has a hydraulic conductivity of 35,980 ft/d, or nearly two orders of magnitude greater than the lower layers. This sharp contrast in hydraulic conductivity causes the lower two layers to not behave as part of the aquifer above them. Instead, the extraction wells, despite being screened within the lower two layers, obtain most of their water from the preferred high flow zone. Hydraulically, the lower two layers do not behave as part of the Biscayne Aquifer.

Q. OPC witness Panday takes issue with using an analysis period of 20 years when the hypersaline plume west of the CCS is removed by 11 years. Is this a valid criticism?

A. No. The RWS is a remediation *and* containment system. If the system were turned off at year 11 when the hypersaline water to the west of the ID has been removed, the containment aspect of the system would be lost. Containment of the area east of the ID is important because there are areas beneath the CCS that are projected to remain hypersaline even after 11 years of pumping and freshening.

Q. OPC witness Panday suggests that the extraction rates and hence the cost apportionment should be adjusted over time as remediation goals are accomplished. FPL witness Ferguson addresses this proposal from an accounting perspective. What is your reaction to the proposal from a scientific perspective?

A. I do not believe that it is reasonable. As I noted previously, the RWS is both a remediation and containment system. Containment depends on capturing the *volume* of water moving westward, not the mass of salt contained in that water. Therefore, a decline over time in the salt mass removed does not affect the volume of water that must be captured. The extraction rates to contain the westward moving water remain relatively constant.

3. FPL Could Not Reasonably Have Been Expected to Know in 1992 That the CCS Was Causing Salinity Intrusion.

Q. You described your involvement in a 2010 feasibility study for stopping westward migration of saline water and decreasing Cooling Canal System concentrations. What was your understanding of FPL's reasons for performing this study?

A. FPL had just renegotiated the site certification for Turkey Point to include the EPU. Among the conditions for the renegotiated site certification was a requirement to develop a monitoring plan to assess the extent of salt water intrusion and in particular hypersaline water, west of the plant. My

understanding was that the purpose of the study was to assess options for addressing the hypersaline conditions in the CCS and to stop westward migration of saline water should the monitoring indicate that this would be required.

Q. Did you, at the time of the study, know the extent of hypersaline water to the west of the CCS?

A. No. One of the key limitations in 2010 was the lack of monitoring points to the west of the CCS. There were two wells, L-03 and L-05, that were located on the L-31E levee (and hence the "L" designations) just outside the FPL property. These wells were monitored for salinity at two depths, shallow (approximately 20 ft) and deep (approximately 60 ft). The next sets of monitoring wells (G-21 and G-28) were located along Tallahassee Road, three miles west of the CCS. These wells were also monitored for salinity at two depths, shallow (approximately 20 ft) and deep (approximately 60 ft). The deep L-wells, just outside the FPL property, indicated hypersaline water to be present. The deep G-wells, on the other hand were showing a rise in salinity, but had not reached the salinity of seawater. Another limitation was that the L and G wells did not have discrete screened intervals from which a sample could be collected or measurement made. Instead, the measuring device was simply lowered into the well to a certain depth and a measurement taken. It was then lowered further to another depth and a measurement taken. The quality and accuracy of this data was questionable. So, in summary, the extent of the hypersaline water was not known in 2010 due to data limitations.

In addition, the data that did exist were of questionable quality.

Q. Did the United States Geological Survey ("USGS") publish maps that showed the extent of saline water intrusion in Southeast Florida at different points in time before and after the CCS went into service?

A. Yes. The USGS published regional maps that showed interpretations of the extent of the 1000 mg/L TDS isocontour line at the base of the Biscayne Aquifer. The interpretations were based on regional monitoring well data that were collected by the USGS. Isocontours were published for 1970, 1984, 1995, and 2008. A comparison of the 1984 and 1995 maps is shown in Exhibit PFA-6.

Q. And what did these maps show?

A. The maps showed the 1000 mg/L TDS isocontour line extending from north to south, essentially following the coastline, shifting slightly westward with the coastal bend in south Florida. This line was approximately 5 miles inland from the coast in all the maps. Besides showing the extent of saltwater intrusion, the maps were interesting because they indicated relative stability of the saltwater interface with time, over a period covering 1970 to 2008. In fact, as shown in Exhibit PFA-6, the saltwater interface was mapped further west in 1984 than it was in 1995, suggesting that the saltwater interface had retracted toward the coast during this time period.

Q. Why was the relative stability of the saline water interface of interest to you?

A. One of the theories that have been advanced is that the hypersaline water

"pushes" the saline water interface. Conversely under that theory, if the saline water interface was stable and not being "pushed," then it would suggest that the hypersaline plume must also be stable.

Q. How accurate were these maps?

A. The USGS struggled with the same data limitations as did FPL. With the benefit of hindsight, it now appears that these maps may not have accurately mapped saltwater intrusion near Turkey Point. However, reliance upon these maps by FPL, regulators, and the general public was reasonable at the time and may have given a false sense of security that salt water intrusion, and hence hypersaline water movement, was not occurring.

Q. OPC witness Panday concludes that it was clearly demonstrated in 2009 that the CCS had increased the Biscayne aquifer's salinity. Do you agree?

A. No. First, saying that "the CCS increased the Biscayne aquifer's salinity" is a very imprecise statement and may not be of importance. Second, OPC witness Panday bases his conclusion on a model by Hughes, et al. (2009) that I have found both to be subject to a significant methodological limitation and to be based on errors in key input assumptions.

Q. What is the methodological limitation with the Hughes model?

A. It is not calibrated, which means that it does not compare the model response to a historical response. Comparison to a past condition provides confidence that the model is an accurate representation of the hydrogeological system. Calibration is an important step in the modeling process and provides

credibility to the model. Because the Hughes model is not calibrated, four different versions of the model are presented, each with a different value of hydraulic conductivity. The hydraulic conductivities in the four versions vary over 5 orders of magnitude. Hydraulic conductivity is perhaps the most important parameter in the model and not knowing its value within 5 orders of magnitude makes the results of the model highly speculative. There are several other technical limitations that further support my conclusion.

Q. You also mentioned errors in the input assumtions for the Hughes model. What are these and how do they affect the results?

A. The model contains errors in the assumed depths of the ID and the return canal. The ID, which is 18 feet deep, is modeled to be 9 ft deep. This error allows more saltwater to move west than would occur with the more realistic deeper ditch. In addition, the 18 ft deep return canal that runs from the south to the north within the CCS is modeled as 3 ft deep. The effect of this error is less clear, although, as a return canal, it may not capture as much CCS water as it would occur with a deeper ditch. Under this circumstance, the model would overestimate the amount of mass added to the aquifer and hence the extent of saltwater intrusion.

Q. Please summarize your testimony.

A. OPC witness Panday's criticisms of the corrective actions that FPL is implementing pursuant to the MDC CA and FDEP CO are based on misunderstandings of the intended purpose of those actions as well as flawed and outdated modeling. They are invalid and should be rejected. For similar

reasons, his criticism of FPL's apportionment of the RWS costs between retraction and containment is ill-founded and should be rejected. Finally, his assertion that FPL should have known by 1992 that the the CCS was causing salinity intrusion is insupportable based on information available at the time.

Q. Does this conclude your testimony?

A. Yes.

BY MR. BUTLER:

Q Mr. Andersen, do you have six exhibits attached to your prefiled testimony that have been identified as Exhibits 48 to 53 on the comprehensive exhibit list?

A I have.

Q Okay. Were these exhibits prepared under your direction, supervision or control?

A Yes.

Q Would you please provide a summary of your rebuttal testimony to the Commission?

A Yes.

Good evening, Commissioners. Thank you for the opportunity to present at this late hour. I am a professional engineer licensed in four states, including Florida, and have 37 years of experience in groundwater hydrology and civil engineering.

During the past eight years, I have worked on a number of projects at the Turkey Point plant that have dealt with the cooling canal system, or CCS. I have served as an adviser on the development of the water monitoring plan; was involved with the feasibility study to assess methods of preventing saltwater intrusion near the CCS; contributed to the evaluation of the freshening alternative and the recovery well system designs that

were approved by the regulatory agencies.

As a part of this evaluation, we built a three-dimensional variable density groundwater flow and transport model to quantitatively evaluate various designs resulting in our approved RWS design. Most recently we used the model to provide FPL a basis to proportion costs for the RWS between retraction of the hypersaline plume and containment.

The purpose of my testimony is to rebut two faulty conclusions offered by OPC Witness Panday. One, that the RWS is ineffective at retracting the hypersaline plume; and, two, that the apportionment of costs proposed by FPL is incorrect. In addition, I respond to his erroneous assertion that FPL should have known since 1992 that the CCS was causing salinity intrusion.

OPS -- OPC Witness Panday is wrong in his assertion that the impact of the recovery wells is minor. Witness Panday appears to have misinterpreted his own figure in Demonstrative 23-B, which clearly shows retraction of the hypersaline plume to the FPL boundary, as I demonstrate in my exhibit PFA-3.

I further disagree with his astounding assertion that the modeled removal of 24 billion -- billion with a B -- pounds of salt by the RWS over a

10-year period is minor.

OPC Witness Panday's criticism of the apportioning methodology for containment -- for containment versus retraction is likewise misguided. He focuses on the fact that the RWS does not retract all saline water, but that misses the point. Both the MDC consent agreement and the FDEP consent order require retraction of the hypersaline plume, and that is exactly what my model shows the RWS will do.

In addition, he believes the system could be turned off, or pumping reduced after 11 years instead of 20, as assumed in the apportioning. Again, this is misguided. As shown in our report, there will still be about one to two million pounds per year of salt being removed from the hypersaline area beneath the CCS between years 11 and 20.

Pumping of the RWS cannot be reduced during that period because one of the two purposes of the RWS is containment. Reduction of pumping would lead to loss of containment, and the RWS would no longer be achieving that purpose.

Finally, I disagree with OPC Witness Panday that FPL should have known much earlier that corrective actions were needed for the CCS. From my involvement in the 2010 feasibility study, I know that as late as 2010,

the extent of saltwater intrusion and hypersaline water remained unknown. One of the key limitations in our evaluations of feasible alternatives at that time was the dearth of detailed data on salinity conditions west of the CCS. Data available at that time did not support a conclusion that saline water was moving rapidly to the west. For example, my exhibit PFA-6 shows that United States Geological Survey interpretation of the saltwater interface was that it receded eastward towards the coast between 1984 and 1995. Although, saltwater intrusion may be evident from the information and models that we have available today, its extent was not known even as recently as 2010, much less in 1992.

And that concludes my testimony.

MR. BUTLER: Your summary.

I tender the witness for cross-examination.

CHAIRMAN BROWN: Thank you.

Public Counsel. Ms. Morse.

MS. MORSE: Thank you.

EXAMINATION

BY MS. MORSE:

Q Good evening, Mr. Andersen.

A Good evening.

Q Please turn to your rebuttal testimony, Exhibit PFA-2.

MS. MORSE: And in connection with that, I would like to mark an exhibit, I handed out the exhibits already, so --

CHAIRMAN BROWN: We are going to be starting at 86.

MS. MORSE: Okay. So for number --

CHAIRMAN BROWN: We didn't move in 85 but we marked it, so we are starting on 86.

MS. MORSE: Okay. So we will identify No. 86 as the first document, I guess if you turn -- I am marking -- no, I am sorry. The exhibits that we put at your desk, not in the folder, but those other ones below it. Yeah. Thank you.

So the top one is an exhibit of -- excerpt of the Tetra Tech 2016-C document, titled Groundwater Flow and Salt Transport Model of the Biscayne Aquifer.

THE WITNESS: I have it.

CHAIRMAN BROWN: Okay. So we are going to mark that one as 86.

MS. MORSE: Okay.

CHAIRMAN BROWN: It's going to be entitled Tetra Tech Groundwater Flow and Salt Transport Model of Biscayne Aquifer.

(Whereupon, Exhibit No. 86 was marked for

identification.)

CHAIRMAN BROWN: And then would you like to mark the second one?

MS. MORSE: Sure. I believe that the second one might be -- is that Demonstrative 25? Is that what it is? I will mark it when I get to it because I am going to have to get an order.

CHAIRMAN BROWN: That sounds good to me.

MS. MORSE: Okay.

BY MS. MORSE:

Q All right. So what I am going to ask you to do in terms of looking between your PFA-2, page four, and the document that's been marked No. 86, Exhibit 86, Tetra Tech 2016-C.

So your Exhibit PFA-2 goes straight from page one to page 16, is that correct? I am sorry, PFA-2, page four of four is what I am referring to. Oh, wait --

A Yes. PFA-2 is one page.

Q You are right. No, PFA-2 is page one of four is how it's labeled at the -- PFA-2?

A Uh-huh.

Q In the top right corner?

A No, I understand. It's PFA-2 is the summary of the report you put in front of me --

Q Exactly.

A -- and there is four pages, and the figure you are referring to is the four of four.

Q You are correct.

So what I was drawing your attention to is at the very first page, page one of four -- I apologize. So if you go to the bottom of that page, it's numbered one, and then you turn the page and it's numbered 16, that's what I'm trying to draw your attention to, correct?

A Yes.

Q Okay. So is PFA-2 supposed to be an excerpt of Tetra Tech 2016-C?

A It is, yes. We were just trying to draw attention to, you know, where this came from by the first page and then, you know, describing the alternatives, and then presenting the alternative -- the pictures of the alternatives.

Q Okay.

A It's kind of a summary of what you have labeled as Exhibit 86.

Q Okay. So looking at what was just marked Exhibit 86, then, which contains pages from the copy of Tetra Tech 2016 as produced to OPC in discovery, the front page of that document's Bates stamp starting ECRC

17-006222, correct? Are you seeing that? Are you on --

CHAIRMAN BROWN: It's the very first page of the exhibit, sir, at the very bottom. You open it up, it's right there.

THE WITNESS: I see it. Yes.

BY MS. MORSE:

Q Okay. Thank you.

A Thank you.

Q And again, just comparing page one of your PFA-2 to the production copy, which is Exhibit 86, those pages don't match, correct? Because there is -- there are extra words at the bottom of your PFA-2 that don't appear on the first page of this Bates-stamped Exhibit 86, correct?

A Yes.

Q Thank you.

And turning to an Exhibit 86, the -- the page that's Bates -- Bates-stamped ending 6237, if you could turn to that, please.

A Yes.

Q Okay. About a quarter of the way down, there is a heading called Model Application, correct?

A Yes.

Q So does that paragraph correspond to the model application header in your PFA-2 page two?

A Generally it does. It looks like the wording is shifted a little bit. I don't know if this is a PDF or Word type of conversion or something. They look a little different.

Q Okay. Yeah, so the bottom line is that the last lines on that -- the last words on that page on your PFA-2 don't match the Bates stamp -- the page Bates-stamped 6237, correct?

A Correct.

Q Okay. Now turning to page PFA-2, page four of four, which contains the figures. All of those graphics titled Alternative 1 and 2 in this document were not presented in the version of Tetra Tech 2016 produced in Exhibit 86, were they?

A My impression was that they were on page Bates-stamped 006237, Alternative 1, no action. The following page, Alternative 2, salinity abatement.

Q I am sorry, are you reading -- I am looking for figures that correspond to your page four of four. That's what I was asking you to compare. So I meant the figures on page four of four of PFA-2 --

A Yes.

Q -- were they produced in exactly that format in 20 -- in Tetra Tech 2016-C?

A I believe they were.

Q What I will represent to you, and what I will ask you to review are the pages that are Bates-stamped on the Bates stamp document ending 620 -- 6270 through 6274.

MR. BUTLER: Ms. Morse, in the copy I am looking at, it -- mine looks like it goes from 6271 to 6274.

MS. MORSE: 6271, 6274 -- oh, yeah, that's what -- I'm sorry, 6270, 6271 and 6274.

MR. BUTLER: But it looks like it's missing 6273 and 6 -- or 6272 and 6273.

MS. MORSE: I understand. I explained it's an excerpt. I have one simple question about these and it's just going to be basically --

CHAIRMAN BROWN: Let's get to that.

MS. MORSE: Yeah.

BY MS. MORSE:

Q All of these graphics have -- have two -- two comparison slides next to each other, right? None of them have three slides that appear as in your PFA-2, page four of four, correct?

A Yes.

MR. BUTLER: Well, I'm sorry, this is getting to my question, though. I don't know what is on 6272 and 6273. I don't know whether those do or

don't have what Mr. Andersen has in his exhibits. We are missing those two pages from the series that you handed out.

CHAIRMAN BROWN: Do you believe that is prejudicial?

MS. MORSE: Well, you know what, I can ask questions that don't exactly -- that -- that take care of that. I mean --

CHAIRMAN BROWN: I mean, the omission of the other pages --

MS. MORSE: It's an excerpt so, you know, as I said from the beginning. So it's not designed to be the entire hundreds of pages document, but I can go -- I can go forward.

CHAIRMAN BROWN: Okay.

BY MS. MORSE:

Q Now, you indicated that you caused your -- the exhibits to your testimony to be produced and filed, is that correct; the documents that are attached to your testimony?

A Yes.

Q Okay. So you are familiar with the Tetra Tech 2016-C, then, correct? Just the document that you attached to -- the document that's PFA-2, that you indicated that you, yourself, excerpted, so it's not

here completely?

A Right.

Q But when you produced your -- your excerpt, presumably you reviewed the entire document, correct?

A Yes.

Q So aside from the ranking table in Tetra Tech 2016-C, there were no discussions in the original document related to Alternative 2 on page four of four of your PFA-2, or how those results from Alternatives 1 and 2 compared with Alternative 3-D, was there?

A I think I can clarify what you are getting at.

We put the -- or I put this description to show what the document was dealing with on the next two pages, which are a description of the alternatives, Alternative 1, Alternative 2 and Alternative 3. And then the fourth page, that is page four of four, is an expansion or a display of Alternatives 1, 2 and 3, which, you are right, I don't believe the original document had a display of all those, especially not the no action or the salinity abatement that are the Alternatives 1 and 2.

Q Exactly. Yeah, that is my point. Thank you.

A Yeah.

Q Again, looking at page four of four on PFA-2, isn't Alternative 2 listed there, which is titled

Salinity Abatement, isn't that essentially the simulation that Dr. Panday conducted regarding freshening only?

A Essentially, yes.

Q Next I would like to draw your attention to Demonstrative 25 from Dr. Panday's testimony, and I believe that should be in the packet I passed out.

CHAIRMAN BROWN: So we are going to go ahead and mark that for identification purposes as Exhibit 87, and we will give it the same title that you just indicated, Panday Demonstrative 25.

(Whereupon, Exhibit No. 87 was marked for identification.)

MS. MORSE: Thank you.

CHAIRMAN BROWN: All right. Mr. Andersen, do you have that in front of you?

THE WITNESS: I do.

CHAIRMAN BROWN: You may proceed.

MS. MORSE: All right. Thank you.

BY MS. MORSE:

Q That's titled there -- or at the bottom there, the label is Difference in Simulated Concentrations between the Retraction Well Pumping and No-Pumping Cases after 10 years, correct?

A Yes.

Q And looking at this document, Demonstrative 25, isn't the maximum concentration change in 10 years in layer eight around 0.2?

A It's -- it's difficult to tell with this gradation. I think the -- the scale -- I think what we are looking at is that there is green towards blue is the -- I see some just barely blue there, which would be as high as about .375, or so. The green is in the range of .25.

Q So somewhere between .25 and .37, according to you, is that what you just testified?

A Well, there is also areas that are yellow-ish that are less, .1 to -- I mean, it covers the whole gamut, .1 to .375, about.

Q Yeah, thank you.

Okay. Well, doesn't this demonstrative show the impact of retraction wells alone?

A That's what Dr. Panday intended to do with this -- with this figure, is to show the difference between pumping -- the difference in the salinity at 10 years from pumping only the RWS versus no pumping cases.

Q So -- I am sorry, were you answering yes or no to my question? So the question, doesn't this demonstrative show the impact of retraction wells alone, yes or no?

A Yes, but it shows the difference between pumping and not pumping.

Q Okay. Thank you.

And going to your testimony, page 11, lines three to four, it appears that your testimony is that, starting at the end of line three, OPC Witness Panday's comparison is tended to show -- intended to show the net effect of the recovery wells, correct?

A Yes.

Q And going down to line seven and -- seven to eight, did you also say that this is one way of approximating the independent effect of recovery wells; is that correct?

COMMISSIONER POLMANN: I am sorry, what page are you on?

MS. MORSE: Oh, page 11, the same page of the rebuttal testimony.

COMMISSIONER POLMANN: Yes, what page? I am sorry.

MS. MORSE: 11.

COMMISSIONER POLMANN: Okay.

THE WITNESS: Well, this -- this description on page 10 and 11 --

BY MS. MORSE:

Q Oh, no, just 11.

A On 11, describes the simulation that he ran with only running the recovery well system. I think I comment later on this Demonstrative 25 in my testimony on page 14.

Q Okay. Next I would like to draw your attention to Demonstrative 22 in Dr. Panday's testimony.

CHAIRMAN BROWN: Is that a separate exhibit?

MS. MORSE: 22.

CHAIRMAN BROWN: I just have 25.

MS. MORSE: Well, it's in Dr -- it's an attachment to the testimony.

CHAIRMAN BROWN: What -- what exhibit number?

MS. MORSE: Exhibit SP-3.

CHAIRMAN BROWN: Mr. Andersen, do you have that in front of you?

THE WITNESS: I have Dr. Panday's testimony, and we are talking about which figure? I am sorry.

CHAIRMAN BROWN: Three.

MS. MORSE: SP-3, Demonstrative 22.

MR. BUTLER: Page 26, correct?

THE WITNESS: I have it.

MS. MORSE: Yes, 26 of 32. Thank you.

BY MS. MORSE:

Q All right. And so there are two figures there labeled 22-A and 22-B, correct?

A That is correct.

Q All right. Would you say that the relative concentration along the western boundary of the CCS is about 1.8?

A I think I would put it at about 1.6.

Q Okay. Is Demonstrative 2 the simulated relative chloride concentration in layer eight after one year of simulation?

A I -- Demonstrative 22?

Q 22, I am sorry, yeah. That's what I --

A Yes, that's layer eight after one year.

Q Okay. And turning to the next page, Demonstrative 23, is this the simulated relative chloride concentration in layer eight after 10 years of simulation?

A That's correct.

Q Is 20 -- Demonstrative 23-A the case for without pumping of retraction wells?

A Yes.

Q So taking a difference between the concentration values in Demonstrative 22 and Demonstrative 23 -- 22-A and 23-A along the western boundary of the CCS, isn't that roughly -- I think you -- you testified 1.6 rather than 1.8. So it would be 1.6 minus 1.2, which is 0.6, correct? I am sorry --

yeah, 1.6 minus 1.2, which is .4?

A .4, yes.

Q Yeah. I had it logged at 1.8, so -- all right.

So isn't the difference between Demonstrative 22 and 23-A the amount of freshening that would occur between year one and year 10 as a result of CCS freshening only?

A I am sorry, could you repeat that question?

Q Okay. I was asking whether -- isn't it true the difference between Demonstrative 22 and 23-A the amount of freshening that would occur between year one and year 10 as a result of CCS freshening only?

MR. BUTLER: I think you said the amount of freshening, did you mean the amount of retraction?

CHAIRMAN BROWN: Ms. Morse?

MS. MORSE: No, because these are the cases without pumping, so that would be freshening only.

CHAIRMAN BROWN: Okay.

MS. MORSE: 23-A is without pumping or retraction wells.

CHAIRMAN BROWN: Okay. Sir.

THE WITNESS: I -- I am -- my recollection of 22 and 23 are that this is only retraction wells pumping, that the difference that Dr. Panday did

between his analysis and my analysis was that when I did my analysis, I included freshening as well as the retraction wells pumping. He did it a different way, where he did not do the freshening but only did the retraction wells.

So when I compare -- and that's what both 22 and 23 are, only -- the only difference between 22 and 23 are the timeframes. One is after one year and one is after 10 years.

BY MS. MORSE:

Q But there is an A and B figure, correct? So one of them --

A One is without and one is with pumping.

Q Yeah. Exactly.

A Okay.

Q Okay. So the reduction in chloride levels along the western boundary of the CCS due to CCS freshening is 0.4, and due to the retraction wells is 0.2; is that correct?

A No. There is no freshening involved in these simulations.

Q Didn't you just testify that the -- that these cases, particularly the 22-A and 23-A, involve cases both where -- without the retraction, so meaning no pumping?

A No. These -- these figures do not involve freshening. They only involve the case of pumping or non-pumping of the retraction wells. And when we compare 22 and 23, the only comparison is time, difference between eight years and one year.

CHAIRMAN BROWN: Ms. Morse, do you need a minute?

MS. MORSE: No, I don't. Hold on.

CHAIRMAN BROWN: Or two?

MS. MORSE: Yeah -- well, I am going to go to a different question right now.

BY MS. MORSE:

Q I am going to ask you about -- if you could return to your -- turn to your rebuttal testimony, page 13, lines one through three.

A Yes.

Q Okay. And corresponding to those lines, I want to draw your attention to the middle graphic on page four of four of Exhibit PFA-2.

CHAIRMAN BROWN: Are you there, Mr. Andersen?

THE WITNESS: Not quite. I am sorry -- but I am now.

BY MS. MORSE:

Q Okay. Isn't most of the hypersaline area in layer eight outside of the FPL property line in year 10

only slightly above seawater concentrations for the case without RWS pumping.

A I am sorry, I am confused with your question. Page 13, which you referred to me, talks about Exhibit PFA-3, and you are directing me to look at PFA-2.

Q Well, because the second and third graphic on PFA-2 are roughly the same as the plots on PFA-3, since I believe you already testified that --

A PFA-3 is Witness Panday's exhibit that's been modified by me, which is a simulation that does not include freshening, it only includes the recovery well system. PFA-2 is my own simulations, which are different, and they show the progression of simulations involving no action, freshening and then Alternative 3-D, which includes freshening.

Q Okay, fair.

Going back to your testimony on page 13, lines 15 through 16, you acknowledged that the RWS is less effective in the deepest layers of the Biscayne Aquifer than in other layers; isn't that right?

A That's correct.

Q Turning to page 14, lines one through four of your rebuttal testimony, your testimony here suggests that the modeled hypersaline water in layer 11 had moved further than based on CSEM data, isn't that correct?

A Yes, that the model shows a saltwater intrusion extending further to the west than supported by the CSEM data.

Q Well, isn't it true that if the modeled extent of the plume is larger than the -- than the model predicted larger movement than actually occurred?

A That's correct.

Q So conversely, then, the model would also allow larger movement than would actually occur under the pumping, or opposing stressers, correct?

A I don't know if you can make that conclusion. In fact, I -- I -- I would take issue with that.

Q Well, turning -- starting on page 14, lines four through seven, is it your testimony here that the modeled hypersaline water in layer 11 -- I am sorry. I am sorry. On lines four through seven, I believe it's your testimony that the Miami-Dade County consent agreement requires FPL to revise the model if necessary after the RWS wells are constructed and operated for a year in order to incorporate new hydrological data produced from the construction and operation of the system?

A Yes. That's what my testimony says, yes.

Q But, Mr. Andersen, isn't it true that the purpose of the model is to guide decisions before

expensive holes are dug into the ground?

A Well, I think that the model has -- has demonstrated to the satisfaction of FPL, our client, as well as the regulators and their reviewers, that this proposed RWS system will work sufficiently. And as Mr. Sole testified, I think it's common that, as additional data are obtained, that certain modifications are made to the model.

For instance, those RWS wells right now, as the model was constructed, we do not have a set stratigraphic data point. That is what the geology looks like at those specific locations. But when we drill those wells, we will get that information; and that's useful information for the model.

Q Well, the model results indicate that the RWS is not fully effective in retracting all layers of the hypersaline plume when full scale construction of this expensive project isn't justified for only one year of what is essentially research and development, isn't it?

A It's not research and development. It's -- it's a reasonable evaluation of the RWS.

Q Okay. Going to page 14, lines 14 through 16. Your testimony here relates to the usefulness of difference in plots -- different plots, correct?

A Yeah. It refers to what we were looking at

previously, which was Demonstrative 25, which -- that was looking at the differences between pumping and non-pumping.

Q Okay. So subtraction, or -- or difference indicates the net change in salinity between pumping and non-pumping conditions; correct?

A That's correct.

Q Therefore, it is, in fact, useful in evaluating the impact of pumping by itself, correct?

A Well, the reason I said what I said was that FPL is required to --

Q Well, if you could answer yes or no, and then explain if you have to.

A Okay. Could you repeat your question?

Q So I said, therefore, after you answered the question about subtraction or difference, it is, in fact, useful in evaluating the impact of pumping by itself; correct?

A Yes, in a -- in a academic sort of way. I guess in an informing sort of way. It does not get at what we are trying to address here, which is a threshold, that is are trying to lower salinity below a hypersaline condition back to a saline condition, and that is variable across the entire domain.

So it doesn't tell me very much whether the

RWS lowers salinity by five, or 10, or whatever. What I am most interested in, does the system work in pulling back the hypersaline plume, or getting saline water in that western area, which is the requirement of -- of -- of what we are trying do with the RWS.

Q Well, turning to page 15 of your rebuttal, lines six through seven, where it appears your testimony indicates you are discussing Dr. Panday's Demonstrative 23. Isn't it true that the shallower layers, meaning levels one through three of the Biscayne Aquifer, were not hypersaline at the beginning of your model timeline for the alternative remediation analyses?

A Layers one through three?

Q Layers -- levels one through three. Yes, that's what I said.

A Those layers are generally clean, or unsalty.

Q So is that yes?

A Yes.

Q So isn't it also true that your Alternative 2 model, meaning the model for the case without RWS pumping, showed there was no hypersalinity in layers four through six of the Biscayne Aquifer outside of FPL's property boundaries, so the RWS was not required in order to withdraw that salinity contour to within the CCS boundary, was it?

A I -- I can't follow your question. I --

Q I will rephrase it.

A Okay.

Q So I started by discussing your Alternative 2 model, meaning the case without RWS pumping --

A Okay.

Q -- which appeared to show no hypersalinity in layers four through six outside of FPL's property boundaries, correct?

A Where are you seeing that? Can you point me to that?

Q In -- let me see. I believe that's PFA-2, Alternative -- PFA-2, your Alternative 2 --

A Yes.

Q -- model.

MR. BUTLER: I'm sorry, are you referring to page four of four in PFA-2?

CHAIRMAN BROWN: Yes.

MS. MORSE: Yeah.

MR. BUTLER: Where it refers to model layer eight?

MS. MORSE: Let me -- let me double check that.

BY MS. MORSE:

Q Yeah, I had the question correct from the

first. I was -- I was discussing your -- your -- your model, meaning the model that you ran, meaning your personal work product.

A So we are not talking about Exhibit PFA-2 at this point?

Q No.

A I am sorry, could you rephrase?

CHAIRMAN BROWN: Maybe restate the question.

THE WITNESS: Yeah.

BY MS. MORSE:

Q In the model that you ran for the case without RWS pumping, did you have an Alternative 2 -- an Alternative 2 model?

A Alternative 2 was the simulation we ran with only freshening, or the salinity abatement.

Q Yeah.

A Okay.

Q So did that model show that there was no hypersalinity in layers four through six outside of FPL's property boundaries?

A I don't recall. I -- you know, it's -- I show layers eight and, generally, layers 11. I don't -- having to answer the question about those layers, especially when you lump them together as four, five and six, I -- I am uncomfortable with answering that

question.

Q If it's easier for you, I won't lump them together if you can answer the question about the layers separately based on your recollection of your model.

MR. BUTLER: I am going to object to this line of questioning. I think it's fair to show Mr. Andersen a -- either a text document, or a diagram, or figure, or something that orients him to what she's referring to. Just talking about your model and generally layers is --

CHAIRMAN BROWN: I was just going to say, Ms. Morse, do you want a break -- a little bit of a break to get organized here?

MS. MORSE: No. The question stands. It's his model. He worked on it. He developed it, so --

CHAIRMAN BROWN: Wait, where are you -- but what are you looking at?

MS. MORSE: I'm referring to the work that Mr. Andersen did to --

CHAIRMAN BROWN: Is there a depiction in here, though? Is there an exhibit that you are actually looking at?

MS. MORSE: No.

CHAIRMAN BROWN: Okay.

MS. MORSE: I am relying on his recollection of his own work.

CHAIRMAN BROWN: Okay.

MR. BUTLER: I am going to renew my objection, because it's obviously a complex analysis. There is lots of material to it. I think it's fair for this sort of questions for the examiner to refer the witness to something that he or she is supposed to be evaluating.

CHAIRMAN BROWN: Based on the documentation that he's filed with the Commission, I am going to allow the question, and the extensive research that he's done. Objection overruled.

If you can answer the question, sir, then go ahead.

THE WITNESS: I don't think I can answer the question, and, you know, the -- the -- the difficulty is that we've run numerous simulations with this model, and, as you can see, a lot of them show very different results depending on what the scenario is.

And so having to answer the question about what's going on in layer four, five and six, I would be happy do that if I had something to look at; but trying to remember all these -- the results

of all these scenarios off the top of my head, I -- I can't do that.

BY MS. MORSE:

Q Well, I will ask you a different question about something you might be more familiar with.

In terms of the layers of the Biscayne Aquifer, isn't it true that the bottom of layer six is between 40 and 50 feet below sea level along the western edge of the CCS?

A That -- that sounds reasonable.

Q And at the bottom, again with the Biscayne Aquifer, the bottom of layer eight is at 50 to 65 feet below sea level at the western boundary of the CCS?

A That's about right. Yes.

Q Therefore, considering what we -- what you just testified to, in terms of the bottoms of layer eight -- level -- layer six and layer eight, in terms of what the RWS achieved in your model, isn't it true that the RWS simply helped the freshening project retract the plume in layers seven and eight to within FPL's property boundary?

A The -- the -- the simulation of the RWS is -- it looks at pulling back the -- retracting the hypersaline plume, I would say, most effectively through layers through eight, in some of the later models that

we've done, layers nine, and -- in layers nine. And then layers 10 and 11 are the ones that have been -- we have not retracted all the way.

Q When you refer to some of the later models you have run, what timeframe are you talking about?

A Well, the -- the first model we ran -- or the first model that was reviewed came out in, I think, May or June, and based on the Miami-Dade review and --

Q No. My question was about the later ones. In your answer, you just referenced that your most recent -- your -- you had some model runs most recently, so when were those?

A They were January of 2017.

Q So consistent with your answer that -- I believe it was your testimony, in your simulations of the RWS, it was most effective in through layer eight, and maybe you had some models that showed some retraction in layer nine; is that correct?

A That's correct.

Q So if the RWS assisted the CCS freshening to pull roughly 1.0 relative salinity within FPL's property boundary through layer eight or so, isn't it true that about half of the Biscayne Aquifer depth between layer eight and the bottom of the aquifer is still in noncompliance with regulatory requirements in your

model?

A Well, I think it's a limitation of either the model or the way we are interpreting the Biscayne Aquifer.

Q But what was your answer, yes or no? I understand you are anxious to explain, but the convention is that you respond to the question first.

A Okay. I am sorry, could you repeat the question?

Q Okay. The question is: While the RWS assisted the CCS freshening process to pull 1.0 relative salinity to within FPL's property boundary through about layer eight, as you testified, isn't it true that about half of the Biscayne Aquifer depth between layer eight and the bottom of the Biscayne Aquifer is still not in compliance with the regulatory requirements in that model?

A No. The reason being that we have -- the Biscayne Aquifer model does 90 feet deep, and the retraction wells, as modeled, are effective to a depth of about 60, 65 feet, something like that. So that's two-thirds of the aquifer, not half.

Now, then this remaining portion from the 60, 65 feet down to 90 is a little bit questionable, I think, as far as the definition of the Biscayne Aquifer.

If you look at the Dames & Moore report, depth of Biscayne Aquifer, where they call the bottom of the Biscayne, is at 70 feet. So I think there is some -- some debate as to what the base of the Biscayne Aquifer really is.

Q Well, in terms of whatever the debate is that you are -- you are indicating there is about the bottom of the aquifer, wasn't it just your testimony that the bottom of the aquifer is at -- at roughly 90 feet below sea level?

A That's the way we modeled it.

Q Did you model it that way because you don't think it's that -- it's not 90?

A No. I think that as a part of the modeling, we've seen that the -- and perhaps most importantly was the CSEM data that were collected, that show that the saltwater wedge does not behave in a classical fashion. It -- it -- it is most advanced about layer eight or so, and then it doubles back on itself such that there is fresher water beneath the wedge below it, which is very unclassical for a saltwater environment, and indicates that, you know, those layers are probably very -- the layers below are probably very -- or much less permeable than the others, which could be indicative of not being part of the aquifer.

Q Okay. Well, in terms of the bottom of the Biscayne Aquifer, I would like to show you a different document.

CHAIRMAN BROWN: We are at Exhibit 88. So if you can just give me a title.

MS. MORSE: What I am going to show him is -- will be the --

CHAIRMAN BROWN: The excerpt or the GeoTrends feasibility study?

MS. MORSE: It's going to be an excerpt from the 2012 pre-uprate report dated October 31, 2012.

CHAIRMAN BROWN: All right. We are marking that as 88.

(Whereupon, Exhibit No. 88 was marked for identification.)

BY MS. MORSE:

Q And for the witness, Mr. Andersen, it's going to be in that folder -- yeah, the larger document.

A Okay.

CHAIRMAN BROWN: It does say Sole on it, but --

MS. MORSE: It does. I am sorry about that.

CHAIRMAN BROWN: It's okay.

Mr. Andersen, do you have a copy of it in front of you?

THE WITNESS: Excerpt from 2012 pre-uprate report.

CHAIRMAN BROWN: That is it.

THE WITNESS: And Exhibit 88?

MS. MORSE: Uh-huh.

CHAIRMAN BROWN: Yes.

THE WITNESS: Got it.

CHAIRMAN BROWN: All right. Let's rock and roll.

MS. MORSE: Okay.

CHAIRMAN BROWN: Are we rocking and rolling?

MS. MORSE: Yeah, we are.

CHAIRMAN BROWN: Okay.

MS. MORSE: I was just going to get my place back. Sorry about that.

CHAIRMAN BROWN: Everybody here is gaining 15 pounds, by the way. These guys over here, they won't stop eating.

BY MS. MORSE:

Q I would like you to turn to the page -- the numbers at the bottom 5-116.

A Got it.

Q Okay. Looking at that figure, and you will see across the top, roughly halfway, a little bit more than halfway across, there is a faint line, there is a

title, L-31E Canal.

A I see it.

Q So -- and then at the bottom of the graph, there is a doted line that says, Base of the Biscayne Aquifer.

A I see it.

Q So the part that's between the L-31 Canal and the cooling -- there is a title called cooling Pond to the right there, it's under the letters TPGW-13, but there is a little title called Cooling Pond --

A I see it.

Q -- and then to the left the canal.

So isn't it true that this -- this depiction shows the bottom of the aquifer, the Biscayne Aquifer, to be at 100 feet below sea level?

MR. BUTLER: I am sorry, at which location on the figure?

MS. MORSE: I was pointing him to between the -- the -- the point between the L-31E canal and the cooling pond.

BY MS. MORSE:

Q So there is an area there, and above it -- where the dotted line goes.

A Well, TPGW-13, at that location, there is two things I see here. I see a dashed line, which implies

the base of the Biscayne Aquifer, which by its dashed notation plots that there are no real control points here is an interpreted point, so that the actual depth is somewhat unknown. None of those wells go below that, that would actually verify the location.

Q Bear with me one moment, I have to look at another exhibit.

Can you point to any analysis by the USGS that shows that the points below, say, 80 -- 80 feet below sea level are not part of the Biscayne Aquifer?

A I can't name -- no, I cannot name something from the USGS particularly.

Q Is there any -- is there any report from any Florida water management district that says that the lower two -- or the lower -- the levels below 80 feet below sea level are not part of the Biscayne Aquifer, under the CCS?

A I don't know. I do know that, you know, others who have investigated this, as in Dames & Moore, called the base at 70 feet. And I think it's -- it's -- it's a bit of a qualitative call, in that, you know, what you call the Biscayne Aquifer, there are geologic determinations of it, and there are hydrogeologic determinations of it.

The hydrogeologic determination being, does it

flow as an aquifer would? And by looking at the CSEM data, and seeing how that saltwater wedge behaves, it looks like it's considerably less permeable than the rest of the Biscayne Aquifer in that layer 10 and 11 region.

Q Turning to page 21 of your rebuttal, lines 18 through 20.

A Page 21, lines 18 through 20?

Q 18 through 20.

A Yes.

Q The CCS freshening activity is projected to freshen the water to 34 PSUs, or below seawater salinity within the CCS footprint, correct?

A Yes.

Q So if the CCS is maintained at less than hypersaline conditions, then hypersalinity would largely not be present in the containment above layer 10, right?

A Above layer two?

Q 10.

A Above layer 10? No, that's not true.

Q Well, turning to your rebuttal, page 23, lines seven through 21.

A I got it.

Q There, it appears you -- your testimony includes statements about limitations back in 2010.

Isn't it true that while the extent of the hypersaline water to the west of the CCS may not have been known exactly, it was, in fact, known that hypersaline water was present outside of the FPL property?

A Yes, I think it was, as -- as has been shown in the Dames & Moore reports, that there was hypersaline water in wells L-3, and I -- I think I point -- I think I even mention these here, that there was hypersaline water in those wells, which are adjacent to L-31.

Q Continuing on page 20 -- 23 in your rebuttal testimony there. Isn't it true that the measurement method you described would generally tend to dilute high concentrations by the lower ones due to the mixing within the well?

A Possibly. The methodology that was used -- these wells -- L-3, L-5, G-28 -- were constructed by in methods that were probably, you know, the way that people did those back in the '70s or so. They are not the way we would construct them today.

The fear is that, with an open hole, you are not getting a representative sample of a discrete interval; and so what you're mentioning could happen, but it is possible that it did not happen.

Q Well, following on the possibility that it did happen, then, if that happened, then the high

concentrations could be expected to be even higher than measured; correct?

A That's a possibility.

Q So in that instance, if -- if the measured levels indicated hypersalinity, then the salinity within the Biscayne Aquifer would be expected to be even higher, wouldn't it?

A Well, with that hypothetical, yes, that's a possibility.

Q Please see your rebuttal, page 26, lines one through seven.

Isn't it true that the -- the Hughes simulations demonstrate the mechanism of -- of saline water sinking into the Biscayne Aquifer and migrating westward even for very low and very high values of -- of aquifer hydraulic conductivity, which would bracket the range of conductivities possible in the Biscayne Aquifer?

A Yes. The Hughes model is what I would consider to be a conceptual type of -- of model, which shows about what you said, is that it shows the mechanism. But, as I testify here, I -- they used four different versions of the model with five orders of magnitude variation in the -- in the hydraulic conductivity. That's a huge range.

And what it results in is, when they run their simulation, they show a migration of possibly a quarter of a mile on the low end, and a migration of six-and-a-half miles on the high end. That doesn't give me much -- much other than just a conceptual idea of what may be happening.

Q Well, even though the timing might not be accurate, didn't your simulations demonstrate that CCS water would sink and intrude westward into deeper portions of the Biscayne Aquifer?

A Yes, and that's all just due to physics.

Q Well, let's go to your rebuttal on page 26, lines 10 through 18.

In your testimony, you are discussing purported errors in the Hughes model, correct?

A That's correct.

Q And you indicate that the interceptor ditch, which is 18 feet deep, is modeled by Hughes to be nine feet deep; correct?

A Correct.

Q And then you further claim that this error allows more seawater to move west than would occur with the deeper ditch, correct?

A Yes.

Q Was it also your testimony that the 18 feet

deep return canal that runs from the south to the north within the CCS model is -- CCS is modeled as three feet deep, but that the effect of this error is less clear?

A Yes.

Q But as a return canal, it might not capture as much CCS water as would occur with the deeper ditch; is that correct?

A That's -- that's what I said, yes.

Q So these depths, meaning the depth of the interceptor ditch and the return canal, are much shallower than the depth of the Biscayne Aquifer; is that correct -- I mean, the bottom of the Biscayne Aquifer, correct?

A Yes.

Q Therefore, the impact of such differences in the interceptor ditch depth in the Hughes model, the 18 feet versus the nine feet depth, would be negligible on saltwater migration at the bottom of the Biscayne Aquifer, correct?

A No, I can't say that.

MS. MORSE: Okay. I would like to mark another exhibit.

CHAIRMAN BROWN: We are at 89.

MS. MORSE: Okay.

CHAIRMAN BROWN: And that would be the

GeoTrends Feasibility Study August 11, 2010?

MS. MORSE: Yes, that's it.

CHAIRMAN BROWN: That's what we are marking.

(Whereupon, Exhibit No. 89 was marked for identification.)

CHAIRMAN BROWN: Mr. Andersen, you have a copy in front of you?

THE WITNESS: I do.

CHAIRMAN BROWN: You may proceed, Ms. Morse.

MS. MORSE: Thank you.

BY MS. MORSE:

Q In the GeoTrends study dated August 11, 2010, did you conduct a study on deepening the ID -- the interceptor ditch?

A We did, yes. That was one of the modifications we looked at.

Q Okay. In that study, you reported that you deepened the interceptor ditch from 18 feet deep to 40 feet, which is a difference of 22 feet; is that correct?

A I don't remember the exact numbers, but that sounds about right.

Q Okay. I am referring to page seven of the report. Additionally, you stated that this option would also require pumping approximately 25 million gallons

per day continuously of additional water from the interceptor ditch to maintain a lower head, is that correct?

A That's what it says, yes.

Q So this option not only deepened the ditch by 22 feet, but also created a lower head in the interceptor ditch to draw even more water toward the interceptor ditch; is that correct?

A Yes.

Q And in that report, you stated, the interceptor ditch modification cannot effectively control deep groundwater, correct?

A That's my recollection, yes.

Q Okay. Well, I refer you to the second page of the executive summary, the second paragraph, about five -- six lines down. Does that refresh your recollection?

A Yes.

Q So therefore, a difference of nine feet in the interceptor ditch depth, instead of 22 feet, would have even less of an impact on the migration in the plume in the deeper portions of the aquifer; is that correct?

A I am not following your numbers, nine to 22?

Q I was referring back to your -- your -- your criticism of the Hughes report, and so that was like

a -- you criticized the modeling at nine feet deep?

A Yes.

Q Okay. And then in this study, the interceptor ditch was even deeper. So in instead of 18 feet, it was 40 feet, which was the difference of the 22; correct?

A Yes.

Q That's what I was referring to, so --

A And the question?

Q So that if you have a difference of nine feet in the depth, instead of, you know, the 22 feet, that would have even less of an impact on migration in the plume in the deeper portions of the aquifer; correct?

A Well, I think what I was -- what I was driving at with the Hughes model was that there were errors in the model. And, you know, that's not -- it was -- it's something that it's difficult to determine what the model is showing when there is -- when there is an error in the model, and we are comparing two different things here.

One is my assessment of the Hughes model, where they use a -- a incorrect elevation or depth of the interceptor ditch, versus my analysis, which is actually deepening it by a considerable amount to look at what would happen as a remedial alternative. I don't see the connection between the two.

Q Let me ask you this: The time you first started working on CCS -- CCS issues was in or about 2004, is that correct?

A Indirectly. My involvement at Turkey Point began in 2004 with Unit 5, which doesn't really -- they have cooling towers there, so it's not -- it's not affected by the cooling canal system; but that's when I became aware of the operation of the cooling canal system, and made a site visit and began to learn about that around that time.

Q Okay. Well, you have not documented in any information you provided to -- excuse me -- to OPC that you recommended to FPL that they perform a density dependent saltwater intrusion model, did you?

A I did, as a part of the 2010 analysis.

Q Oh, but not before 2010?

A I don't believe I -- no, I don't believe I did.

Q And the same question as to a density dependent saltwater intrusion study, when, if ever, did you recommend one of those to FPL?

A A saltwater intrusion study?

Q Yeah. The first thing I asked you is about a model.

A Yeah.

Q Uh-huh.

A I think they run kind of hand-in-hand. You need to do the study before you do the model.

Q Okay. So is it your testimony that maybe -- that you wouldn't have recommended one of those to FPL before 2010?

A Well, my history of involvement with the CCS, where I really began to advise on it, began with my involvement in the monitoring plan in about 2009. And at that time, the uprate monitoring data was -- the data program was being put together and data were starting to come in. And my recommendation at that time was that, let's use all this data, let's study it, and let's build a model.

Q Okay. Fair enough.

MS. MORSE: Madam Chair, could I have two or three minutes to get my last couple of questions together, just to strike off other questions?

CHAIRMAN BROWN: Sure enough.

(Discussion off the record.)

CHAIRMAN BROWN: Would you like to take a five-minute break?

MS. MORSE: No, I am ready now.

CHAIRMAN BROWN: Awesome.

BY MS. MORSE:

Q Okay. Mr. Andersen, going back to your summary, I believe you stated there was an eastern -- eastward moment of the interface; is that correct?

A Yes. What I did was I looked at a USGS report that showed their estimate of the saltwater interface in 1984 and 1995.

Q Okay. And turning to your PFA-6, attached to your rebuttal testimony.

A I have it.

Q Under the heading explanation -- one, two three four -- about the fifth paragraph or grouping of explanation symbols down there, there is one heading that reads the Proximate Inland Extent of Saltwater Interface?

A Yes.

Q Could you read the rest of that?

A Are you -- there is two of those. Are you talking about the fourth or the fifth one?

Q The fifth one.

A The fifth one. The proximate inland extent of saltwater interface in the Biscayne Aquifer in 1984, Klein and Walter, 1985, note differences between the 1984 and 1995 lines may be due to additional data being available but not necessarily movement of the interface.

Q Thank you.

Next I would like to refer you to Dr. Panday's demonstrative -- bear with me -- was it page 30 -- page 33 of Dr. Panday's testimony.

A I have it.

Q Okay. Start on line nine. Do you see the language that stated, I conducted simulations with the Alternative 3-D model files without the retraction well component? That's -- I am sorry, line nine through 10.

A Yes.

Q Okay. And then at lines 11 through 13, isn't it true he indicates that Demonstrative 22-A is the case of without retraction was at year one versus -- well, you will see at lines 16 to 18, lines -- the without retraction case for year one was compared to 23-A without retraction wells at 10 years, correct?

A Yes.

Q Therefore, it shows that 22-A versus 23 are, in fact, without retraction well pumping and show the impact, therefore, of any freshening -- of only freshening?

A After eight years, and, yes, I believe that's true.

Q Okay. So would you agree that all layers or levels of the aquifer do not have to have the same level of permeability in order to be considered part of the

same aquifer?

A Yes. There can be variability in hydraulic conductivity within an aquifer, yes.

Q So it follows that a layer of the aquifer that is not in the high flow zone can still be part of the aquifer?

A It could, yes.

Q Okay. Thank you.

MS. MORSE: Those are the last of my questions.

CHAIRMAN BROWN: Awesome.

Mr. Moyle.

MR. MOYLE: Thank you.

EXAMINATION

BY MR. MOYLE:

Q I have some questions of you.

In your testimony, page six, line 17, you talk about a feasibility study, and I just wanted to confirm, that's the Exhibit 89; is that right?

A Page six of my testimony?

CHAIRMAN BROWN: Page six, line 17.

THE WITNESS: Yes, that is the one.

BY MR. MOYLE:

Q All right. So if I ask you questions about Exhibit 89, you are -- you are -- this is the

feasibility study, the subject of your testimony, you are comfortable answering questions related to Exhibit 89, correct?

A Yes.

Q Okay. What was your role in preparing this feasibility study?

A I was the project manager.

Q Okay. And there were 32 alternatives that were identified?

A Initially, yes.

Q And then you brought it down to 13?

A Correct.

Q And at the very top, the first paragraph of your executive summary, you looked at cooling towers; is that right?

A Cooling towers was part of the study. The way it actually worked out was that Siemens was the ones that actually did that analysis.

Q And why did you not end up saying, well, let's go with cooling towers?

A I think that the amount of cooling towers that were necessary and, to a certain extent, also the -- just the cost of -- or the amount of retooling I guess it would take to move to something like that, it was an enormous task.

Q Same question with respect to desalinization?

A Same answer. There were other ways of -- there were other more cost-effective ways of addressing the problem.

Q How about -- how about effective ways with respect to achieving the requirements of the consent agreement and the consent order?

A Well, at the time, there was no consent agreement and no consent order. This was in 2010.

Q Do you have an opinion today to whether what's being proposed will achieve the requirements of the consent order and consent agreement?

A I -- I believe it will, yes. I think there is a -- I am very confident that it will.

Q You are back with a narrative answer. Can you -- can you answer the same question I posed to Mr. Sole, as a professional engineer, and somebody who consulted on this? If you had to put a grade on it, A, B, C, D or F, to use the academic grades, or one through 10, can you give me a quantitative measurement, in your opinion, of how this proposed plan will fair, in your judgment, with respect to achieving the objectives of the consent agreement and consent order?

A I would prefer to give that a qualitative answer, like Mr. Sole did, that there is a high degree

of certainty that it will work.

Q Are you unable to give me an answer with respect to the qualitative -- I mean, engineers deal in qualitative measures, right?

A Well, we deal with quantitative.

Q I am sorry, quantitative. I keep confusing that.

A Well, yes, but, I mean, it's -- it's basically a qualitative -- I haven't done any computations to give me a, you know, a percent probability -- or a probability of success, and so any number that I give you would just be a translation of my qualitative idea about what the chances of success are.

Q If FPL said, listen, we want to have a better understanding of our chances of success and asked you to do that, could you do that?

A I think we've done what we can do subject to when the actual wells go in, and they begin to test the wells and we can determine, for instance, whether they should be operated at a uniform rate, or whether some of the other -- some of the wells should be operated at a different rate.

So right now, there -- there was an aquifer test that was performed, which is a very useful bit of information, in the northwest corner of the cooling

canal system, and we used that information in our modeling. And as these wells go in, they are providing tests of those, and that give us -- gives us more information. So the database will improve as the -- as the project is built.

Q All right. So I appreciate that.

I guess I was trying to understand, from an engineering standpoint, if somebody asked you, FPL or somebody else asked you to give me a -- give me a percentage chance that this is going to work, could you do that or no? You would say, I would rather -- I can't do that, I want to stick to the narrative answer?

A That's right.

Q Lawyers get asked a lot of times, too. They say, what are my chances of winning the case, and --

CHAIRMAN BROWN: Anyone who says a slam dunk, it's zero.

BY MR. MOYLE:

Q We prefer narratives as well.

I want to -- I want to ask you a few questions about -- about you just referenced in your response to that question, that you did a study of the aquifer in, I think, the northwest corner. What -- what did you do there?

A Well, it -- I am not taking credit for that.

There was -- it was another contractor that performed basically an aquifer test, where they put in a well, and they pumped the well and observed what happens in terms of draw-downs around that well that then provides -- you can back out aquifer parameters that then were actually used in the groundwater model.

Q All right. How -- how deep with the wells that are proposed to, you know, to -- to withdraw the -- retract the plume? What's the depth of the wells that are being proposed?

A They are proposed to be on the order of 70 to 90 feet deep.

Q That hadn't been nailed down yet with respect to how deep they will be?

A Well, I think I am talking about, like, the open interval is -- is where there is actually being withdrawn from the screen zone.

Q Okay. And if I understood some of the testimony, that your model that you are running only goes down to 65 feet; is that right?

A No. Our model goes down to 90 feet in that area, and then it's -- the Biscayne Aquifer is a -- is kind of a wedge that is thickest near the coast, and then it thins as you move west, and that thinning is incorporated. So when we talk about thicknesses, I

think we have to talk about where.

Q A little discussion with respect to the freshing of the aquifer, that's putting freshwater in it, right?

A Basically freshwater, water from the Floridan aquifer, right.

Q You got to get a consumptive use permit to do that, is that the plan, to take freshwater out of the aquifer and move it and put it into the wells -- I mean, into the canals?

A Well, it's no longer a plan. It's -- it's going on now.

Q Okay. What do you believe has a more positive effect with respect to trying to solve the problem, which is the increased salinity, the freshing, or the wells?

A Well, I think they both provide positive benefits. I think, as Mr. Sole testified, it's -- it's the way we normally -- it's similar to the way we normally address a contamination problem, where you first remove, or eliminate the effect of the source. In this case, it's the hypersalinity in the cooling canal system. And then you go after the extent of a plume, or contamination outside the source area.

And so it's -- it's -- the freshening takes

care of the source, and the retraction wells, or the recovery well system take care of the contamination that is -- is outside the source area; but then it has that dual purpose of retracting the hypersaline wedge, as well as containing on the FPL property.

Q Okay. What -- what -- what was your ultimate recommendation to FPL with respect to how to solve the problem?

A At what point?

Q Well, did you -- did it change over time?

A Well, back in 2010, when we did the feasibility study, we were -- we thought that the freshening was a useful alternative, and that there might be some benefits of pumping beneath the interceptor ditch.

And so that was kind of an initial thing that we looked at, and that we recommended. And where we are today, is -- is pretty similar to that. I think some of the numbers have changed with regard to how much would be required for freshening, and then also with regard to if the pumping that would take place on FPL property.

Q Okay. Well, I saw on page seven, you said: FPL chose to address the source of contamination in the CCS by lowering salinity through the addition of fresher water from upper aquifer -- Upper Floridan aquifer. Was

that -- was that your recommendation?

A I am sorry, where did you -- where were you reading from?

Q Seven, line two.

CHAIRMAN BROWN: It's seven of your testimony.

THE WITNESS: I am looking at it. Yeah, I am trying to find the context of it.

Yes, what I am referring to here is a analysis that I began right around the time of the -- when the administrative order was -- was -- prior to all the hearings, I was looking at, and we presented to the various regulatory organizations, the concept of freshening the cooling canal system. And so at that time, that was the selected remedy. It has since evolved to inclusion of the -- of the pumping.

BY MR. MOYLE:

Q Mr. Sole has some testimony where he suggests that, well, maybe there is going to need to be some refinements to what our plan is, we get some data, and maybe we need to pump more over here, or pump less over there, you -- you agree with that, right?

A Yes.

Q Okay. Do you think there is a chance that -- that you all may -- you all collectively may be back

saying, this just didn't work, we -- you know, we got to go with desal; we got to go with cooling towers; we got to come back and, you know, start from scratch?

A I don't think the scenario you describe is realistic with going back to scratch. I think what we are anticipating, or thinking if there are changes, it would be tweaks to the existing proposal, that is as we talked about moving pumping around, you know, maybe changes in the freshening methodology, those types of things, but all along the same basic path that we are taking now.

Q Okay. With respect to the depths that we are talking about, the well depth, the Florida aquifer depth, there is not going to be a situation where the wells don't go down far enough to address all of the -- all of the water, which is what I understood happened with respect to the -- to the ditch. It went down 18 feet. It did a good job at the upper levels, but didn't do a good job at the lower levels.

Are you -- are you satisfied that the plan now will not allow something similar like that to happen with respect to not going down far enough and taking care of the problem all the way as far down as the aquifer goes?

A I am. And what gives me great comfort is

the -- the CSEM data that have been collected that show that the extent of the in saltwater is greatest at this approximate 60-foot depth, and then as you go deeper, the concentrations become less.

Q So sometimes -- I don't know if you have had this happen to you in your professional career, but sometimes somebody will come in and say, listen, I only have so much money to tackle the problem, have you ever had that happen to you?

A I don't -- I don't believe I have had -- I have had it the other way around, I guess, where we've proposed something, and someone has been, you know, like, that's an expensive remedy; but, no, not exactly what you described --

Q Okay.

A -- that they want you -- I think what you are describing is something about, I have so much money, what can you do for me; and that's -- I don't think I have ever been faced with that --

Q Or to say I have a budget -- you know, I have a budget, you know, I prefer not to spend over $100 million, or, you know, some kind of discussion like that.

A Well, I mean, I think that's kind of similar to what we are talking about with the -- with the

feasibility study, was that we go ahead and we do the analysis, and then as far as costs are concerned, there is certain things that just fall out of the analysis that are just, you know, much more expensive than anything else. It's just not worthwhile doing.

Q You do a lot of work for regulated utilities, right?

A Not necessarily. I do work for Florida Power & Light, and -- and Florida Power & Light, that's -- that's the utility I work with.

Q Okay. And -- and I am a little confused about this point about OPC's expert modeled -- modeled -- ran a model on freshen -- freshening, and looked at that separately and independently, and then ran another model on -- on the well approach. And if I understand what you are saying, is, well, I can't really do that, or I don't think that's a valid way to approach the problem; do I have that right?

A Sort of, yeah. And what -- what we did -- the way -- the way we modeled Alternative 3-D, which is the selected remedy, was we ran the recovery well system and the freshening simultaneously, and as a system, what Dr. Panday did was that he ran them separately, that is the recovery well system without the freshening. And, you know, that's one way, and sort of academic way of

looking at it, but that's not the way it's going to happen. The two go hand-in-hand.

Right now, we are looking at a cooling canal system that is freshened down to, I think the last time we looked, at 39 PSU, and so it would not be realistic to run this scenario at 60 PSU.

Q Yeah, all right.

And you are not comfortable answering a question if you only could pick one, which one would be better between those two approaches?

A No. They -- they really have -- as I mentioned before, one addresses the source and one addresses the -- the plume.

Q All right.

MR. MOYLE: That's all I have. Thank you?

CHAIRMAN BROWN: Thank you, Mr. Moyle. Good job.

MR. CAVROS: I have just have a few questions.

CHAIRMAN BROWN: Okay.

MR. CAVROS: Madam Chair.

EXAMINATION

BY MR. CAVROS:

Q Hi, Mr. Andersen. I am going to just ask you some questions about the feasibility analysis.

Mr. Moyle asked you about the cooling towers,

and you said that Siemens did that study. If I look at the whole feasibility analysis, will that information be in there?

A It is in there. I think that just by the nature of the way the work was conducted was that we were separate contractors, but -- so we had no control over Siemens. I think they then ended up doing a PowerPoint presentation, and so it -- the two formats are different but everything is in the report.

Q But it's in there.

And is it safe to say that the cooling towers, if that was the choice that was made, would abate the source of salt in the groundwater?

A No, it would not. The cooling towers would be kind of that preventative measure that would take it from here on out, would provide the cooling to the -- to the plant, but what is in the groundwater certainly a cooling tower does not address what's within the groundwater system.

Q Right. Maybe I didn't ask that correctly. But it would -- it would abate the source of further salinity to groundwater?

A It would be a whole different approach to cooling the -- the system, and -- and you would not have the problems associated, perhaps, with the cooling canal

system.

But, as I mentioned before, it was a very disruptive and a very expensive alternative that, as I recall -- and I am sorry, but this is seven years ago, it seems like Siemens was even kind of take shaking their head and saying this isn't a very good option.

Q Sure. And do you recall what the price tag was?

A I do not. I believe it's in our -- it's in our report.

Q Okay. That's quite all right.

The date on this is August 11th, 2010. Is that the date that it was presented to FPL management?

A This project was done in two phases, as I recall. There was kind of an initial study that was done in March of 2010, and then there was a more what we called a focus feasibility study that was done later, I think perhaps in July -- or June or July, and then we summarized the results of that in -- in the August report.

Q Okay. So then this -- this notation down here that says, draft, has no real significance; is that fair to say that?

A The draft notation is simply that we -- we developed a draft report, as this is, and that's all the

further it went.

Q Okay. So this --

A There was no final.

Q Okay. So this is, in essence, the final report?

A It's the final, but it's still in a draft state, I guess, where we received limited comment on it from -- from the client, and not gone through the final edits that we normally would to put a final report together.

Q Okay. That's helpful.

And it's also stamped confidential, attorney work product. Do you have -- do you know what precipitated the report, and was it in anticipation of litigation?

MS. CANO: Objection. This specific line of questioning has already been gone through today.

CHAIRMAN BROWN: I don't know if that specific question was asked, so I will allow it.

THE WITNESS: I don't know what precipitated that. I know that, in 2010, there were indications that -- that, you know, the data were coming in from the uprate monitoring program, and I think FPL was just looking at what options they might have if that data showed that there was a problem.

BY MR. CAVROS:

Q Okay. And that data, when you say it showed a problem, can you be more specific?

A Well, I think, as a part of the agreement, there was a discussion about collecting data and putting a monitoring program together looking at the data, and then, you know, making sense of the data. And part of that would be that, you know, possibly using a model to understand the data. And then, you know, after that, then, you know, it was kind of left up in the air as to what the consequences might be. But, you know, there were data that were being collected, a much more extensive than had ever been collected before in this area.

Q Right. And that data was showing a greater contribution from the cooling canal system than had previously been recorded, or previous data?

A Well, I think it filled in the gaps. Previously, the -- what -- what there was was some wells that were on the levee, the L-3 and L-5 wells, and then -- they were just adjacent to the source. And then, you know, the next line of wells that FPL had an opportunity to monitor were out on Tallahassee Road. So there was a big gap between, you know, those two measuring points, and, you know, the monitoring program

helped fill in those gaps as -- as well as others.

Q Sure. And it's fair to say that there was data as early as 2009?

A I don't recall the exact date when those wells started going in, the uprate monitoring wells. I don't remember the date.

Q Okay, but the data would have been from the uprate monitoring wells in 2010, is that correct?

A That's about the date when they started getting information, I believe.

Q Okay. And I have just one more question, and it's not in the exhibit that was provided to you, but it was in an earlier exhibit. It's the same feasibility study, and maybe we can just do this by maybe I can just read it to you and you can try to recall what you might have meant by this, but it's really just on the second page. It's right after the executive summary. And, you know, you are starting to discuss the initial criteria and alternatives. And the first sentence is: The rapid timeframe and complexity of the project required a focus group discussion. Does that reference to rapid timeframe, does that -- do you recall that, or do you have a sense of what the authors may have been alluding to?

A Yes. And it goes back to what I was talking

about with the, you know, kind of two phases of this project. It was kind of an initial first study done, and then a second one that was more focused. And I think the first study had a pretty quick turn on it with about -- I think we had about a month to -- to put our study together.

As far as your question about what precipitated that, I don't recall the exact -- exact situation. I think that there was a meeting with management that, you know, the staff of FPL were trying to meet a deadline for -- an internal deadline.

Q Okay. So then it's fair to say --

CHAIRMAN BROWN: You said that was your last question.

MR. CAVROS: Oh, okay. Absolutely last question.

BY MR. CAVROS:

Q So it's fair to say there was some urgency on the part of FPL to get this done?

A Yeah, I sensed that the urgency was more of an internal type of thing than external.

MR. CAVROS: All right. Okay. Thank you.

CHAIRMAN BROWN: Thank you, Mr. Cavros.

Staff.

MS. CUELLO: Staff has a minor clarifying

question for the witness.

EXAMINATION

BY MS. CUELLO:

Q Good evening, Mr. Andersen. I am Stephanie Cuello with Commission staff. And can you please turn to page seven of your rebuttal testimony?

A Yes.

Q Okay. In referencing lines five through eight, is it correct to say that the freshening activity will not interfere with the Fukushima well's function as emergency backup water supply?

A Yes. They were all evaluated together, and so we -- we know what the impact on each individual well is.

MS. CUELLO: Okay. Thank you.

Staff has no further questions.

CHAIRMAN BROWN: Thank you, Stephanie.

Commissioners. Commissioner Polmann.

COMMISSIONER POLMANN: Thank you, Madam Chairman. And thank you, Ms. Cuello for pointing to the right page.

Mr. Andersen, good evening.

THE WITNESS: Hello.

COMMISSIONER POLMANN: Let's stay on page seven of your testimony, and look at line 17. This

is in reference to what we've been referring to as CA, the consent agreement with Miami-Dade County. And if you could simply review starting at line 17, the remainder of that page, I will ask you a question or two. We don't need to read it out loud.

THE WITNESS: Yes.

COMMISSIONER POLMANN: Thank you.

It indicates here the requirement to develop the 3D density dependent model, and we've referenced this many times. I am going to highlight the end of line 18, and going on to design a recovery well system. It implies here that the requirement was to design -- or the purpose of the well -- developing the well was to did he sign the RWS.

Could you comment on that, please, as to the purpose? Is that your -- is that the position -- was that your specific understanding that that was the use of the model, or the initial use was for design purposes?

THE WITNESS: Yes. It was -- that was -- our statement of work was to develop a model that was capable of evaluating a recovery well system.

COMMISSIONER POLMANN: Okay. Let me -- let me

interpret that and ask you a related question.

The evaluation of alternatives that you just mentioned, is that a normal part of coming to a conclusion of a preferred alternative? In the traditional sense of your work, you would look at a number of alternatives and then come to a recommendation?

THE WITNESS: Yes. The --

COMMISSIONER POLMANN: Okay. Let's just move on.

THE WITNESS: Yeah.

COMMISSIONER POLMANN: And then specifically, how was the model used -- and I am pointing to design in the engineering sense, or, you know, coming up with recommendations on the depth of the wells, and the pumping rates, and those types of things? Was the model used for that specific purpose, to make recommendations on location of wells, and size of wells, and depth of wells, and so forth?

THE WITNESS: Yes. I think that if -- in our report, we also looked at different types of alternatives like, you know, just the -- well, for comparison purposes, we did the freshening, and we did the no action case which is fairly normal.

COMMISSIONER POLMANN: Thank you.

THE WITNESS: Then we looked at variance on the alternatives for pumping. We looked at some alternatives for addressing the saline plume out near Tallahassee Road, and, you know, kind of settled on, after looking at different variance of well spacing, well location, well depth, pumping rates, we settled in on what the Alternative 3-D should be.

COMMISSIONER POLMANN: All right. Now, let's look at the bottom of that page, on line 23, and then carrying over, it says: Since selection of Alternative 3-D you have modified the model -- and then to the next page -- in an attempt to improve the accuracy and certainty. And then you used the model to apportion costs.

Do you envision that this -- this notion of improving the model for accuracy and certainty is going to continue? Is there some reason why that will be an ongoing effort, or is there an end point where the model will be static?

THE WITNESS: Well, I think that it's a -- it's kind of an asymptotic type of a thing, where initially we made some changes that were important. I think we've now kind of honed in on a model that

we are comfortable with, and there may be some modifications. And what I can think of most is just that those new wells are going on we will get -- are going in we will get new stratigraphy --

COMMISSIONER POLMANN: Okay.

THE WITNESS: -- we will get new parameters for that --

COMMISSIONER POLMANN: You mentioned that earlier. Thank you.

THE WITNESS: Yes.

COMMISSIONER POLMANN: Now, with regard to the remediation, the maintenance, and so forth, there's been discussion, and I read in various testimony, and I am a little bit uncertain so let me ask for clarification.

The recovery -- the remediation and the containment, and so forth, the saltwater could be analyzed based on mass or volume. What was the final determination that was made by you and the utility? Is it mass based or volume based? And that's A or B.

THE WITNESS: Can I answer a little bit more complicated? We ran it on -- we ran it on mass. That is what the 83 percent --

COMMISSIONER POLMANN: Right.

THE WITNESS: -- number is from. We also -- and that's without layers 10 and 11. Then we ran it with 10 and 11, and we got seven -- the 70 -- 73 percent number --

COMMISSIONER POLMANN: Right.

THE WITNESS: -- 75 percent number.

COMMISSIONER POLMANN: So that mass based?

THE WITNESS: That was also mass based.

If you look at it in a very simplistic --

COMMISSIONER POLMANN: I am sorry to interrupt you. That's the number that's been put forward.

THE WITNESS: The 70 -- the 74 percent, yes.

COMMISSIONER POLMANN: Right. And I believe that was the number Mr. Ferguson pointed to.

THE WITNESS: Yes, sir.

COMMISSIONER POLMANN: And I think it was represented elsewhere that that was a conservative number. And I got the understanding, or I took it that that was a number the utility intended to use -- and I am not asking you for that conclusion, but perhaps we can just leave it there. I was looking for the mass based, unless you feel compelled, do you need to elaborate that for some good reason?

THE WITNESS: Well, the good reason is that I

think there has been some discussion about why use mass? Why not use volume?

If you look at it in a very simple way, then the first 10 years, if we realize it will clean up after 10 years on the west side, we will be about 50 percent from the west, 50 percent from the east. So it's 50-50 for the first 10 years, okay.

After it's all cleaned up, it's all a containment option. So the water that's coming in is all for containment purposes. So you have 100 percent for containment. You average that together, you have 75-25. And that's very close to what you have with -- with the analysis that was mass based, and what I am just proposing really is a volume based analysis.

So just perhaps -- well, I don't think it's -- I think it's -- that's just the way it works out, is that, you know, the option that was chosen by the utility is very close to a volume based analysis.

COMMISSIONER POLMANN: Thank you.

All right. Let me move on here. There was a lot of discussion here about the Biscayne Aquifer, and we had earlier discussion about layers, and you just referenced layers, and I need some

clarification, and I hope this is beneficial to the record as the Commission moves forward.

We've had testimony, and it's already admitted, through documents, and we've had witnesses testify -- let me just state that we understand an aquifer to be a subsurface geologic formation that can store, transmit and yield water in useful quantities, would you accept that definition?

THE WITNESS: Yes.

COMMISSIONER POLMANN: Thank you.

In your opinion, is the notion of an aquifer, as I have just described, is the aquifer important or constraining to the model development for the purposes that we just discussed? The aquifer as opposed to the hydraulics and the hydrology and the salt.

THE WITNESS: It's the hydraulics is what drives it. It's not a designation of the aquifer. It's the properties that drive --

COMMISSIONER POLMANN: Thank you.

Now, so the fact that -- that it's -- it's named and labeled the Biscayne Aquifer, and we see that all the time, we talk about it all the time, that's with regards -- or utilized for other

purposes, that is not important to your analysis, or your conclusions; is that a fair statement?

THE WITNESS: The parameters themselves are the most important in driving how it behaves.

COMMISSIONER POLMANN: Okay. Now, we also heard -- and I am asking you because you are an expert in hydrology and water resources, and so forth, and Mr. Sole represented that he was not. He is more an expert in regulatory environmental resources, and so forth, but he made a reference to a G-II and a G-III. Are you familiar with those terms?

THE WITNESS: I am, yes.

COMMISSIONER POLMANN: And those refer to conditions in the subsurface, and would those terms typically apply to an aquifer in the sense that one would develop an aquifer for purposes of withdrawing water or -- or be concerned about the water quality conditions the a particular location? Is there any relevance there?

THE WITNESS: Well --

COMMISSIONER POLMANN: And it's okay if the answer is owe no.

THE WITNESS: In a G-III -- let me answer this way: In a G-III aquifer, it may be perfectly

capable of transmitting and storing large quantities of water, however, the water quality is so degraded that it's no longer useful as a water supply.

COMMISSIONER POLMANN: Okay. Thank you.

Let's talk about the model itself just briefly. And I want to ask some questions back on --

Mr. Ferguson utilized your document, and relied upon it for a purpose, but he is not an expert there in that regard, and we referred it to you, so I -- I -- I read about SEAWAT model. Is that the name of a model that you used?

THE WITNESS: Yes.

COMMISSIONER POLMANN: Okay. Is that -- that's an acronym for a model, S-E-A-W-A-T?

THE WITNESS: It is. And then you are probably familiar with the MODFLOW and MT3D model, and it is a linking of those two with density as a coupling term.

COMMISSIONER POLMANN: Okay. So it's a numerical model, and is that a standard that's established that's used by many different people? It's not something you created, your company made?

THE WITNESS: No. It's a USGS developed

product.

COMMISSIONER POLMANN: Okay. Thank you.

Now, within that, it has capabilities to include surface water features, as well as groundwater?

THE WITNESS: It treats surface water as a boundary condition.

COMMISSIONER POLMANN: Okay. That was my question, how the surface water --

So the whole CCS, the canal system, is that represented in the model, in your analysis, as a boundary condition?

THE WITNESS: It is, yes.

COMMISSIONER POLMANN: Is that time varying or is that --

THE WITNESS: It is time varying, yes.

COMMISSIONER POLMANN: Okay. So the entire model is transient?

THE WITNESS: It is.

COMMISSIONER POLMANN: As part of your analysis, either calculated within the SEAWAT or off-line, was there a water balance performed inclusive of the canal system?

THE WITNESS: Yes, we -- as a part of our work, we have two models that we execute. There is

the SEAWAT model, which we look at for regional effects. And then we have the water and salt balance that we use to look at what's happening within the cooling canal system itself with regards to salinity.

COMMISSIONER POLMANN: Okay. So if I understand that correctly, so the interaction between the canal and the subsurface, you are able to discern from -- from your model in the transient nature that there is a flux of water and salt between the canal and the subsurface; is that correct?

THE WITNESS: Yes.

COMMISSIONER POLMANN: Okay. And those are time varying. What is the time stepping in the model? Is it --

THE WITNESS: Daily.

COMMISSIONER POLMANN: Daily. Thank you.

Now, under current conditions, as I understand, there has been an addition, construction of a well and now there is being water added to the CCS, and there is now a salinity limitation imposed --

THE WITNESS: Yes.

COMMISSIONER POLMANN: -- in the canal?

THE WITNESS: Yeah. It's actually a series of wells -- a series of Floridan wells, yes.

COMMISSIONER POLMANN: Okay. Do you know whether or not that salinity limitation is a constraint that will be in place for a finite period of time, or an indefinite period of time? Is that something you are aware of?

THE WITNESS: I -- my understanding is that it is -- forever more it will be at 34 --

COMMISSIONER POLMANN: Okay.

THE WITNESS: -- for however long the cooling canal system is operated.

COMMISSIONER POLMANN: And further, based on your understanding, having developed and run the model and performed a water and a salt balance related to the canal and the groundwater system, is it your opinion that the pumping of the wells in providing water into the canal from these groundwater wells, is that also something that's going to be required for a like period, essentially as you say, forever, in order to maintain that salinity level in the canal?

THE WITNESS: Yes. It's a -- basically a maintenance type of addition. Basically what we are doing is we are -- we are -- we are covering

the gap between he evaporation and precipitation.

COMMISSIONER POLMANN: So in the absence of this pumping, you would expect, based on your expertise, that the salinity in the canal would go back up?

THE WITNESS: That's correct.

COMMISSIONER POLMANN: Thank you.

Just a moment, Madam Chairman.

You indicated a moment ago that the water level in the canal is transient boundary condition, and my next question is, does that water level change -- how much does that water level change in the -- as a boundary condition? What's the magnitude of the water level change, approximately? Is it inches? Feet?

THE WITNESS: It's probably feet -- a foot or so.

COMMISSIONER POLMANN: Okay. And is that water level -- would you consider that water level change in any way significant to the hydraulic behavior on the property, or in the vicinity of the property that change in canal water level? Is that important to direction of flow or --

THE WITNESS: It -- it can be. The cooling canal system is -- is -- sometimes provides water

to the -- to the aquifer, and sometimes if the water levels are very low, it serves as a sink.

COMMISSIONER POLMANN: Is it true that immediately at the canal, that the canal is sufficiently well connected to the groundwater that a -- the canal is, in effect, a surface expression of the groundwater level?

THE WITNESS: To a certain extent it is, especially as you get away from the circulation pumps that are near the plant --

COMMISSIONER POLMANN: Okay.

THE WITNESS: -- because near there, the -- the water level is raised as it enters the cooling canal system, and it's depressed actually to the lowest water level in the vicinity on the intakes to the plant.

COMMISSIONER POLMANN: Okay. Thank you.

So in terms of the interaction between the canal and the groundwater, how would you compare the -- the importance of the water quality in the canal relative to the water level fluctuation in the canal as it relates to permit compliance, and so forth? Is the water level change relatively more or less important than the water quality maintenance in the canal? Do you understand my

question?

THE WITNESS: I think I do. And I can't provide you a more important than another, because the water quality is obviously important as to what, you know, what happens as it goes into the aquifer. The water levels are important because of this desire to avoid westward flow of groundwater -- of cooling canal water.

COMMISSIONER POLMANN: Okay. Let me ask a related question.

Does the utility have a means to manage the water quality -- the salinity in the canal?

THE WITNESS: Through the freshening, yes.

COMMISSIONER POLMANN: Yes. And, in fact, they have an obligation to keep that below 34 at this point, is that correct?

THE WITNESS: Not at this --

COMMISSIONER POLMANN: At this time -- well, they will.

THE WITNESS: In four years they have to attain that.

COMMISSIONER POLMANN: Okay. So they have ability to -- to -- to manage that, and do they have an ability to manage the water level?

THE WITNESS: The water level is controlled by

a lot of outside factors, and also how they operate the recirculation pumps, but I don't think that operation of the recirculation pumps would guide any way of managing water levels in the cooling canal system.

COMMISSIONER POLMANN: Okay. Thank you.

With regard to the subsurface at the site and within the area that you modeled, would you regard the subsurface as homogeneous or heterogeneous?

THE WITNESS: Heterogeneous definitely.

COMMISSIONER POLMANN: And have you captured some degree of -- of this heterogeneity within your model?

THE WITNESS: Yes, and that's been one of the progressions. We've moved from homogeneous layers to very heterogeneous layers in the more advanced renditions of model.

COMMISSIONER POLMANN: And is the heterogeneity represented by layers in the sense that the layers are uniform across the model space, or is there heterogeneity in the layer as well, spatial differences across the layers?

THE WITNESS: It started out as homogeneous layers, the June model did, and then it's evolved to the heterogeneity within the layers in addition

to the vertical, which has always been a feature.

COMMISSIONER POLMANN: So in terms of the -- the water flow, is it -- in colloquial terms, is it reasonable to say that it's fairly random? It goes a whole variety of different directions, although it's essentially driven by pressure differences --

THE WITNESS: Right.

COMMISSIONER POLMANN: -- in terms of hydraulics, and then there is an influence on the salt concentration differences, but this heterogeneity has to do with the properties of the aquifer, and it gets very complex?

THE WITNESS: It does. And as you can imagine with the Biscayne Aquifer, there are some high flow zones within the -- within the system.

COMMISSIONER POLMANN: Now, if we look at the demonstrative exhibit there behind you, are you familiar with -- with that exhibit there?

THE WITNESS: And you are talking about the pink one?

COMMISSIONER POLMANN: Yes, the one with the many pink colors.

THE WITNESS: Yes.

COMMISSIONER POLMANN: That's based on a particular method of measuring something in the --

in the subsurface. It's not an actual water quality measurement, is that correct?

THE WITNESS: It's an electrical signal that's converted to the -- an equivalent of a concentration, yes.

COMMISSIONER POLMANN: Okay. Is that a depth averaged representation to your understanding?

THE WITNESS: No. There are discrete depths that are able to be modeled as this. And if you look very closely on, kind of on the edge, you can see that there is a -- there is a depth function to it.

CHAIRMAN BROWN: Commissioner Polmann --

COMMISSIONER POLMANN: Yes.

CHAIRMAN BROWN: -- if you could, it's about 12:10, and our court reporter has been going diligently for quite a while. How much more questions do you have for this witness on rebuttal?

COMMISSIONER POLMANN: Well, it would be less than 30 minutes, but it will be more than five.

CHAIRMAN BROWN: So why don't we take a brief break for our court reporter. Let's say five minutes, stretch your legs. Thanks.

(Brief recess.)

CHAIRMAN BROWN: Okay. We have Commissioner

Polmann back, so we will go back on the record.

Commissioner Polmann you have the floor still.

COMMISSIONER POLMANN: Thank you, Madam Chairman.

Thank you, Mr. Andersen. Actually, our discussion -- your -- your answers to my questions have been very helpful. I appreciate that.

THE WITNESS: Thank you.

COMMISSIONER POLMANN: I have a much better understanding of what you are doing here.

So I think we left off talking about the highly variable flow in the subsurface, and I would like to talk just for a moment about the resulting uncertainty in, let's call it forecasting, kind of looking into the future for a moment. And by way of example, I am going to refer to an exhibit that was -- that was put forth here, it's actually Exhibit 70. You have access to that. I believe it was put forth by FPL to Witness Sole.

THE WITNESS: I have it.

COMMISSIONER POLMANN: Okay. And I am going to try to do two things here, and I think that this -- this was -- this particular item was discussed by one of the parties, but let's look at page 69, I am going to make a different point, ask

you a different question.

Near -- near the bottom of that -- near the bottom of Section 6.2, this talks about a four-year period, there were data and some analysis in chloride concentrations of the cooling canal system ranged from 14 to 22.4 parts per thousand during the same period -- do you see where I am looking there, Mr. Andersen?

THE WITNESS: Yes.

COMMISSIONER POLMANN: Okay. And the maximum concentrated chlorides in Biscayne Aquifer at Turkey Point says can, therefore, be expected to be on order of 23. That's this particular consultant's conclusion. No other source of higher chloride values exist.

Now, their point -- their assertion is maximum concentration is essentially -- their interpretation is that it will be consistent with what has been observed to date?

THE WITNESS: To date, meaning 1976, yes.

COMMISSIONER POLMANN: Yes.

Now, if we turn to the next page, it's page 70, and down the third line, it says: A rate at which movement is occurring has been determined with caution through use of regression analysis of

chlorinity. And then they -- the -- they apparently infer from the rate -- from this rate, the maximum chloride concentration, the time of stabilization of the moment can be predicted. Do you see that?

THE WITNESS: I do.

COMMISSIONER POLMANN: Can you reads the remainder of that sentence, please, out loud -- or just read the whole sentence from this rate.

THE WITNESS: From this rate in the maximum chloride concentration, the time of stabilization of the movement of the saltwater wedge can be predicted provided as discussed in Section 4.3, the hydrologic conditions operating on chlorinity in the past four years have the same magnitude of influence in the future.

COMMISSIONER POLMANN: Given your expertise in subsurface hydrology and water quality, I am going to see, without trying to lead you, can you give us some interpretation of the meaning of that sentence, the first part before the comma and the second part and how one relates to the other?

THE WITNESS: I am not really familiar with the analysis that they did here, but the analysis --

COMMISSIONER POLMANN: Yeah, the analysis -- the analysis aside, just --

THE WITNESS: It looks to me like what they are doing is they are looking at the chloride concentrations in the cooling canal system, and then divining, or deriving a movement, a maximum amount of movement from that, and then the time that it would take to -- to reach that kind of maximum point.

That's my interpretation of it.

COMMISSIONER POLMANN: Okay. That was -- that was not where I was going, so let me see if I can get there.

I believe the -- let me focus on the second line in the sentence: The time of stabilization of the movement of the saltwater wedge can be predicted.

So the assertion here that I believe they are making is that the movement of saltwater wedge will stabilize.

THE WITNESS: Yes.

COMMISSIONER POLMANN: Is that something that you take from that sentence?

THE WITNESS: I do.

COMMISSIONER POLMANN: Okay. And they believe

the time of stabilization can be predicted. Is -- are you with me on that?

THE WITNESS: Yes.

COMMISSIONER POLMANN: And they believe they can predict that from a rate, from this rate, meaning a rate of movement, and the maximum chloride concentration. So time of stabilization, given certain data, can be predicted. What is the next word after predicted?

THE WITNESS: Provided.

COMMISSIONER POLMANN: Okay -- provided the hydrologic conditions operated on chlorinity in the past four years -- could you read the rest of it for me, please?

THE WITNESS: Have the same magnitude of influence in the future.

COMMISSIONER POLMANN: Now, could I please ask you to interpret the meaning of provided -- or the connection between the first part of the sentence and the second in the context of provided, see if we can get --

THE WITNESS: I think what they are saying is that provided means that as long as conditions are the same over the next foreseeable future, I guess in this case, four years, then this relationship

can be used.

COMMISSIONER POLMANN: Mr. Andersen, let me suggest to you that the four years refers to the past, and that the future is -- is not defined?

THE WITNESS: Is not the what? Excuse me.

COMMISSIONER POLMANN: The future timeframe is not defined. They have data for the past four years.

THE WITNESS: Right.

COMMISSIONER POLMANN: Okay. So my point here -- and I am sorry to belabor the point. I was trying to have you interpret it rather than me. What this basically says is we have some data, and we are looking back four years, and we do a regression analysis, and we are going to predict the future, assuming that nothing changes.

THE WITNESS: Yes.

COMMISSIONER POLMANN: What has been your experience with your data analysis over the period of time at the FPL site?

THE WITNESS: Well, in this case --

COMMISSIONER POLMANN: Has anything changed?

THE WITNESS: In this case, things changed. I mean, the assumptions that are for the cooling canal chlorinity have changed over time.

COMMISSIONER POLMANN: Do you expect conditions to continue to change with regard to the impact on flow and salt concentrations; or is everything going to be stable and the same?

THE WITNESS: Well, I think that the -- we are going to put some pretty large constraints on with the recovery well system and the freshening that will stabilize where the high concentrations are, they will be contained, and then the rest will be retracted.

COMMISSIONER POLMANN: But in the meantime, things will be fairly dynamic?

THE WITNESS: Yes.

COMMISSIONER POLMANN: Okay. There was discussion a number of points in testimony about an influence of rainfall in this same document. Let's just jump forward to Figure 2.1, which, just by sequence, appears to be page five.

CHAIRMAN BROWN: I do have a point of order, Commissioner Polmann. We have 30 minutes until this facility must be shut down, and we still have several post-hearing matters to address, so if you could just be cognizant of that, please.

COMMISSIONER POLMANN: Yep. I am sorry, yes, Madam Chairman.

This concerns average rainfall. Do you see what we are looking at?

THE WITNESS: Yes.

COMMISSIONER POLMANN: And across this graph, which is about 30 -- 36 years, there is a straight line there that points to average rainfall, and I will just make a statement here.

Is there any particular year in which you see the rainfall is average, or is it typically rainfall is not the average rainfall?

THE WITNESS: Well, it's generally --

COMMISSIONER POLMANN: And the short answer --

THE WITNESS: -- generally, 1963 looks like a pretty good estimate of average.

COMMISSIONER POLMANN: Okay. And all the other years, rainfall is something other than average?

THE WITNESS: Correct.

COMMISSIONER POLMANN: Okay. So the influence of rainfall on the site varies significantly from year to year?

THE WITNESS: It does.

COMMISSIONER POLMANN: Okay. I just have, I think, one -- one point, this may be the last question, I am sorry to say.

In Mr. Ferguson's testimony, and this would be his Exhibit KF-1, I don't understand how you -- do you have his exhibit? This is your work, Tetra Tech's work, at docket -- well, let's see --

THE WITNESS: I do have it.

COMMISSIONER POLMANN: All right. Thank you.

At the top of page two in that numbered page, at the top it says, Exhibit KF-1, page two of nine. The first full paragraph, in order to evaluate an allocation of costs Tetra Tech reconfigured the groundwater flow and salt transport model to delineate and track two different species, hypersaline water -- and then let's just jump to -- jump to somewhere.

You also have Exhibit 80, Mr. Andersen, which was also entered through Mr. Ferguson?

THE WITNESS: Stopping at 79 -- let me see here.

COMMISSIONER POLMANN: Thank you, Mr. Butler.

THE WITNESS: Thank you.

CHAIRMAN BROWN: Thank you, Mr. Butler.

THE WITNESS: I have it.

COMMISSIONER POLMANN: You go to page five in Exhibit 80.

THE WITNESS: I have it.

COMMISSIONER POLMANN: There is red, green and blue areas on that graphic.

THE WITNESS: Yes.

COMMISSIONER POLMANN: And it indicates in the -- in the title red is species A and green is species B?

THE WITNESS: Correct.

COMMISSIONER POLMANN: And if you look back at KF-1 in Mr. Ferguson's that we just pointed to on page 2-9, it indicates two different species. It's -- the graphic that I just identified for you in the reference to the two different species, are we talking about the same thing, those two different things?

THE WITNESS: I think we are talking about two different -- basically the same thing.

COMMISSIONER POLMANN: Okay.

THE WITNESS: Exhibit 80 was our recommended procedure done in November, and then this report was done in --

COMMISSIONER POLMANN: I understand they are two different documents, Mr. Andersen. Are they essentially the same notion that there is water in two different places, and you tried to split them, it's type A and type B water?

THE WITNESS: Same notion, yes.

COMMISSIONER POLMANN: Elsewhere -- and I am sorry I don't have the reference here, but I do recall you mentioning that there is some way within the model to separate and identify these waters distinctly one from the other --

THE WITNESS: Yes.

COMMISSIONER POLMANN: -- as species?

THE WITNESS: Yes.

COMMISSIONER POLMANN: Are they tagged somehow in the solute transport of the model, because I don't understand how that's done?

THE WITNESS: The way that seawater is configured, you can have different -- different species of water that can have different properties. In this case, we acted like they had different -- we just set the properties the same, but we have two species that are being solved for.

COMMISSIONER POLMANN: Okay. So you can attract different --

THE WITNESS: Yes.

COMMISSIONER POLMANN: -- different species based on some tag, or whatever?

THE WITNESS: Right.

COMMISSIONER POLMANN: That's helpful. Thank

you.

Give me one second, Madam Chairman.

Madam Chairman, that's all I have. Thank you.

CHAIRMAN BROWN: Thank you.

Redirect.

MR. BUTLER: I'm full of the hour, I have none.

CHAIRMAN BROWN: Thank you.

Let's go to the exhibits. Mr. Andersen has 48 through 53, would you like those moved into the record?

MR. BUTLER: I would, please.

CHAIRMAN BROWN: Seeing no objection, we will go ahead and move in 48 through 53 into the record.

(Whereupon, Exhibit Nos. 48 - 53 were received into evidence.)

CHAIRMAN BROWN: Office of Public Counsel, you have 86 through 89.

MS. MORSE: Yeah, we would like those moved.

CHAIRMAN BROWN: Any objection?

MR. BUTLER: No objection.

CHAIRMAN BROWN: We will go ahead and move in 86 through 89 into the record.

MS. MORSE: Thank you.

(Whereupon, Exhibit Nos. 86-89 were received

into evidence.)

CHAIRMAN BROWN: Mr. Andersen, you are excused for the night.

THE WITNESS: Thank you.

CHAIRMAN BROWN: Thank you. Thank you for coming down here.

(Witness excused.)

CHAIRMAN BROWN: Are there any other matters that need to be addressed?

MS. CUELLO: Yes. Staff will note that post-hearing briefs regarding issues 10A through E are due on November 8th, 2017, and should not exceed 40 pages. And it is also anticipated that this will be considered at the December 5th agenda conference.

MR. REHWINKEL: Madam Chairman --

CHAIRMAN BROWN: Yes.

MR. REHWINKEL: -- may be head?

CHAIRMAN BROWN: You are going to ask for an extension.

MR. REHWINKEL: Well, I heard earlier in this, it seems like this year long docket that we've had this week, that the fuel SoBRA issues brief was due on the 13th, and I was going to ask if there was any compelling reason why we could not have the

same since we are in the same timeframe, actually we are a little later.

CHAIRMAN BROWN: Staff.

MR. MURPHY: Yes, we are going to the December 5th agenda, that leaves us very little time to deal with your briefs, if you want us to JUST ignore your briefs, I think you could file as late as you like.

MR. REHWINKEL: Well, isn't -- aren't the SoBRA briefs also in that issue on December 5th?

CHAIRMAN BROWN: Mary Anne.

MS. HELTON: Madam Chairman, we sat through hours of testimony today, very complicated testimony. I appreciate Mr. Rehwinkel wanting more time, but if staff really -- seriously, if staff is going to be able to give you a recommendation that does fully look at and develop the briefs of the parties, I -- I think that we need to stick with the schedule that we have.

CHAIRMAN BROWN: It's hard to argue with Mary Anne.

MR. REHWINKEL: Well, and she kind of made my point, that there is hours of complicated scientific testimony, which I would ask that we at least get to -- to that Friday, the 10th.

CHAIRMAN BROWN: FPL, do you have anything to offer here?

MR. BUTLER: We will be able to meet the 8th, but would of course be happy to have until the 13th.

CHAIRMAN BROWN: All right. I -- we are going to go ahead and move it to November 13th, and we will work -- our staff will diligently work to accommodate that schedule.

Are there any --

MR. REHWINKEL: Thank you, Madam Chairman.

CHAIRMAN BROWN: You are welcome.

MR. MOYLE: So the 13th?

CHAIRMAN BROWN: Yes.

Are there any other additional matters that need to be addressed?

Seeing none, given the hour, we are adjourned. Thank you.

(Whereupon, the proceedings were concluded at 12:39 a.m.)

CERTIFICATE OF REPORTER

STATE OF FLORIDA)
COUNTY OF LEON)

I, DEBRA KRICK, Court Reporter, do hereby certify that the foregoing proceeding was heard at the time and place herein stated.

IT IS FURTHER CERTIFIED that I stenographically reported the said proceedings; that the same has been transcribed under my direct supervision; and that this transcript constitutes a true transcription of my notes of said proceedings.

I FURTHER CERTIFY that I am not a relative, employee, attorney or counsel of any of the parties, nor am I a relative or employee of any of the parties' attorney or counsel connected with the action, nor am I financially interested in the action.

DATED this 31st day of October, 2017.

DEBRA R. KRICK
NOTARY PUBLIC
COMMISSION #GG015952
EXPIRES JULY 27, 2020