

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Alex S. Karlin, Chairman
Dr. Anthony J. Baratta
Dr. Randall J. Charbeneau

In the Matter of

PROGRESS ENERGY FLORIDA, INC.

(Levy County Nuclear Power Plant, Units 1 and 2)

Docket Nos. 52-029-COL, 52-030-COL

ASLBP No. 09-879-04-COL-BD01

May 20, 2013

MEMORANDUM AND ORDER

(Providing Proposed Questions for Evidentiary Hearing on Contention 4A)

This Board conducted an evidentiary hearing on Contention 4A on October 31, and November 1, 2012 in Bronson, Florida. Pursuant to 10 C.F.R. § 2.1207(a)(3)(iii), this issuance and the accompanying attachments provide the proposed questions submitted to the Board in camera by the Intervenors,¹ the NRC Staff, and Progress Energy Florida, Inc. (PEF) prior to and during the hearing.

It is so ORDERED.

FOR THE ATOMIC SAFETY
AND LICENSING BOARD

/RA/

Alex S. Karlin, Chairman
ADMINISTRATIVE JUDGE

Rockville, Maryland
May 20, 2013

¹ The Intervenors are two public interest groups: Nuclear Information and Resource Service and the Ecology Party of Florida.

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ATTACHMENT 1

Intervenors' Pre-Filed Proposed Questions

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)	
Progress Energy Florida, Inc.)	Docket Nos. 52-029-COL
(Levy County Nuclear Power Plant,)	and 52-030-COL
Units 1 and 2))	August 30, 2012

**INTERVENORS' PROPOSED QUESTIONS FOR
NRC STAFF AND PEF REBUTTAL WITNESSES**

As provided by LBP-09-22, the Atomic Safety and Licensing Board's ("ASLB's") Initial Scheduling Order of August 27, 2009, Intervenors hereby propose questions for the ASLB to ask to the U.S. Nuclear Regulatory Commission ("NRC") and Progress Energy Florida ("PEF") witnesses. These questions are based on the rebuttal testimony submitted by the Staff and Progress Energy on July 31, 2012.

A. Questions to NRC Staff Regarding Rebuttal Testimony

1. Q/A 11, Q/A 12, Q/A 21

The Staff testifies that no "large-scale preferential flow features have been identified." NRC Rebuttal at A.11. Intervenors wish to clarify that the Staff has not established the absence of large-scale preferential flow features, but rather has not identified them. Therefore Intervenors request the ASLB to ask the following questions:

- (a) The Staff testifies in A.11 that no "large-scale preferential flow features have been identified." But isn't it true that there are a number of springs in the area? Does the Staff have an understanding of the preferential flow path network that feeds these springs? How can the Staff be certain these networks do not extend to below the LNP Site?

- (b) In A.12 of your rebuttal testimony, you state that "[o]bserved hydraulic test responses from hydraulic tests conducted at the LNP site did show spatial variability that would be indicative of formational heterogeneity but they were not consistent with a system dominated by fracture/dissolution channel flow." Doesn't your answer in NRC rebuttal A.12 mean that the hydraulic test responses indicate that there are preferential flow paths below the LNP Site?

(c) NRC Staff Rebuttal A.21 indicates that there are well-developed karst conditions approximately six miles south of the LNP site. Does that mean there could be large-scale preferential pathways in that area? If so, could smaller-scale preferential flow paths that connect to this area be present under the LNP site?

2. Q/A 24

Q/A 24 of the NRC Staff's rebuttal testimony read as follows:

Q24. In Mr. Still's testimony at A.25, he states that the FEIS determines current groundwater usage by "looking at the number of well permits (which are also known as Consumptive Use Permits- CUPs). There was no attempt to do a spatial analysis of where these uses occurred." Does Staff agree with this statement?

A24. (VRV, DOB, LWV, RP) No. As indicated in the FEIS, groundwater usage of all currently permitted users is included in the model, which takes into account the spatial location of these users. Id. at 2-33.

But it is not possible to find a statement in the FEIS that the model takes into account the spatial location of CUPs relative to LNP. The citation to page 2-33 appears to be a clerical error, because the FEIS discusses surface water quality at that page. On page 2-31 in Section 2.3.2.2, the FEIS discusses "Groundwater Use" -- but the language in Section 2.3.2.2 indicates that the Staff used a total figure for groundwater use and did not take the spatial location of CUPs into account. Intervenors therefore request the ASLB to ask the following clarifying questions to the NRC Staff witnesses:

(a) In A.25, you cite the FEIS at page 2-33 for the proposition that the model used to predict groundwater behavior for LNP takes the spatial locations of CUPs into account. But at page 2-33 the FEIS discusses surface water quality rather than groundwater use. Is your citation a clerical error?

(b) Please confirm that the discussion of groundwater use appears on page 2-31 of the FEIS in Section 2.3.2.2, entitled "Groundwater Use."

(c) Is it correct that the FEIS states that groundwater use by "all permitted users" was specified as 3.51 Mgd in 2001 in the model and that projected future usage (not including the proposed LNP) is expected to increase from 3.51 Mgd to 10.3 Mgd by 2078? Do these estimates and projections take into account the relative spatial locations of wells within the area of the data collected for the model? If so, how does the model provide a means of evaluating the impacts of LNP's water withdrawals on existing adjacent legal

users? How did you evaluate whether a resident groundwater user living within ten miles of the LNP site will be affected by LNP?

3. Q/A 28

In A.28, the Staff testifies that the transmissivity data for the LNP site are “less than expected for a well-developed karst system.” The Staff also asserts that “chemical evaluation of the Avon Park Formation onsite indicates a high degree of dolomitization, which decreases rate of dissolution and permeability.” *Id.* Intervenors believe that (a) the data on which the Staff relies are fraught with uncertainty because pump testing may not fully penetrate the formation and therefore may not reveal karstic features. In addition, the assumption that dolomitic (i.e. magnesium) limestone cannot be karstic is incorrect. Finally, in any event it is not clear whether the Staff has established the boundaries of the dolomitic karst. Therefore, Intervenors ask the ASLB to probe these issues by asking the following questions. Intervenors also request the Board to follow the same line of questioning with Mr. Davies and Dr. Hazlett.

(a) Do you agree that a significant uncertainty associated with pumping tests is whether the well fully penetrates the entire thickness of the formation that is being measured?

(b) How precisely do you know the boundaries of the magnesium karst? What is your knowledge base?

(c) You say that it is unlikely that there will be large-scale karstic formations in rocks other than calcium carbonate? Are there many proven examples of long flow paths in dolomite rocks?

3. Q/A 35

The Staff’s testimony contains a misleading question and answer regarding the FEIS’ water consumption estimates, on which the Intervenors request the Board to ask several clarifying questions. The exchange is as follows:

Q35. In Mr. Still’s testimony at A.16, he states that “[t]he bibliography on FEIS page 2-217 indicates that the SRWMD [Suwannee River Water Management District] Water Supply Assessment was accessed on June 23, 2011, and also on FEIS p. 2-148, it admits using “[e]stimates from the two water districts for 1985–1990.” In 2011, the current 2010 Water Supply Assessment was also available for use and that data should have been used because by the time the FEIS was issued, the 1990 data were obsolete.” Does Staff agree with this statement?

A35. (VRV, DOB, LWV, RP) No. As explained in FEIS Sections 2.3.2.2 (NRC001A at 2-21) and 2.5.2.6 (id. at 2-148) the data mentioned by Mr. Still was used along with more recent data to support the Staff’s hydrological assessments. A discussion of district-wide current and projected future groundwater usage is provided in Section 7.2.1.2 of the FEIS. Id. at 7-14. A related discussion of estimated baseline and projected groundwater usage within the footprint of the local-scale groundwater model is discussed in Section 2.3.2.2 of the FEIS. Id. at 2-31. Current groundwater use near the LNP site was identified in three ways: using the SWFWMD and SRWMD well permitting database, using the FDEP’s Source Water Assessment and Protection Program database, and performing a land-use survey. PEF used these data sources to define baseline (i.e., pre-construction) conditions and provide a basis for making predictions of future usage. Based on these data sources, groundwater use by all permitted users within the boundary of the local-scale groundwater flow model was specified as 3.51 Mgd in 2001. Id. The 2001 data were selected to represent baseline conditions so that PEF-collected monitoring data fell within the simulated period. Projected future groundwater use by all permitted users within the boundary of the local-scale groundwater flow model was also estimated by PEF based on population projections from the 2000 U.S. Census. This approach assumes that increases in permitted groundwater usage will be proportional to increases in population. Between 2001 and 2078, which is the anticipated LNP closure date (assuming startup in 2018, and 60 years of operation), the population increase was projected to be 293 percent. Given this population increase, projected future usage (not including the proposed LNP) would be expected to increase from 3.51 Mgd to 10.3 Mgd.” Id. The Staff did not base its assessment on the 2001 data alone, but on projected usage through 2078.

The Staff’s answer muddies the point made by Mr. Still in his testimony (A.21 at page 16) that the FEIS’ *baseline* estimate of water usage in 2001, which is based on 1985-1990 data, is outdated because more recent data (from 2010) was available. Intervenors seek to clarify that only the 1985-1990 water use data was used to establish baseline water use. The Staff’s testimony also incorrectly implies that it used the 2010 water use data to project future use. Intervenors seek to clarify that only the predicted population increase and not the 2010 water use data was used to predict future groundwater use.

(a) Please specify exactly what groundwater use data were used to establish the baseline water use in the FEIS.

(b) Is it correct that the Staff relied exclusively on population growth predictions to project groundwater use in 2078? If the Staff relied on groundwater use data, exactly what data did it rely on and how?

4. Q/A 33

As noted by the Staff in A.22, both Dr. Bacchus and Mr. Still expressed concern about a fifth permitted water supply well whose contribution to cumulative impacts was not addressed in the FEIS. The Staff states that the inclusion of this “temporary well” in the LNP permit “does not increase the total allowable groundwater usage over that accounted for in the FEIS.”

Intervenors seek to probe these late assertions with the following question:

Will the fifth well be abandoned after construction is completed or will it be held in reserve for possible use during operation? If it will be abandoned, will it properly abandoned according to the requirements of the Florida Administrative Code?

B. Questions to PEF Rebuttal Witness Dr. Mitchell L. Griffin

1. Par. 5

Dr. Griffin testifies that very dry periods occur every 20 years, and that there are longer rainfall cycles; yet, the groundwater model relied on for the FEIS used only 8 years of data.

Intervenors seek to establish the inadequacy of the data to bound predictable conditions with the following questions:

(a) You state that very dry periods occur every 20 years or so. Griffin Rebuttal at para. 5. In addition there are longer rainfall cycles. Griffin Rebuttal at A.6. Why then was the groundwater model run using only 8 years of data (PEF218 at 9)?

(b) Was this modeling bounding for wetlands impact if it failed to include a drought period?

(c) You state the annual average lake evapotranspiration is 48 to 53 inches per year, while the annual average precipitation is 53 inches per year. Griffin Rebuttal at para. 9.

Doesn't this mean that in average years the loss from the recharge ponds will be approximately equivalent to the rainfall that falls upon them, while in dry years they will cause a loss?

2. Par. 17

Intervenors believe that PEF has understated the potential for sinkholes and karst geology at the LNP site and that there is disagreement between PEF and the Staff on this issue. They seek to probe some of Dr. Griffin's statements about this issue:

(a) You state that "there are no known sinkholes on the LNP site." But doesn't the classification of Type 1 terrain for the LNP Site mean that there is a potential for sinkhole development?

(b) Do you agree with NRC Staff Rebuttal Testimony (A.26) that some of the wetlands at the LNP site location "are associated with minor surficial dissolution?"

(c) Do you agree with the NRC Staff Rebuttal Testimony (A.27) that "shallow dissolution features" occur at the LNP Site?

(d) What is the water source for the large spring into the Withlacoochee River discussed in Griffin Rebuttal par. 26? Doesn't the source of water to a large spring have to be a conduit?

2. Par. 18

Dr. Griffin disputes Dr. Bacchus' assertion that stormwater ponds cause sinkhole collapses resulting from increased weight and recharge. Intervenors wish to clarify that although the precise cause of sinkhole collapse beneath stormwater ponds may be disputed, the fact that stormwater ponds cause sinkhole to collapse is not in dispute. Therefore Intervenors ask the ASLB to pose the following questions:

Isn't it true that the construction of stormwater ponds in karst terrains has led to the formation of sinkholes? Can you explain why?

C. Questions to PEF Rebuttal Witness James O. Rumbaugh

1. Q/A. 6

While Intervenor's witnesses Davies and Hazlett asserted in their direct testimony that a "reasonable degree of certainty" is the appropriate standard for groundwater monitoring for the LNP site (INT001R at 16-17 and INT101R at 3), Mr. Rumbaugh suggests that what they mean by "a reasonable degree" of certainty is "absolute" certainty. Rumbaugh Rebuttal Testimony, A.6. The questions below are designed to show that in fact the uncertainty in the predictions from the model is too large to meet the standard of "reasonable scientific certainty."

a) Intervenor's are not suggesting that the groundwater model should provide absolute certainty, are they?

b) Isn't it true that the difference in on-site draw down predictions between the initial calibration and the recalibrated model is four times? (INT601 at A.4)

c) You state that the two models make "similar predictions." If a difference of four times is similar, how big would the difference in prediction have to be for you to view it as significantly different?

2. Q/A 7

Mr. Rumbaugh states that integrated models have been used where water supply comes from surface water. Intervenor's wish to show that he failed to consider that local wetlands derive their water supply from surface water, which is precisely why an integrated model is needed by asking the following question:

You state that integrated models have been used where water supply comes from surface water. Don't the wetlands in the area of the LNP derive their water supply from surface water?

3. Q/A 10

With the following questions, Intervenors wish to clarify that when both models were run in transient predictive mode, they used average rainfall conditions that did not take drought periods into consideration:

- a) When you ran the groundwater models in transient predictive mode, did you use averaged meteorological data?
- b) The model doesn't predict drawdowns during drought conditions, does it?

4. Q/A 17

In A.17, Mr. Rumbaugh disagrees with the assertion in Dr. Hazlett's direct testimony (INT101R, page 7) that wetlands impacts are "poorly constrained" by PEF's model. As Dr. Hazlett explained in his direct testimony:

Although expecting the upper FAS [Floridan Aquifer System] and SAS [Surface Aquifer System] to be well connected and mirror drawdown impacts, there are few SAS wells in the model and therefore poor constrain on SAS impacts from upper FAS drawdowns. The wetlands sit on the surface of the SAS, so by implication, impacts there are also poorly constrained.

Hazlett Direct Pre-filed Testimony, A.8.

Mr. Rumbaugh asserts that "[f]rom a modeling perspective, the surficial aquifer is virtually irrelevant to the predictions of these models." According to him:

LNP active groundwater withdrawals occur in the Upper Floridan Aquifer. Drawdown is not affected very much by the hydraulic conductivity within the surficial aquifer because the surficial aquifer is relatively thin and generally has a lower hydraulic conductivity than the Upper Floridan Aquifer. The DWRM2 assumes that the surficial aquifer and Upper Floridan Aquifer are hydrologically connected at the LNP site so that the drawdown computed for the Upper Floridan Aquifer and the overlying surficial aquifer will be of equal magnitude. When pumping from the Upper Floridan Aquifer in these circumstances, it is impossible for the surficial aquifer to have more drawdown than the Upper Floridan Aquifer.

Rumbaugh Rebuttal Testimony, A.17. For these reasons, Mr. Rumbaugh concludes that both the ER Model and the Recalibrated Model “use more conservative assumptions than those recommended by Dr. Hazlett.” *Id.* Intervenor seeks to clarify that Mr. Rumbaugh’s claim that the assumptions used in the models are relatively conservative is only valid from one standpoint: the perspective of assessing impacts on groundwater. But the model is not conservative from the standpoint of evaluating impacts to wetlands, because it does not include data from the SAS which directly underlies the wetlands. Instead, it merely assumes characteristics about the SAS, as Mr. Rumbaugh admits. Therefore Intervenor requests the Board to pose the following questions:

(a) In A.17 of your rebuttal testimony, you assert that both the ER Model and the Recalibrated Model “use more conservative assumptions than those recommended by Dr. Hazlett.” Are you referring to the assumption that the surficial aquifer and Upper Floridan Aquifer are hydrologically connected at the LNP site so that the drawdown computed for the Upper Floridan Aquifer and the overlying surficial aquifer will be of equal magnitude? (Other assumptions? He doesn’t mention any in his testimony.)

(b) Do you think that this assumption is conservative from the perspective of evaluating groundwater impacts caused by consumptive use permits? Isn’t that the purpose of the model used by PEF? But is the assumption also conservative if what you are trying to understand is impacts to wetlands? Would it not be more conservative to explicitly model wetlands water being pumped through the SAS if that is your purpose?

(c) If you were to make a water budget for one of the wells that is pumping, can you tell us how much, respectively, comes from the UFA, the SAS, and surface water, including wetlands and lakes?

D. Questions to PEF Rebuttal Witness Jeffrey D. Lehen

1. Q/A 7, 9, 10

As discussed above, Intervenor believes that PEF has understated the potential for sinkholes and karst geology at the LNP site and that there is disagreement between PEF and the

Staff on this issue. There may even be disagreement among PEF's own witnesses. They seek to probe some of Mr. Lenhen's statements about this issue:

- (a) You state that preferential flow paths are not present under the LNP site. Do you disagree with the NRC Staff who state the existence of such flow paths under the LNP site "is plausible" NRC Rebuttal Testimony at A.11?
- (b) You testify in A.7 that the Avon Park Formation that underlies the LNP site is a "highly dolomitized carbonate rock formation that is resistant to the dissolution activity that creates new karst phenomena such as preferential conduits." You also say that the dolomitic rock in the Avon Park Formation is "relatively permeable compared to other carbonate rocks such as that within the Ocala Formation present in other parts of Florida, or carbonate rock in other parts of the country." Please explain the reasons for this anomalous situation and describe the data that you rely on.
- (c) Where are Big Spring and Little King Springs relative to the LNP site? Is it possible that they are fed by a conduit that passes under the site? Is it likely?
- (d) In the pumping test did you attempt to distinguish between permeability caused by flow through the rock matrix and permeability caused by flow through preferential pathways? If so, how much was from one and how much from the other? How did you make the distinction?
- (e) In your well, would you have been able to discern whether there was one opening that was ten inches wide or ten openings that were one inch wide?
- (f) In A.10, you state that "sink-hole activity" is "non-existent at the LNP Site." Do you agree with NRC Staff Rebuttal A.26 stating that some of the wetlands at the LNP site location "are associated with minor surficial dissolution" and NRC Staff Rebuttal A.27 documenting shallow dissolution features at the LNP Site?
- (g) Do you agree with Mr. Rizzo that there are fractures and flow along bedding planes in the Avon Park formation (Rizzo Rebuttal at A.10)?

2. Q/A 8

In A.8, Mr. Griffin disputes Mr. Davies' claim that the American Society for Testing and Materials ("ASTM") standard referenced in Mr. Davies' direct testimony at page 9 demonstrates a "consensus" among hydrogeologists. In support of his position, Mr. Griffin states that the ASTM standard "was *withdrawn* in 2005 – over seven years ago." *Id.* In fact, the ASTM

withdraws its standards every eight years if they are not re-approved or updated. The standard has not been discredited or replaced and is still the only relevant standard that exists. Intervenors seek to clarify this through the following questions:

- (a) Is it not the case that the American Society for Testing and Materials withdraws its standards every eight years if they are not re-approved or updated?
- (b) In this case, is it also true that the ASTM standard has not been re-approved or updated?
- (c) And is it also true that the ASTM standard has not been discredited?
- (d) And is this ASTM standard still the only relevant standard that been established by the ASTM?

2. Q/A 15, 16

As discuss in their testimony, Intervenors are concerned that the groundwater model relied on in the FEIS is inappropriate for local conditions. Intervenors request the ASLB to ask questions that would further develop the inadequacies of the model.

- (a) When the inconsistency between the model and slug tests emerged (Lehnen Rebuttal at A.15), what did PEF do to check if the testing method or the model was at fault?
- (b) If this slug test is wrong, could the other slug tests have similar flaws?
- (c) With regard to building an integrated model, what data were you lacking? (Lehnen Rebuttal at A.16). Would it have been possible to acquire this data?
- (d) What kind of computing power is required to run an integrated model? How much would this computer power cost?

E. Questions to PEF Rebuttal Witness Dr. William J. Dunn

1. Q/A 5, 11

As discussed in their testimony, Intervenors are concerned that the groundwater model relied on in the FEIS is inappropriate for local conditions and that PEF has understated the potential for karst geology and sinkholes at the LNP site. Intervenors request the ASLB to ask questions of Dr. Dunn that would further develop these issues:

(a) In A. 5 of your rebuttal testimony you discuss the highly dynamic nature of the wetland system. How is this dynamism captured in the modeling predictions produced to date?

(b) You state that preferential flow paths are not present under the LNP site. Dunn Rebuttal at A.8. Do you disagree with the NRC Staff who state the existence of such flow paths under the LNP site “is plausible.” (NRC Rebuttal at A.11)?

F. Questions to PEF Rebuttal Witness Dr. Paul C. Rizzo

1. Q/A 9

As discussed above, Intervenors are concerned that the groundwater model relied on in the FEIS is inappropriate for local conditions and that PEF has understated the potential for karst geology and sinkholes at the LNP site. Intervenors request the ASLB to ask questions of Dr. Rizzo that would further develop these issues:

(a) You state in A.9 that there is “evidence of limited minor karst activity” at the LNP Site. Please describe the evidence of karst activity you are referring to here.

(b) Do you agree with the NRC Staff that the existence of preferential flow paths under the LNP site “is plausible” (NRC Rebuttal at A.11)?

2. Q/A 14, 15, 18

The environmental impacts of the nuclear islands to be built under Units 1 and 2 were not addressed in the FEIS. Therefore Intervenors seek to probe the basis for testimony by PEF that the islands will not have a significant adverse effect. In addition, Intervenors seek to clarify apparent disagreements between PEF and the Staff regarding wetlands impacts and geology.

(a) You state in A.14 that inhibiting flow through the nuclear islands will reduce the potential for dissolution activity. Will the nuclear islands increase groundwater flow velocity around the outside of it, as you imply in your answer to question 16, where you discuss “the increase in groundwater flow”? If so, doesn’t this mean that the potential for dissolution activity will increase?

(b) In A.15, you state that nearby wetlands will not be impacted. Do you disagree with NRC Rebuttal A.55 that the project has the potential to affect 2093 acres of wetlands, which could be “regionally destabilizing” and could be labeled as LARGE?

(c) In A.18, you state that “no evidence of past or present sinkholes has been found” at the LNP Site. Do you disagree with NRC Staff Rebuttal A.26 stating that some of the wetlands at the LNP site location “are associated with minor surficial dissolution” and NRC Staff Rebuttal A.27 documenting shallow dissolution features at the LNP Site?

G. Questions to PEF Rebuttal Witness Peter Hubbell

1. Q/A 6

Mr. Hubbell claims to be “intimately knowledgeable of the matters addressed in Mr. Still’s testimony,” in part based on his “previous experience as an employee of the SRWMD.” Intervenors request the ASLB to clarify that Mr. Hubbell has not been an employee of the SWFWMD for the past 15 years. Intervenors also wish to establish that Mr. Hubbell had a previous professional relationship with Mr. Still when Mr. Still was Executive Director of the SRWMD and that Mr. Still terminated a large contract that Mr. Hubbell’s company had with the SRWMD. (A copy of the contract is attached.) Therefore Mr. Hubbell may not be completely objective about Mr. Still’s testimony.

(a) What was your last year of employment with the SWFWMD?

(b) Is it correct that your company had a large contract with the SRWMD while Mr. Still was Executive Director? Did the SRWMD cancel the contract while Mr. Still was Executive Director? Are you aware that the contract was cancelled on Mr. Still’s recommendation?

2. Q/A 8

In Q/A 8, Mr. Hubbell disputes Mr. Still’s assertion that the FEIS should have considered alternative water supplies before licensing of Levy LNP, rather than postponing consideration of alternative water supplies until some future time when mitigation becomes necessary. He reviews three different alternative water supply strategies – use of reclaimed wastewater,

withdrawals from the Withlatchoochee River, and desalinization – and concludes that these alternatives *have* been considered and found to be “neither feasible nor economical.” If that is the case, it raises the question of whether these alternative water sources will *ever* be viable as mitigation measures – regardless of whether they are studied now or in the future when they become necessary. Intervenors believe it is important to clarify that if, in fact, alternative water supplies are too infeasible or expensive now, the situation is not likely to improve in the future. Therefore, the mitigation requirement that PEF must “investigate possible development of alternative water sources to use in case monitoring reveals possible adverse groundwater impacts from operation of the proposed production wells” (NRC Staff Direct Testimony, A.105) is unlikely to actually result in any effective means of mitigation. Intervenors request the ASLB to question Mr. Hubbell about this issue as follows:

- (a) Your rebuttal testimony identifies three alternative water supply sources that you consider to be infeasible or too expensive to have warranted consideration in the FEIS: use of reclaimed wastewater, withdrawals from the Withlatchoochee River, and desalinization. If those alternatives are not feasible or too expensive now, do you have any reason to think they will be feasible or affordable in the future if and when groundwater monitoring at LNP may show that an alternative water supply is needed to mitigate LNP’s impacts?
- (b) Are there any alternative water supply sources that are currently feasible and affordable and that you believe will remain so into the future?
- (c) In the Tampa Bay model, isn’t correct that Tampa Bay is using an alternative water supply for public water supply? Does the alternative water supply include desalinization and treated surface water? If the cost of these alternatives is affordable to Tampa Bay, why is it not affordable to PEF ratepayers?

3. Q/A14

In A.14, Mr. Hubbell disputes the relevance to LNP of a report of deteriorated water quality at Cedar Key, published in the *Gainesville Sun*. His assertion implicitly denies the

regional nature of groundwater flow in Florida. Intervenors seek to highlight the unreasonableness of Mr. Hubbell's statement by asking the following question:

Do you agree that the wells being monitored at Cedar Key are connected with the regional groundwater supply that serves the LNP? If your answer is yes, aren't these regions larger in size than 20 miles? If your answer is no, then are saying that Florida groundwater regions have a radius of twenty square miles or smaller?

4. Q/A 15

In A.15, Mr. Hubbel discusses integrated surface-groundwater computer models but asserts that such modeling "is not considered practical or needed by the SWFWMD." But his own testimony appears to show the feasibility of such modeling. Therefore Intervenors request the Board to ask the following question:

If an integrated surface-water model was built for the Tampa Bay region, Hubbell Rebuttal at A.15, doesn't that mean such a model could be built for the LNP Site?

Respectfully submitted,

(Electronically signed by)

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August 30, 2012

Certificate of Service

I hereby certify that on August 30, 2012, I posted a notice on the NRC’s Electronic Information Exchange that I served Intervenors’ Proposed Questions for NRC Staff and PEF Rebuttal Witnesses on the members of the Atomic Safety and Licensing Board and law clerks Matthew Flyntz and Josh Kirstein. It is my understanding that the following individuals were notified:

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Signed [Electronically] by
Diane Curran

ATTACHMENT 2

NRC Staff's Pre-Filed Proposed Questions

August 30, 2012

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)
)
)
PROGRESS ENERGY FLORIDA, INC.) Docket Nos. 52-029 and 52-030
)
)
(Combined License Application for Levy)
County Nuclear Power Plant, Units 1 and 2))

NRC STAFF PROPOSED QUESTIONS

INTRODUCTION

Pursuant to 10 C.F.R. § 2.1207(a) and the Atomic Safety and Licensing Board's (Board) Initial Scheduling Order,¹ the NRC Staff (Staff) hereby presents its proposed questions for the Board to ask the Intervenors' witnesses during the contested hearing on Contention 4A. As directed in the Board's Initial Scheduling Order and Section 2.1207(a)(3)(i) and (ii), the Staff is filing these questions *in camera*.

¹ Progress Energy Florida, Inc. (Levy County Nuclear Power Plant, Units 1 and 2), LBP-09-22, 70 NRC 640, 651 (2009).

I. QUESTIONS REGARDING DEWATERING IMPACTS

A. Hydrology and Geology Questions

1) The Intervenors claimed many groundwater model implementation deficiencies throughout their testimony. The following questions challenge some of the Intervenors' claims regarding groundwater modeling.

a. Mr. Davies, in your direct testimony at A.10, you state that a porous medium model would not be appropriate for simulating groundwater flow in the vicinity of the proposed Levy Nuclear Plant (LNP). Isn't it true that equivalent porous medium models can be used to simulate dual porosity systems, including the relatively extreme case represented by a well-developed karst system?

i. Isn't this indeed a standard industry practice that is well documented in the peer-reviewed literature as cited by the Staff in its rebuttal testimony (NRC071 at 137-140, 155-156; NRC072 at 897, 902-903)?

ii. Isn't this the approach adopted by the Southwest Florida Water Management District (SWFWMD) in its district wide regulation model, which includes regions of well-developed karst?

2) Throughout the Intervenors' testimony they claim that measures should have been taken to reduce model uncertainties so that the resulting groundwater model could be used as the sole basis for providing a definitive assessment of wetlands impacts. They claim that this would eliminate the need for reliance on the State water use permitting process and the associated environmental monitoring program. The following questions are meant to test this assertion.

- a. Intervenors, are you aware of any water use permits for groundwater usage comparable to LNP's issued within the SWFWMD where a numerical model was used to provide a definitive assessment of wetlands impacts?
 - b. Aren't environmental monitoring programs consistently relied upon by SWFWMD to ensure that no adverse impacts to wetlands occur?
 - c. Even if the Staff requested that the applicant develop additional groundwater models incorporating alternative conceptual models that included large-scale preferential flowpaths and temporally variable surface recharge, isn't it true that these models would not be the sole basis of a wetlands impact assessment?
 - d. In such a situation, isn't it true that it would be reasonable for the Staff to also rely on an environmental monitoring program as it did in this case?
 - e. Isn't it true that an environmental monitoring plan is a reasonable approach to ensure protection of wetlands?
- 3) In Mr. Davies' rebuttal testimony at A.4, he states that he agrees with the Staff that "the existing model is not sufficiently realistic to provide reliable predictions about the effects of the proposed groundwater withdrawal upon wetlands." In Dr. Hazlett's rebuttal testimony at A.4, he states that "there is agreement between the NRC Staff and me that the model relied on by PEF and the NRC Staff is not sufficiently realistic to provide reliable predictions about the effects of the proposed groundwater withdrawal upon wetlands." Where the Staff and Intervenors disagree is whether collection of additional characterization data would result in a model that could be used as the sole basis of a wetlands impact assessment. In Dr. Hazlett's rebuttal testimony at A.4, he also states that "significantly more site characterization would be needed to enable the creation of a

more realistic and reliable model.” One of the primary model deficiencies alleged by the Intervenors throughout their testimony is that preferential flowpaths were not considered. The Staff proposes the following questions regarding these statements.

- a. Mr. Davies and Dr. Hazlett, isn't it true that there is no direct field evidence, either in the literature or from LNP site characterization data, for large, interconnected, laterally (along bedding planes) or vertically (along fractures) extensive dissolution voids, infilled dissolution cavities, or related karst features at the LNP site?
- b. Mr. Davies and Dr. Hazlett, even if large-scale preferential flowpaths of the kind you allude to were present beneath the LNP site, and even if one or more of these features were characterized with additional hydraulic and tracer testing, isn't it true that other potential preferential flowpaths or other model uncertainties that were not fully characterized would still represent significant sources of uncertainty in the model?
 - i. Because there is no guarantee that additional characterization would resolve most of the uncertainty, isn't it true that the resulting model still would be insufficient for making a definitive estimate of wetlands impacts and thus should not be used as the sole basis of the Staff's assessment?
 - ii. Isn't it true, that given the complex site hydrologic conditions, that the approach for protecting wetlands adopted by SWFWMD the Florida Department of Environmental Protection, and the Staff, which relies in part on environmental monitoring and an adaptive management strategy, is reasonable?

- 4) Throughout Mr. Davies', Dr. Bacchus', and Dr. Hazlett's direct and rebuttal testimony, they made claims regarding the existence of karst features underneath the LNP site and the connection of wetlands to these features. The following questions challenge several of these specific statements in the Intervenors' testimony.
- a. Mr. Davies, in your direct testimony at A.11, you state that publications prepared by scientists at the Florida Geological Survey (FGS) indicate the "whole area, including the LNP site, is a karst terrain." Isn't it true that, while there are karst-related features in the vicinity of the site, FGS scientists show the LNP site to be located in a region where carbonate rocks are bare or thinly covered and karst dissolution features are few and generally shallow, broad, surficial features as shown in Staff exhibit NRC076 at Figure 2.5.1-237?
 - b. Mr. Davies, isn't it also true that well-recognized karst experts, as shown in A25 of the Staff's rebuttal testimony, classify the types of karst features described by FGS scientists in the vicinity of the LNP site as being indicative of surficial solution sinkholes, rather than characteristic of deep collapse sinkholes or extensive subsurface voids or caverns?
 - c. Mr. Davies, isn't it likewise true that residual silts and clays are commonly known to floor the surficial solution sinkholes in the LNP site area, and that this creates shallow depressional wetlands due to sealing that prevents or limits connectivity of the shallow sinkholes with the underlying aquifer, as explained in FSAR Section 2.5.1.2.1.3.2.1, which is referenced in Answer 25 of the Staff rebuttal testimony?

- d. Dr. Bacchus, in your direct testimony at A.12 you presented a conceptual model of pond-cypress wetlands (INT 359 at 509) and raised concerns about potential impacts to wetlands due to preferential flow between the Upper Floridan Aquifer and depressional wetlands. Isn't it true that this conceptual model, which included connectivity between wetlands and groundwater, was developed for the Tampa Limestone in Pasco County, Florida?
- i. Isn't it true that the hydrologic communication between the Tampa Limestone aquifer and its overlying wetlands could be higher than the interaction between the dolomitized Avon Park Formation and its overlying wetlands at the LNP site?
 - ii. Is it possible that sand, clays and silts that were found to floor the depressional wetlands onsite, could act as a seal to prevent or limit connectivity between the wetland and the underlying aquifer, as described in A25 of the Staff's rebuttal testimony?
- e. Mr. Davies, in your direct testimony at A.3 and A.4, you assert that readily soluble carbonate rocks underlie the LNP site and most groundwater flow moves through preferential flow pathways related to dissolution of the carbonate rocks. Isn't it true that the Avon Park Formation is dolomitized, which decreases dissolution rates?
- i. Mr. Davies, isn't it also true that FGS scientists indicate that the LNP site does not lie in an area of well-developed and extensive subsurface dissolution features?

- ii. Mr. Davies, isn't it likewise true that site characterization data do not reveal the existence of well-developed, interconnected dissolution voids, infilled dissolution cavities, or extensive related karst features in the subsurface at the LNP site?
- f. Mr. Davies, in your direct testimony at A.11, you state that "there is no clear distinction between a well-developed karst setting and any other." Isn't it true that the dolomitized Avon Park Formation is different in regard to resistance to dissolution than areas of pure limestone?
 - i. Mr. Davies, isn't it likewise true that karst terrains can be differentiated by consideration of the type of sinkholes that have developed (i.e., by assessment of whether solution, cover-subsidence, or cover-collapse sinkholes have developed)?
- g. Dr. Bacchus, in your direct testimony at A.20, you state that karst conduits that could serve as preferential flow pathways connecting wetlands in the vicinity of the LNP have not been accurately identified or considered. Isn't it true that the Avon Park Formation is dolomitized, which decreases dissolution rates?
 - i. Dr. Bacchus, isn't it also true that FGS scientists indicate the LNP site does not lie in an area of well-developed and extensive subsurface dissolution features?
 - ii. And further, Dr. Bacchus, isn't it true that site characterization data do not reveal the existence of well-developed, interconnected dissolution voids, infilled dissolution cavities, or related karst features at the LNP site?

- iii. Dr. Bacchus, isn't it also true that field data reveal the surficial, broad, shallow dissolution features (i.e., solution sinkholes), which occur near the site and contain wetlands, are floored by residual silts and clays?
 - iv. Dr. Bacchus, isn't it likewise true that these sediments could seal the feature from further infiltration of surface waters and inhibit subsurface connectivity with groundwater?
- h. Mr. Davies, in your direct testimony at A.11, you state that the LNP site lies in an area described as karst (the Ocala Karst Plain). Isn't it true that the LNP site is not underlain by the Ocala Limestone, but by the dolomitized Avon Park Formation, which is less susceptible to dissolution than the Ocala?
- i. Mr. Davies, isn't it also true that that there is a distinction in the type of dissolution features developed in the site area (i.e., shallow and broad, surficial "solution sinkholes" that are sealed from the subsurface by residual sands and clays) as compared to other areas in Florida where cover-subsidence or cover-collapse sinkholes have developed?
- i. Dr. Bacchus, in your direct testimony at A.21, you discuss linear features defined by Vernon (1951, exhibit INT369) and Faulkner (1973, exhibit INT370) that may represent fractures and faults that coincide with the proposed LNP site. Isn't it true that more current studies by FGS scientists do not show any surface or subsurface faults in the site vicinity as shown by the Staff in exhibit NRC078 at 2-97?
- j. Dr. Bacchus, isn't it also true that none of the site characterization data, which are also shown in Staff exhibit NRC078 (Id. at 2-98), indicate that extensive karst

features, including dissolution-enlarged fractures capable of enhancing groundwater flow, occur in the subsurface at the site location?

- 5) The following questions challenge specific statements made by the Intervenors regarding surface water impacts. These questions focus on the Staff's analysis of salinity and whether the Staff considered seasonality in its assessment of runoff salinity.
- a. Dr. Bacchus, in your direct testimony at A.17, you stated that the FEIS appeared to have addressed increased salinity only within the Withlacoochee Canal. As shown in the Staff's rebuttal testimony at A43 and pages 5-10 to 5-14 of the FEIS, isn't it true that the FEIS evaluated and described changes in salinity in the entire Cross Florida Barge Canal-Old Withlacoochee River (CFBC-OWR) system?
 - b. Dr. Bacchus, in your direct testimony at A.17, you stated that the FEIS did not consider seasonality in its assessment of salinity of runoff. Isn't it true that the Staff's use of the lowest mean monthly precipitation described in the FEIS at 5-24 does indeed account for seasonality?
 - i. Dr. Bacchus, as explained in the Staff's direct testimony at A198-A200, doesn't the Staff's use of historical dry periods also account for seasonality?

- 6) The following questions address Dr. Bacchus' criticism that the proposed LNP stormwater ponds would result in a large amount of passive dewatering of the aquifer.
- a. Dr. Bacchus, in your direct testimony at A.12, A.28, A.29, and other places, you state that the wet LNP stormwater ponds would passively dewater the aquifer and you cite your paper from 2006, exhibit INT363, as support. Is that correct?

- b. Dr. Bacchus, in Table 2 of your 2006 paper, you presented estimated passive dewatering losses of 29.7 million gallons per day (Mgd) for a 21,000 acre (ac) area in southeast Florida, 32.3 Mgd for a 22,800 ac area in northwest Florida, 0.5 Mgd from a 308 ac area in southwest Florida, and 0.2 Mgd from a 175 ac area in east-central Florida, which gives a maximum of about 1623 gallons per day per acre (gpd/ac) of passive dewatering. Do you agree?
- c. Dr. Bacchus, using your data in Table 2 of your 2006 paper, it would seem that a passive dewatering of 1650 gpd/ac is a conservative estimate. Do you agree?
- d. Dr. Bacchus, using the passive dewatering estimate of 1650 gpd/ac based on your 2006 paper, isn't it true that the wet LNP stormwater ponds that are 105 ac in size would result in a maximum passive dewatering of about 173,250 gpd?
- e. Dr. Bacchus, isn't it true that the conservatively estimated passive dewatering of 173,250 gpd is less than 11 percent of the proposed LNP groundwater pumping rate of 1.58 Mgd and about 0.08 percent of the regional groundwater flux of 208 Mgd?
- f. Dr. Bacchus, based on the above estimates, isn't it true that the combined groundwater extraction from the proposed LNP withdrawal and the conservatively estimated potential passive dewatering from wet stormwater ponds would be about 1.75 Mgd, 1.58 Mgd plus 173,250 gpd, or about 0.84 percent of the regional groundwater flux of 208 Mgd?
- g. Dr. Bacchus, isn't it true that the combined groundwater extraction of 0.84 percent of the regional groundwater flux would be unnoticeable?

- h. Dr. Bacchus, in Figure 2 of your 2006 paper (INT363), it seems that your estimate of passive dewatering from an open, excavated pit is 12 in./yr. Is that correct?
- i. Dr. Bacchus, using your estimate of passive dewatering from open pits of 12 in./yr, the wet LNP stormwater ponds that are 105 ac in size would potentially lose about 105 ac-ft/yr, the equivalent of about 93,740 gpd via passive dewatering. Do you agree?
- j. Dr. Bacchus, isn't it true that the passive dewatering of 93,740 gpd is less than 6 percent of the proposed LNP groundwater withdrawal of 1.58 Mgd and less than 0.05 percent of the regional groundwater flux of 208 Mgd?
- k. Dr. Bacchus, isn't it true that using data you presented in Figure 2 of your 2006 paper, the combined groundwater extraction from the proposed LNP withdrawal and the potential passive dewatering from wet stormwater ponds would be 1.67 Mgd, 1.58 Mgd plus 93,740 gpd, or about 0.8 percent of the regional groundwater flux of 208 Mgd?
- l. Dr. Bacchus, isn't it true that the combined groundwater extraction of 0.8 percent of the regional groundwater flux would be unnoticeable?

B. Terrestrial Ecology Questions

- a. The following questions relate to Dr. Bacchus' criticism that the FEIS erred in concluding that impacts to terrestrial ecology from dewatering would not be LARGE.

- b. Dr. Bacchus, isn't it true that a comprehensive literature review performed in 1995 by the South Florida Water Management District (NRC041) demonstrated that an extended water table drawdown of 0.6 ft to 1.0 ft corresponded to a minimum threshold for significant changes to the composition and structure of plant communities in overlying wetlands?
- c. Dr. Bacchus, isn't it true that the Conditions of Certification require that the applicant change to an alternative water source or implement approved mitigation if environmental monitoring detects or predicts adverse impacts to wetlands due to groundwater pumping from the proposed supply wells (PEF005A at 43 to 44)?
 - i. Wouldn't this requirement pertain to adverse effects caused by the hydroperiod alterations you refer to repeatedly in your testimony?
- d. Isn't it true that Section 5.3.1.6 of the FEIS (NRC001A at 5-47) acknowledges possible uncertainty regarding the response of wetlands to extended water table drawdowns and therefore concludes that the potential wetland impacts from LNP operations would be SMALL to MODERATE?
- e. Dr. Bacchus, in your direct testimony at A.28 you state that "[t]o the contrary, in my professional opinion, the proposed excavations and dewatering of the approximately 100-foot deep pits under the two proposed nuclear islands for the considerable time of "two to four years" (FEIS Vol 1. p.4-34) will dewater all of the remaining wetlands on the proposed LNP and surrounding wetlands, resulting in the death of all of the pond-cypress trees and constituting LARGE adverse impacts." Isn't it true that relatively long-lived wetland plants such as pond

cypress would have to be capable of surviving irregularly occurring drought periods of two to four years or more?

i. Isn't it true that relatively mature, well established pond cypress trees do not necessarily die if temporarily exposed to reduced hydroperiods over a period of two to four years?

f. Dr. Bacchus, in your direct testimony at A.37 you state that "...even if the response were rapid, there is no evidence to support a conclusion that the fires could be contained or controlled when attempts to control similar fires in that area have been unsuccessful, as described in the April 8, 2011 Levy Wildfire Report by the Florida Forest Service (Exhibit INT386)." Isn't it true that the Levy Wildfire Report indicated that the fire was contained within about 8 hours of discovery?

i. You're not aware of any unusual difficulties encountered in responding to the subject fire, are you?

ii. Isn't it true that there would likely be fewer difficulties in responding to similar fires if the LNP were built, considering the availability of new roads and the increased proximity of fire fighting resources?

C. Aquatic Ecology Questions

1. Dr. Bacchus made several incorrect statements regarding impacts to aquatic ecology and threatened and endangered species in her direct and rebuttal testimony. The following questions highlight these inaccuracies.

a. Dr. Bacchus, in your direct testimony at A.39, you concluded that active and passive dewatering during construction and operation of LNP would have

more substantial and irreversible effects on the aquatic environment and endangered and threatened species than is presented in the FEIS. Isn't it true that the FEIS characterizes LNP building, operation, and cumulative effects on aquatic environments, and threatened and endangered species in Sections 4.3.2.3 (NRC001A at 4-75 to 4-80), 5.3.2.1 (NRC001A at 5-47 to 5-61), 7.3.2 (NRC001B at 7-29 to 7-34), and Appendix F (NRC001C at F-5 to F185)?

- i. Isn't it true that the FEIS sections just listed identified impacts on Federally-listed species and species currently considered for listing?
- b. Dr. Bacchus, in your direct testimony at A.18, you stated that the FEIS failed to consider effects of increased salinity on estuarine and marine essential fish habitats. Isn't the National Marine Fisheries Service (NMFS) responsible for evaluating the NRC's assessment of impacts to essential fish habitat?
 - i. Isn't it true that the FEIS (NRC001C at F5 to F59) describes how the Staff followed the process for completing the assessment of essential fish habitat?
 - ii. Isn't it true that the NMFS, in its letter of October 26, 2010 (NRC081), did not express any concern over the effect of changes in salinity due to the construction and operation of the LNP on the aquatic environment?
 - iii. Isn't it true that the Staff addressed the variable salinity attributes under operating conditions as part of the Essential Fish Habitat

Assessment as presented in the FEIS (NRC001C at F28 to F30) and summarized in the Staff's rebuttal testimony at A67?

- c. Dr. Bacchus, in your direct testimony at A.19, you come to the conclusion that changes in salinity in nearby watercourses caused by the construction and operation of the LNP will result in the death of freshwater vegetation, including vegetation that provides food for manatees and green sea turtles. You state that there is no analysis and no consideration for the LARGE impacts to species inhabiting these ecosystems and relying on these ecosystems for breeding and feeding. Isn't it true that the Applicant's surveys of aquatic vegetation in the CFBC performed in 2007 and 2008 found no submerged aquatic vegetation (SAV) within the CFBC (NRC042 at 17-18)?
- i. Your exhibit INT383 states in Finding of Fact 63 (page 8) that "[m]anatee use the waters of the Greenway Canal [CFBC] and the Upper Withlacoochee [OWR]. The Greenway Canal [CFBC] is not, however, considered particularly good habitat for manatee. It has relatively deep water, steep banks, little freshwater and little vegetation of interest to manatee." Given that your exhibit indicates that the CFBC is not good manatee habitat, isn't it true that any impact on salinity from LNP cannot be destabilizing to the population of manatees?
 - ii. Isn't it true that turtle grass is the preferred food for the green sea turtle as stated in A19 of the Staff's rebuttal testimony?

iii. Since turtle grass requires higher salinities and is uncommon in watercourses that could be affected by the LNP, isn't it true that the impacts of active and passive dewatering on turtle grass cannot be LARGE?

d. Dr. Bacchus, in your direct testimony at A.39, you state that formal consultations with the U.S. Fish and Wildlife Service (FWS) for the proposed LNP project are invalid "because of the grave inadequacies of the FEIS in identifying the LARGE and irreversible impacts of this proposed project..." Are you familiar with the consultation process?

i. Are you familiar with the correspondence related to the consultations and the results of those consultations involving the Staff, U.S. Army Corps of Engineers, FWS, and NMFS conducted for the LNP?

ii. Are you aware that the NMFS and FWS, the experts in assessing impacts to Federally-listed species, concluded that for all protected species that could be affected by the construction and operation of the LNP there was either a "no effect" or a "may affect but not likely to adversely affect" determination?

II. SALT DRIFT QUESTIONS

A. Hydrology Questions

1. The following set of questions addresses Dr. Bacchus' claim that the Staff did not consider spatial variability of salt drift and deposition. As the Staff stated in its rebuttal testimony at A76, consideration of the variation in the salt deposition pattern was not

necessary because the Staff's estimate of surface water salinity on the LNP onsite and offsite areas used the maximum areal salt deposition rate of 10.75 kg/ha/mo.

- a. Dr. Bacchus, in your direct testimony at A.38, you stated that the runoff from the area southwest of the LNP site would be more saline because of your stated wind directions resulting in greater deposition in that area. In its rebuttal testimony at A76, the Staff presented its basis for showing that the maximum areal salt deposition rate, including onsite and offsite areas, is 10.75 kg/ha/mo. Do you have any basis to dispute this analysis?
 - b. Dr. Bacchus, in its rebuttal testimony at A76, the Staff stated that because the Staff conservatively used the maximum areal salt deposition rate, 10.75 kg/ha/mo, on onsite as well as offsite areas for surface water salinity estimation, consideration of the variation in the salt deposition pattern was not necessary. Wasn't this portion of the Staff's analysis conservative?
 - c. Dr. Bacchus, in light of the above, isn't it true that whether or not the Staff evaluated the area southwest of the LNP site regarding runoff salinity it wouldn't have made any difference to the Staff's estimate of runoff salinity and its analysis of the associated impacts?
2. The following questions address Dr. Bacchus' criticism that the Staff's runoff salinity estimate did not use dry seasons or periods of drought followed by minimal rainfall.
- a. Dr. Bacchus, in your direct testimony at A.33, you stated that the Staff's assessment of increases in salt concentrations is based on average precipitation and you also suggested that significantly greater salt concentrations could result by considering dry seasons or periods of drought followed by rainfall events that

dissolve the deposited salt and carry them to nearby waterbodies. Isn't it true that the Staff's salinity assessment in the FEIS at 5-24, as described in the Staff's direct testimony at A198-A200, that uses salt deposition during a dry period followed by a low rainfall amount, is similar to what you proposed?

- b. Dr. Bacchus, in the Staff's direct testimony at A200, the Staff used a 98-day dry period followed by a small, 0.4 in.-rainfall, which the Staff said is the most severe historical dry period followed by minimal rain. Isn't it true that this event is exactly what you propose for runoff salinity estimation in your direct testimony at A.33?
- c. Dr. Bacchus, with respect to the Staff's estimate of runoff salinity and its analysis of the associated impacts using the most severe historical dry period, isn't it true that the runoff salinity is still much less than that of brackish water?

B. Ecology Questions

- 1. In Dr. Bacchus' direct and rebuttal testimony, she challenged the Staff's analysis of impacts to wetlands from salt drift and salt deposition. Specifically, she challenged the Staff's use of long-term averages, and use of the Crystal River Energy Complex (CREC) salt-drift studies. The following questions highlight that Dr. Bacchus misunderstood or inaccurately described how the Staff performed its analysis of salt drift and deposition on the wetlands surrounding LNP.

- a. Dr. Bacchus, in your direct testimony at A.15 you state that "[u]nder the guise of "long-term average," the wetlands and other ecosystems affected by salt drift could be destroyed from the combined, cumulative impacts of salt drift and hydroperiod alterations, while the long-term average rainfall theoretically remained adequate." By "destroyed", are you suggesting that the affected

wetlands would no longer be wetlands and no longer function in any way as wetlands?

- i. Isn't it true that at least some wetlands close to the LNP site could be noticeably affected by LNP operations, as is acknowledged as part of the SMALL to MODERATE conclusions in the FEIS (NRC001A at 5-47), without destabilizing the overall functional capabilities of wetlands in the region (i.e., causing LARGE impacts)?
- b. Dr. Bacchus, in your direct testimony at A.38 you state that "[n]either PEF nor the DEIS appears to have even a single year of air concentration and vertical deposition data or sedimentation measurements from a comparable site as support for allegations that drift from the proposed LNP cooling towers would not result in significant adverse environmental impacts." Isn't it true that the nearby CREC is the operating nuclear site with an environmental setting most comparable to the LNP?
- c. Dr. Bacchus, A.38 of your direct testimony suggests that the CREC is surrounded by coastal vegetation dominated by trees and other plants that are tolerant of brackish water, such as mangroves and saltmeadow cordgrasses. Although these brackish water plant species dominate west of the CREC cooling towers, isn't it true that adjoining vegetation in other directions is dominated by inland plant species also present at the LNP site, such as pond cypress and slash pine?

- i. Isn't it true then that a consideration of the responses of these plant communities at the CREC is relevant to an evaluation of possible salt drift impacts at the LNP?
- d. Dr. Bacchus, in A.38 of your direct testimony you state that "neither PEF nor the FEIS quantified or assessed the combined and cumulative impacts of salt drift from operating cooling towers similar to the proposed LNP cooling towers combined with naturally occurring airborne salt deposition from the coast in the vicinity of the proposed LNP site" (emphasis in original). Because the LNP site is situated in an inland rather than a coastal setting, where wetlands and other terrestrial habitats are dominated by pond cypress and other plant species not adapted to even brief exposures to salt spray, isn't it reasonable to assume that the possible contribution of natural salt spray is minimal when assessing the cumulative impacts of salt drift originating from the LNP site?

Respectfully submitted,

/Signed (electronically) by/

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Dated at Indianapolis, Indiana
The 30th Day of August 2012

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)
)
)
PROGRESS ENERGY FLORIDA, INC.) Docket Nos. 52-029 and 52-030
)
)
(Levy County Nuclear Site, Units 1 and 2))

CERTIFICATE OF SERVICE

In accordance with 10 C.F.R. § 2.1207(a), and the Board's Initial Scheduling Order, the Staff is filing its Proposed Questions *in camera* to the members of the Board and their law clerk. I hereby certify that copies of the NRC Staff's Proposed Questions have been served on the following individuals via the electronic information exchange on this 30th day of August 2012.

Administrative Judge
Alex S. Karlin, Chair
Atomic Safety and Licensing Board Panel
Mail Stop: T-3F23
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ATTACHMENT 3

PEF's Pre-Filed Proposed Questions

**UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION**

Before the Atomic Safety and Licensing Board

In the Matter of)	
)	Docket Nos. 52-029-COL
Progress Energy Florida, Inc.)	52-030-COL
)	
Combined License Application for)	
Levy County Nuclear Plant, Units 1 and 2)	ASLBP No. 09-879-04-COL

**Progress Energy Florida, Inc.’s Proposed
Questions For The Board To Ask**

Pursuant to 10 C.F.R. § 2.1207(a)(3)(i) and (ii), and the Atomic Safety and Licensing Board’s (the “Board”) Initial Scheduling Order dated August 27, 2009,¹ Progress Energy Florida, Inc. (“PEF”) hereby files, in camera, its proposed questions for the Board to consider propounding to the Intervenor’s witnesses regarding Contention 4A in this proceeding.

As directed by the Board in the Initial Scheduling Order, the sets of questions contained herein are prefaced by a brief description of the issues that PEF contends need further examination, the objective of the examination, and the proposed line of questioning (including specific questions) that may logically lead to achieving the objective.²

I. QUESTIONS TO BE POSED TO GARETH DAVIES

A. Avon Park Formation

Mr. Davies’s testimony is the centerpiece of Intervenor’s assertions that, because of the karstic conditions at the LNP site, production well drawdown from the aquifer “could include destruction of wetlands, cutting off of spring flow, accelerated development of sinkholes, and diverting water flows in conduits in unexpected ways.” Intervenor’s Response Statement of Position at p. 7; INT501 at p. 2. The following questions are designed to establish that Mr. Davies is not familiar with the Avon Park Formation that underlies the LNP site, that he has no basis to assert that there will be conduit flow or

¹ Progress Energy Florida, Inc. (Levy County Nuclear Power Plant, Units 1 and 2), LBP-09-22, 70 NRC 640 (2009).

² Id. at 655-56.

sinkholes that are the basis of his assertions of environmental harm, and that he has no basis to recommend a site investigation to determine the location of conduits in the karst formation.

1. Have you reviewed the materials in the FSAR (PEF703), as described by Dr. Paul Rizzo (PEF700), regarding the geotechnical/geological characteristics of the LNP site and surrounding area, the results of core drillings, the results of aerial and field inspections of the region surrounding the site, and the results of pump tests regarding the flow in the aquifer?
 - a. If yes, how do you square the information and data regarding the LNP site geotechnical characteristics in the FSAR, which served as the basis of the NRC Staff and ACRS safety findings regarding the geotechnical conditions of the site, with your testimony?
 - b. If no, what is the basis of your testimony that the LNP site is located above a pure limestone karst formation that is subject to conduits and dissolution?
2. What is the basis of your position that accelerated development of sinkholes would occur due to drawdown from the aquifer from LNP production wells? Have you any evidence of the presence of sinkholes on the LNP site or surrounding area in the Avon Park Formation?
3. Your rebuttal testimony (INT501 at pp. 5-6) claims that the mantle of permeable sediment above the Avon Park Formation near the LNP site will not inhibit the development of karst phenomena. Have you reviewed Mr. Lehnen's direct testimony (PEF200 at p. 9) and exhibit (PEF208) supporting the opposite conclusion? Have you provided any scientific basis or evidence to distinguish or refute Mr. Lehnen's testimony or the content of PEF208?
4. Your rebuttal testimony equates "mature" or "ancient" karst with an "active karst terrain" characterized by active sinkholes and susceptibility to dissolution. INT501 at pp. 5-6. Have you provided any scientific basis or evidence in support of this assertion? Please explain how you can square your understanding of "mature" or "active" karst with the findings of the LNP site characterization that there have been no sinkholes observed within 2 km of the LNP site. PEF703 at p. 2.5-97.
5. What is the basis of your opinion that the LNP site must be further investigated beyond the geotechnical investigation conducted at the direction of Dr. Rizzo and described in the FSAR (PEF703)?
6. Are you aware of an investigation such as the one you recommend to "map the conduit system" that has been carried out in an Avon Park Formation in connection with a relatively modest water use permit of 1.58 million gallons per day or less?

B. Use of Porous Media Assumptions in LNP Groundwater

Mr. Davies's direct (INT001R at pp. 5-7) and rebuttal (INT501 at pp. 1-3) testimonies criticize the use of porous media assumptions in the groundwater model (the District Wide Regulation Model, Version 2, or DWRM2) that was used in LNP groundwater modeling efforts. The following questions are designed to demonstrate that Mr. Davies's insistence on the use of non-porous media assumptions is inconsistent with general practice among hydrogeologists, and would actually result in less conservative predictions of the effects from LNP withdrawals.

1. Have you reviewed the conclusion in the rebuttal testimonies of Mr. Lehnen (PEF218 at pp. 5-7), Mr. Rumbaugh (PEF104 at p. 11), and the NRC Staff's experts (NRCTEST at pp. 7-8) that the DWRM2's use of porous media assumptions results in reliable predictions of aquifer drawdown? Do you agree with their conclusion? Have you provided a scientific basis or evidence to distinguish or refute their conclusion?
2. Have you reviewed the rebuttal testimonies of Mr. Lehnen (PEF218 at pp. 5-7), Mr. Rumbaugh (PEF104 at p. 11), the NRC Staff's experts (NRCTEST at pp. 7-10), or the exhibits (NRC071 and NRC072) proffered by the NRC Staff's experts concluding that the use of porous media assumptions in groundwater modeling of the area in the vicinity of the LNP site is appropriate and consistent with general practice within the industry? Do you agree with their conclusion? What scientific basis or evidence have you provided to refute their conclusion?
3. Are you aware that the American Society for Testing and Materials ("ASTM") standard referenced in your direct testimony (INT001R at p. 9) was withdrawn in 2005? Have you provided any evidence in support of your claim that this standard, which was withdrawn seven years ago, is "currently being updated"? INT001R at p. 13.
4. Do you disagree with the conclusion of the NRC Staff's experts (NRCTEST at pp. 7-8) that some of your suggestions for improving the LNP groundwater modeling — including incorporating a larger number of geotechnical boreholes and increased groundwater flow tracing and mapping — would be unfeasible here?
5. Your rebuttal testimony criticizes the DWRM2 for not providing useful predictions of the groundwater flow blockage from the LNP nuclear island. INT501 at p. 2. What scientific basis or evidence have you provided indicating that the LNP nuclear island will obstruct groundwater flow? Do you agree with the statements in Dr. Rizzo's rebuttal testimony (PEF700 at pp. 14-15) and exhibit (PEF703 at RAI Response 02.05.01-3) that groundwater modeling determined that the LNP reactor island would not adversely affect groundwater flow? Have you provided any scientific basis or evidence for why these explanations were incorrect, or the groundwater modeling performed flawed?
6. Your rebuttal testimony (INT501 at p. 3) claims that the greater flow velocities within preferential conduits cause drawdown to develop more quickly than it would in uniformly porous geological formation. What

scientific basis or evidence have you provided for this conclusion? Have you reviewed the explanation in the rebuttal testimonies of Mr. Lehen (PEF218 at pp. 5-6) and the NRC Staff's experts (NRCTEST at p. 25) for why the greater flow velocities within preferential conduits would actually reduce the area experiencing drawdown, as well as the magnitude of any drawdown? Do you agree with their explanation? Please provide a scientific basis for rejecting their analysis.

7. Your rebuttal testimony claims that springs in the vicinity of the LNP site are "probably" overflow springs that are "directly connected" to preferential conduits supplying 99% of their flow. INT501 at p.4. What scientific basis have you provided in support of this conclusion?

II. QUESTIONS TO BE POSED TO DR. TIMOTHY HAZLETT

A. Use of Porous Media Assumptions in LNP Groundwater Modeling

Dr. Hazlett's direct (INT101R at pp. 1-2) and rebuttal (INT601 at pp. 1-3) testimonies criticize the use of porous media assumptions in LNP groundwater modeling. The following questions are designed to demonstrate that Dr. Hazlett's criticisms are inapposite, and that the alternative modeling methods he proposes are unworkable.

1. Do you agree with the conclusions in the rebuttal testimonies of Mr. Lehen (PEF218 at pp. 5-7), Mr. Rumbaugh (PEF104 at p. 11), and the NRC Staff's experts (NRCTEST at pp. 7-8) that the DWRM2's use of porous media assumptions results in reliable predictions of aquifer drawdown? What scientific basis or evidence have you provided in support of a contrary conclusion?
2. Have you reviewed the rebuttal testimonies of Mr. Lehen (PEF218 at pp. 5-7), Mr. Rumbaugh (PEF104 at p. 11), the NRC Staff's experts (NRCTEST at pp. 7-10), or NRC exhibits NRC071 and NRC072 concluding that the use of porous media assumptions in groundwater modeling of the areas in the vicinity of the LNP site is appropriate and consistent with general practice within the industry? Do you disagree with their conclusion? Please identify a scientific basis for your disagreement.
3. Do you disagree with the conclusion of the NRC Staff's experts (NRCTEST at pp. 7-8) that some of your suggestions for improving the LNP groundwater modeling — including incorporating a larger number of geotechnical boreholes and increased groundwater flow tracing and mapping — would be unfeasible here? Please identify a scientific basis for your disagreement.

B. Conceptual Design and Calibration of the DWRM2 Groundwater Model

Dr. Hazlett's direct (INT101R at p. 4) and rebuttal (INT601 at pp. 1-2) testimonies criticize the conceptualization and calibration of the DWRM2 as inadequate to yield accurate and reliable predictions of the effects of LNP withdrawals. The following questions are designed to demonstrate that the conceptual design and calibration of the DWRM2 produce accurate and reliable predictions, and that Dr. Hazlett's criticisms are unsubstantiated.

1. Have you reviewed the direct testimonies of Mr. Lehen (PEF200 at pp. 30-32) and Mr. Rumbaugh (PEF100 at pp. 12-13) concluding that the DWRM2's

conceptual design and calibration produce accurate predictions of the effects of LNP withdrawals? Do you disagree with their conclusion? Please identify a scientific basis for your disagreement.

2. Have you reviewed the descriptions of the design and calibration of the DWRM2 in the direct testimony of Mr. Rumbaugh (PEF100 at pp. 12-13) and the DWRM2 Technical Manual (PEF103)? Are you aware that the DWRM2 was designed to incorporate recent Florida Geological Survey hydrostratigraphical data and was the product of an exhaustive calibration in two stages against data collected over the course of eight years from more than 1,000 wells located throughout the Southwest Florida Water Management District (“SWFWMD”)? What scientific basis or evidence have you provided indicating that that this data set was an inadequate basis for the design and calibration of the DWRM2?
3. The Peer Review of the DWRM2 cited in your direct testimony states that the conceptual design of the DWRM2 represents the “best available hydrogeologic framework” for water permitting activity within the SWFWMD because its conceptual design “accurately represents key aquifers in the DWRM2 domain” and because its calibration was “rigorous.” INT105 at p. 6. Have you provided an explanation as to why this characterization of the DWRM2 was incorrect?
4. What scientific basis have you provided to support your conclusion that the “additional data streams” identified in your direct testimony (INT101R at p. 4) are needed for the DWRM2 to produce accurate and reliable predictions?
5. You assert in your rebuttal testimony (INT601 at p. 4) that, because the onsite drawdowns predicted by the LNP groundwater modeling efforts can differ by up to a factor of four over a 60-year modeling period, the DWRM2 model conceptualization was inaccurate, or the DWRM2 should have incorporated a different data set. Have you reviewed the direct testimonies of Mr. Lehnen (PEF200 at pp. 29-30) and Mr. Rumbaugh (PEF100 at pp. 20-21) describing the significance of the largely similar predictions of both models? Do you disagree with their conclusion? Have you provided any scientific basis or evidence in support of your conclusion that these marginally different predictions of long-term drawdowns mean that the DWRM2 is incapable of yielding accurate and reliable predictions?

C. Integrated Groundwater/Surface Water Modeling

Dr. Hazlett’s direct (INT101R at pp. 2, 5-8, 10) and rebuttal (INT601 at pp. 1-2) testimonies criticize the LNP groundwater modeling for an alleged failure to account for the relationship between groundwater and surface water systems. The following questions are designed to demonstrate that an integrated groundwater/surface water model (integrated model) of the sort envisioned by Dr. Hazlett would be unnecessary and inappropriate for use in predicting the effects from LNP withdrawals.

1. What scientific basis or evidence have you provided in support of your conclusion that LNP withdrawals will result in saltwater intrusion? Have you reviewed the analysis in Mr. Lehnen’s rebuttal testimony (PEF218 at pp. 22-26) explaining why the characteristics of the area in the vicinity of the LNP site make saltwater intrusion unlikely? Do you disagree with his analysis? Please identify a scientific basis for your disagreement.

2. Have you presented evidence of the existence of an integrated model for the area in the vicinity of the LNP site? Have you reviewed the statements in the rebuttal testimonies of Mr. Lehnen (PEF218 at pp. 17-18) and Mr. Rumbaugh (PEF104 at pp. 4-5) that no such integrated model exists for the area? Please identify and describe the integrated model that you assert exists for this area.
3. Have you provided any evidence of the availability of the additional data needed to create an integrated model for the area in the vicinity of the LNP site?
4. Have you reviewed the explanations in the rebuttal testimonies of Mr. Rumbaugh (PEF104 at p. 13) and Mr. Lehnen (PEF218 at pp. 21-22) of how the hydrological connection between the surficial and Upper Floridan Aquifers in the vicinity of the LNP site allows for the accurate modeling of impacts to wetlands from LNP withdrawals? Do you disagree with their explanations? Please identify a scientific basis for your disagreement.

D. Climate Change

Dr. Hazlett’s direct testimony states that the effects of climate change, such as a rise in sea level, should have been considered in the NRC Staff’s groundwater modeling. INT101R at p. 9. The following questions are designed to point out that the effects of climate change are too uncertain to quantify with accuracy or reliability.

1. Do you believe it is possible to accurately (or even reasonably) predict the impact of global climate change on sea level rise, particularly over the time frame in which the LNP will operate (i.e., 40 – 60 years)?
2. Please summarize your knowledge and/or experience with regard to climate change modeling? Please summarize your understanding of the accuracy of those models?
3. Isn’t it true that there are not any climate change models that are acknowledged or regarded by the scientific community to be reasonable, much less accurate?

III. QUESTIONS TO BE POSED TO DAVID STILL

A. Criticisms of the Southwest Florida Water Management District (“SWFWMD”) Water Use Permitting

Mr. Still, former Executive Director of the Suwanee River Water Management District (“SRWMD”) lodges wide-ranging criticisms of Florida’s processes for protecting water resources, the Florida water management districts’ water use permitting, and, in particular, the performance of the SWFWMD. INT201R. These charges were addressed by Mr. Peter G. Hubbell, the former Executive Director of SWFWMD. PEF800. The purpose of this set of questions it to have Mr. Still address Mr. Hubbell’s specific rejoinder to Mr. Still’s opinions, which opinions are supported by little more than anecdotal evidence.

Mr. Hubbell outlines in some detail the statutory basis, regulatory development, enhanced guidelines, advances, successes and continuing improvement of the SWFWMD water use permitting process and protection of Florida’s water resources. PEF800. Please respond to Mr. Hubbell’s very specific defense of the SWFWMD programs by answering the following questions:

1. Do you contend that the SWFWMD program violates Florida law?
2. Does the SWFWMD follow its regulations set forth in PEF312?
3. Have you reviewed the SWFWMD Water Use Basis of Review (PEF311)? Are these guidelines consistent with SWFWMD's regulations and Florida law? Did you develop or use similar guidelines at SRWMD?
4. Did Mr. Hubbell accurately describe the water use permit standards against which an applicant must demonstrate compliance in order to obtain a water use permit (PEF800 at pp. 10-12)? If you disagree with the description, provide the factual basis of your disagreement.
5. Do you have any evidence to testify that the SWFWMD did not follow this process in reviewing PEF's LNP Site Certification Application ("SCA") for water use permitting and recommending approval to the State Siting Board with certain Conditions of Certification ("COC") developed jointly with the Florida Department of Environmental Protection?
6. Notwithstanding the relatively small planned withdrawal of water from the LNP site for service water needs (1.58 Mgd) (especially when compared to withdrawals such as those for a total of 44 Mgd issued by the SRWMD during the six-month period between August 2011 to January 2012 while you were still Executive Director), did the application for the first new nuclear plant in Florida in decades receive careful scrutiny at the SWFWMD and throughout Florida?
7. You state that the COC only identify impacts rather than limit or prevent them. INT701 at pp. 5-7. Isn't it true that the COC require PEF to mitigate adverse impacts or implement an alternative water supply if adverse impacts are detected or if they are predicted through the APT Plan or the EMP? PEF005 at pp. 43-44. Please explain how the APT Plan, the EMP, and the implementation of an alternative water supply would not limit or prevent adverse impacts.

B. Drawdown Criteria

In his rebuttal testimony, Mr. Still disagrees with Dr. Dunn's statement that the 0.5 ft drawdown level in wetlands and aquatic ecosystems and their underlying aquifers has been used by the SWFWMD and the St. Johns River Water Management District ("SJRWMD") as a threshold of concern regarding potential risks of adverse impacts, and disagrees that those water management districts have created modeling thresholds that prevent impacts due to water drawdown. INT701 at pp. 2-4. The following questions are intended to demonstrate that Mr. Still lacks adequate factual or evidentiary support for his conclusions.

1. What evidence do you have that the SWFWMD and the SJRWMD do not use drawdown thresholds in the manner described by Dr. Dunn's direct testimony on pages 17-18 of PEF300?

2. Dr. Dunn describes the research of the regional water supply management initiative (of the SJRWMD, the SWFWMD, the South Florida Water Management District, and the Florida Department of Environmental Protection) known as the Central Florida Water Initiative (“CFWI”) and its results to date that the probability of wetlands exhibiting unacceptable adverse impacts is low if the historic median water level is lowered by 0.5 ft or less. PEF300 at pp. 19-20. Are you familiar with the research of the CFWI? Do you agree with its research results? If not, why not and what evidence have you provided to support your response?
3. In your rebuttal testimony, you attribute to Dr. Dunn a statement that the SRWMD has used the drawdown threshold range as a screening tool for the evaluation of potential for harm for groundwater use permitting. INT701 at p. 3. Are you aware that Dr. Dunn’s statement is about the SJRWMD, not the SRWMD? PEF300 at p. 17.

C. Environmental Monitoring Plan (“EMP”)

In his rebuttal testimony, Mr. Still discusses the alleged inadequacies of the EMP (PEF305). INT701 at pp. 7-11. The following questions are designed to probe the specific allegations made by Mr. Still.

1. In your rebuttal testimony, you state that the “strong possibility that PEF will be released after only five years is a fatal loophole” in the COC. Id. at p. 8.
 - a. Although PEF is authorized by the COC to request a release from the requirements of the EMP after 5 years of monitoring, are you aware that the COC require the SWFWMD to approve this request before cessation of monitoring can occur? PEF005 at p. 42. Shouldn’t the need for approval from the regulatory agency before the monitoring can cease be a sufficient safeguard against the premature conclusion of the EMP monitoring program? Please tell us your experience in the last 10 years with SWFWMD water use permit monitoring programs in which the SWFWMD failed to provide sufficient protection for the water resources of concern.
 - b. What evidence do you have that the SWFWMD or other government agency would fail to require continuation of the monitoring program due to difficult economic times, as you imply on page 7 of your rebuttal testimony (INT701)? Are you aware of any SWFWMD failure to monitor the compliance of a permittee due to lack of funds?
2. You express concern that the EMP will be based on an inappropriate, artificially-lowered baseline. INT701 at p. 8.
 - a. Are you aware that the EMP specifies that the baseline monitoring will occur pre-construction? PEF305 at p. 16. Are

you aware that the EMP further specifies that the baseline data for the monitored wetlands will be extended through regression analysis with regional background lake, wetland, or surficial aquifer system wells with long periods of record, and used to hindcast a historic data range, with the objective of estimating a long-term baseline of approximately 20 years? *Id.* at pp. 17-18. Given this, do you still believe that the EMP will be based on an inappropriate, artificially-lowered baseline? If yes, why?

3. In your rebuttal testimony, you disagree with the EMP's focus on the near vicinity of the production wells as the most likely place for initial detection of drawdown impacts, on the grounds that it is highly unlikely that impacts will occur in a radial pattern emanating from the production wells due to conduits, fractures and other preferential pathways. INT701 at pp. 9, 10-11.
 - a. What expertise do you have in geology or geotechnical formations to form an opinion regarding the likelihood of conduits, fractures, and preferential pathways at and in the vicinity of the LNP site?
 - b. Given Dr. Rizzo's rebuttal testimony that preferential flow paths were not found in spite of a diligent and comprehensive investigation of vertical fractures and overall fracture patterns at the LNP site and off-site (PEF700 at p. 14), what is the basis for your assertion that there will be other than an essentially symmetrical radial drawdown around each production well?
 - c. In the absence of preferential flow paths, wouldn't drawdown impacts most likely be detected first in the near vicinity of the production wells?
 - d. Please point out where the NRC Staff stated that it is possible that an EMP will fail to detect localized wetland impacts, as indicated in Q.13 of your rebuttal testimony. INT701 at p. 10.
4. In your rebuttal testimony, you take the position that it was unreasonable for PEF to rely on the adaptive management strategy laid out in the EMP and that adaptive management is intended to deal with unforeseen difficulties and is not intended to replace analysis of expected impacts before a project has begun. INT701 at pp. 12-14.
 - a. Isn't the groundwater modeling performed in this case part of the SWFWMD's, the NRC Staff's and PEF's analysis of expected impacts?
 - b. Are you familiar with the field of adaptive management? Do you agree that adaptive management strategies conform to best practices in managing natural resources, such as water and ecosystems? Do you agree that adaptive management is

specifically designed to deal with uncertainty and to reduce the effect of uncertainty over time?

- c. Your rebuttal testimony states that, despite the fact that State law specifies that any permit granted cannot contribute to water quality violations, the EMP does not monitor for water quality. INT701 at p. 13. Are you aware that PEF is obligated to conduct water quality sampling and provide the results to the SWFWMD pursuant to Section C.II.A.8 of the COC? PEF005 at pp. 49-52.

D. Mitigation

In his rebuttal testimony, Mr. Still cites examples of failed mitigation projects. INT701 at pp. 11-12. The following questions are intended to clarify the relevance of these examples.

1. Mr. Still describes the Yelvington Distribution Center and Canon Creek Basin Improvements/Home Depot as two sites that failed despite monitoring and mitigation. Please explain how the two examples cited are relevant to the LNP site. Were the monitoring and mitigation measures at these sites similar to those for the LNP?

E. Salt Drift Modeling

Mr. Still's rebuttal statement argues that, if freshwater springs flowing into the Cross Florida Barge Canal ("CFBC") disappear due to dewatering, the salinity of the cooling tower water will increase, causing the salt drift modeling to under-predict salinity deposition. INT701 at p. 7. The following questions are designed to demonstrate that solids emitted through LNP cooling tower salt drift are limited by the maximum permitted emissions rate, which maximum rate was used as a conservative assumption in the NRC Staff's (and PEF's) salt drift modeling.

1. In your rebuttal testimony, you state for the first time in this proceeding that the salt drift modeling relied upon by the FEIS would under-predict salt deposition impacts if the water in the CFBC is more brackish than assumed in the modeling. INT701 at p. 7.
 - a. Are you aware that, under the LNP's air permit (PEF504 at p. 3 of 5, para. 4), the particulate matter emissions from the cooling towers (all of which in the salt drift modeling were conservatively assumed to be salts) are expressly limited to the specific pound per hour limit set forth in the LNP's air permit application? PEF504 at p. 3 of 5, para. 4. Are you aware that this emission limit, which was used in the salt drift modeling, is fixed and independent of any salinity changes in the CFBC?

F. Annual Rainfall

Mr. Still's direct and rebuttal testimony argues that it was inappropriate to rely on 53 inches of annual rainfall for groundwater modeling when the trend is toward less rainfall, that rolling averages should have been used, and that changes in weather patterns should have been considered. INT201R at pp. 3-4; INT701 at p. 14. The following questions are intended to demonstrate that the 53 inches of rainfall is a reasonable estimate based on historical data (including rolling averages).

1. In your rebuttal testimony (INT701 at p. 14) you state that “[r]elying on a long-term rainfall average of 53 inches is not the most accurate data for modeling” and that “[a] rolling average would be more useful.”
 - a. Are you aware that, as Dr. Howroyd testified (PEF506 at p. 13), since 1980 the 10-year moving average of annual precipitation in Levy County has decreased from approximately 60 inches to 50 inches per year, which is only slightly less than the 53 annual inches of rainfall relied upon in the FEIS?
 - b. Are you also aware that, as Dr. Howroyd testified (PEF506 at p. 13), from 1940 to 1980, the 10-year moving average of annual precipitation in Levy County increased from approximately 50 inches per year to 60 inches per year?
 - c. Are you also aware that, as demonstrated in PEF017, the 10-year moving annual average of precipitation in Levy County has been between approximately 50 and 65 inches?
 - d. Are you also aware that, as set forth in the FEIS (NRC001 at p. 2-21), the 53 inches of annual rainfall relied upon in the FEIS is based on data from 1892 to 2009 that is taken from 13 weather stations in the LNP’s region?
 - e. Given all of these historical statistics, do you still believe that it was unreasonable for the FEIS to rely on projections of 53 inches of annual future rainfall?
 - f. When trying to project rainfall amounts for a period of 40 to 60 years, isn’t it more reliable to look at long-term (e.g., 100 years) historical data, rather than just “current conditions” or recent “trends” as your direct testimony recommends? INT201R at pp. 3-4.
2. In your rebuttal testimony, you say that “foreseeable changes to weather patterns” should have been factored into the groundwater modeling. INT701 at p. 14.
 - a. Do you have any training in meteorology? What changes in weather patterns do you believe are “foreseeable”, and therefore should have been factored into the modeling? On what do you base your opinion that such changes in weather patterns are “foreseeable”?

IV. QUESTIONS TO BE POSED TO DR. SYDNEY BACCHUS

A. Hydroperiods

Dr. Bacchus’s direct testimony claims that “irreversible adverse impacts to the natural hydroperiods” on and in the vicinity of the LNP site would occur from dewatering and that such irreversible adverse impacts to the natural hydroperiods will result in adverse impacts to both plants and animals. INT301R at p. 9. The following questions are intended to demonstrate that Dr. Bacchus lacks factual or evidentiary support for those conclusions.

1. You state that the disruption of natural hydroperiods can lead to the degradation and ultimate destruction of the wetland and the biota it supports. INT301R at p. 12.
 - a. Given Dr. Dunn's direct testimony that the wetlands and the aquatic ecosystems on and in the vicinity of the LNP site are robustly adapted to highly-variable rainfall patterns, from short-term seasonal variations, to the 5 to 10 year El Niño/La Niña cycle, to the 60-year cycle of the Atlantic multi-decadal oscillation ("AMO") (PEF300 at pp. 21-23), what is the basis for your contention that the wetlands on the LNP site and surrounding area are extremely sensitive to changes in depth, duration, and frequency of flooding and dewatering regimes? How can these wetlands be so sensitive to slight changes in hydrology, yet are adapted to survive through 60-year cycles of varying rainfall like the AMO? Have you performed any studies that support these claims?
 - b. Are you familiar with the statistical hydrology approach used by the SWFWMD and the SJRWMD discussed in Dr. Dunn's rebuttal testimony (PEF315 at pp. 3-4)? Doesn't this statistical hydrology approach recognize that wetlands and aquatic ecosystems are adapted to a range of natural inundation and dewatering conditions and that the range of such conditions necessary to maintain the wetlands and aquatic ecosystems can be defined by hydrologic statistics using cumulative frequency analysis of water level records? How does this approach compare to the hydroperiod approach you discuss in your direct testimony?
2. Are you familiar with the research conducted by the SWFWMD and the SJRWMD regarding drawdown thresholds and their impacts as described in Dr. Dunn's direct testimony at pp. 17-18 of PEF300? Do you agree with the results of that research? If not, why not, and what evidence have you provided to support your response?
3. Dr. Dunn describes the research of the regional water supply management initiative (of the SJRWMD, the SWFWMD, the South Florida Water Management District, and the Florida Department of Environmental Protection), known as the CFWI, and its results to date that the probability of wetlands exhibiting unacceptable adverse impacts is low if the historic median water level is lowered by 0.5 ft or less. PEF300 at pp. 19-20. Are you familiar with the research of the CFWI? Do you agree with its research results? If not, why not, and what evidence have you provided to support your response?
4. In your direct and rebuttal testimony, you fail to identify a wetland drawdown level that will not cause harm or unacceptable change, and imply that there is no such level. Do you believe that there is a wetland drawdown level below which there will not be unacceptable adverse impacts? What evidence is there to support your answer, and how does it

compare to the studies conducted by the SJRWMD, the SWFWMD, and the CFWI?

B. Environmental Monitoring Plan (“EMP”)

Dr. Bacchus’s rebuttal testimony discusses the alleged inadequacies of the EMP (PEF305). The following questions are designed to probe the specific allegations made by Dr. Bacchus.

1. Your rebuttal testimony states that the EMP implies that monitoring would be confined to the LNP site, excluding the surrounding vicinity, and that it includes only on-site wetland habitats. INT801 at pp. 2-3.
 - a. Given the fact that the EMP requires a minimum of three background monitoring transects that are “located outside of the modeled drawdown influence on properties adjacent to the LNP property,” (PEF305 at p. 12) and that Figure 3 of the EMP (PEF305 at p. 14) identifies two of the potential background transect monitoring locations off of PEF property, to the east of the LNP site and the South Property, what is the basis for your claims that the EMP monitoring will only occur on the LNP site?
2. Your rebuttal testimony indicates that the failure of the EMP to include the construction well on the LNP site, identified by you as “supply well #5,” is an inadequacy of the EMP. INT801 at pp. 2-3, 4.
 - a. Since the COC require an EMP for the groundwater withdrawal from the production wells and not the temporary construction well (PEF005 at p. 41-42), why is the fact that the EMP does not apply to the construction well withdrawal an inadequacy? Please describe what negative consequences that you believe will result from this inadequacy.
3. The EMP provides that management thresholds will be based on the SWFWMD approach to establishing minimum flow levels (“MFLs”) for cypress wetlands. PEF305 at p. 17. Your rebuttal testimony states that, in effect, CH2M Hill proposes to act in the capacity of the SWFWMD because the SWFWMD has not established MFLs for the aquifer and surface waters in the vicinity of the LNP and that this determination will be made in the future, without any input from regulators, and by a private entity. INT801 at pp. 6-7.
 - a. As an initial matter, please provide the citation to the Florida law that requires the SWFWMD to set MFLs for every county and water body within its jurisdiction. Isn’t it true that the Florida law mandates a process for each water management district to prioritize MFLs to be developed? How would the failure of the SWFWMD to have set MFLs for the aquifer and water bodies in the vicinity of the LNP site have negatively impacted the SWFWMD’s review and authorization of the groundwater withdrawal for the LNP?

- b. Since the EMP must be reviewed and approved by the SWFWMD and the U.S. Army Corps of Engineers (“USACE”), how would the management threshold determinations be made without the input of regulators and solely by a private entity? Page 17 of the EMP (PEF305) states that a description of how the management thresholds are developed will be provided in the baseline monitoring report for review by the agencies. Won’t the yearly environmental monitoring report required by the COC also provide a level of scrutiny by the regulatory agencies? PEF005 at p. 43.
- 4. Your rebuttal testimony indicates that the proposed schedule for initiation of monitoring and the duration of the proposed monitoring will not ensure adequate and accurate assessment of adverse impacts from the LNP. INT801 at p. 7.
 - a. You claim that the monitoring will be insufficient because it will not take into account alterations of the natural hydroperiods that will occur during construction. Id. at p. 7. However, doesn’t page 16 of the EMP (PEF305) specify that hydrologic monitoring will begin pre-construction?
 - b. Although PEF is authorized by the COC to request a release from the requirements of the EMP after 5 years of monitoring, are you aware that the COC require the SWFWMD to approve this request before such cessation of monitoring can occur? PEF005 at p. 42. Shouldn’t the need for approval from the regulatory agency before the monitoring can cease be a sufficient safeguard against the premature conclusion of the EMP monitoring program? Please tell us your experience in the last 10 years with SWFWMD water use permit monitoring programs in which the SWFWMD failed to provide sufficient protection for the water resources of concern.

C. Nutrients

In her direct testimony, Dr. Bacchus asserts that harmful increases in nutrient levels will result from the LNP’s withdrawal of large quantities of water from the Cross Florida Barge Canal and from the aquifer because the proposed LNP withdrawals will concentrate the existing nutrient pollution in the remaining, flow-depleted waters. INT301R at pp. 37-38. The following questions are designed to probe the factual basis for this assertion.

- 1. Dr. Dunn states in his direct testimony that, without a new external source of nutrients being deposited at or in the vicinity of the LNP site, the effect of water use on nutrient concentration in either surface water or groundwater on and in the vicinity of the LNP site will be quite small. PEF300 at pp. 41-42. Will the LNP activities add a new source of nutrients to the area wetlands and aquatic ecosystems? If yes, please describe such source(s). If no, how will nutrient concentrations increase?

D. Species

In her direct testimony, Dr. Bacchus asserts that the FEIS fails to adequately assess the impacts on Federally listed species, including their habitat. (See, e.g., INT301R at pp. 4, 24, 36-37, 47-52, 55-58, 67-68). The following questions are intended to demonstrate that Dr. Bacchus lacks factual support for these allegations.

1. The FEIS discusses potential impacts on Federally listed species in Sections 4.3.1.3 (NRC001 at pp. 4-47-4-58), 4.3.2.3 (Id. at pp. 4-76 to 4-78), 5.3.1.3 (Id. at pp. 5-38 to 5-42), 5.3.2.3 (Id. at p. 5-60), 7.3.1 (Id. at pp. 7-30 to 7.29, and 7.3.2 (Id. at pp. 7-29 to 7.34) and in the two Biological Assessments and the Biological Opinion in Appendix F.
 - a. Given the above FEIS discussions, what is the basis for your assertions that the FEIS fails to adequately assess the impacts on Federally listed species from the construction and operation of the LNP?
 - b. What evidence do you have that contradicts the conclusions of the NRC, the National Marine Fisheries Service, and the U.S. Fish and Wildlife Service?

E. Salt Drift Deposition

Dr. Bacchus's direct testimony sets forth various criticisms of the modeling performed by the NRC Staff to calculate the amount of salt that may be deposited onsite and offsite at the LNP due to salt drift from the LNP's cooling towers. INT301R at pp. 41-47. The following questions are designed to demonstrate that Dr. Bacchus has no legitimate basis for claiming that such salt drift modeling, based on the American Meteorological Society/Environmental Protection Agency Model ("AERMOD"), is inaccurate.

1. In your direct testimony, you state that "[t]he FEIS assumed, without any adequate, scientifically based analysis, that the impact associated with salt drift and salt deposition [from the LNP] would be negligible." INT301R at p. 41. You also state that "[t]he computer modeling in the FEIS for salt drift and deposition inaccurately portrays salt deposition rates and locations and underestimates the ensuing effects." INT301R at p. 42.
 - a. Can you describe your experience performing or scientifically evaluating dispersion modeling of air pollutants, including salt deposition?
 - b. Can you describe your experience and familiarity with use of the AERMOD for dispersion modeling?
 - c. Do you believe that the AERMOD is an inaccurate model? If so, what is your basis for reaching that conclusion? Given Dr. Howroyd's testimony that the AERMOD was developed by the EPA and is a widely used tool for dispersion modeling (INT500

at pp. 6-7), do you believe that it was unreasonable for the NRC Staff and PEF to use the AERMOD in this case? If so, why?

- d. Given the testimony of the NRC Staff (NRCTEST at p. 153) and Dr. Howroyd (PEF506 at p. 3) that Gainesville wind data were used in the AERMOD, do you now acknowledge that wind data used in the modeling were from Gainesville and not from Tampa as you previously testified? INT301R at p. 41. Given the fact that the Gainesville data has been shown to correlate very well with the limited onsite data at the LNP (NRCTEST at pp. 83-84, PEF506 at p. 3), do you still believe that the modeling results relied on by the FEIS are “inaccurate”? If so, what is the basis for that conclusion?
 - e. Nothing in the record indicates that you conducted your own modeling or other scientific study to determine that the salt deposition rates and locations as predicted using the AERMOD are inaccurate. Why didn’t you perform such modeling or study? How can you be sure that the AERMOD results are inaccurate without performing your own modeling or study of LNP salt deposition rates and locations?
2. In your direct testimony you state that: “The FEIS assumed, without any scientifically based analysis, that the impact associated with salt drift and salt deposition would be negligible. That finding is without any scientific foundation because it is based on experience with saltwater cooling towers located on the coast, not inland, as for the proposed LNP.” INT301R at p. 41.
- a. Have you reviewed the information regarding salt drift and salt deposition in the NRC’s NUREG-1555 (NRC013) and NUREG-1437 (NRC057)?
 - b. Are you aware that these documents do in fact describe the scientific basis for the thresholds set forth in NUREG-1555 for evaluating potential foliar damage from salt drift? NRC057 at pp. 4-35 through 4-42.
 - c. Are you aware that the basis for the NRC guidance thresholds includes results from published scientific information on foliar damage due to power plant salt drift, including plants located at inland locations? NRC057 at pp. 4-35 through 4-42.
 - d. Do you challenge the accuracy of the scientific information referred to in NUREG-1555 and NUREG-1437? If so, what is the basis for that challenge?

F. Salt Drift Impacts

The following questions are designed to show that, Dr. Bacchus’s challenges to the FEIS’s conclusions regarding salt drift impacts (INT301R at pp. 41-46) are without basis.

1. Have you performed your own study or analysis of the impact on fauna or flora due to LNP salt deposition, based on the expected salt deposits calculated by the NRC Staff? Have you performed your own study or analysis of the impact on fauna or flora due to LNP salt deposition, based on the specific amounts of salt that you believe will be deposited by the LNP? (If so, why are such analyses not in the record?) If not, on what scientific basis can you claim that the FEIS underestimates the impact of salt drift from the LNP?
2. You assert that the FEIS fails to account for normal dry seasons and for drought conditions in its salt drift analysis. INT301R at p. 44.
 - a. Are you aware that the NRC Staff's analysis regarding salt drift impacts took into account the driest period in the meteorological records that the Staff examined for the region? NRCTEST at p. 160. Are you aware that the Staff's analysis also considered the lowest regional mean monthly precipitation rate? NRCTEST at p. 159. Given these analyses, do you continue to claim that the FEIS's salt drift analysis failed to account for normal dry seasons and drought conditions?
 - b. Do you dispute the fact that, as set forth in the testimony of the NRC Staff (NRCTEST at pp. 158-160) and Dr. Blancher (PEF608 at pp. 2-8), precipitation will dilute salt deposited by the LNP cooling towers?
 - c. Did you take into account the impact of precipitation when developing your testimony regarding salt drift? (If so, why is that not included in your testimony?) If not, on what basis did you fail to account for the impact of precipitation on salt drift?
3. You support your testimony with various pictures of trees that you assert demonstrate death and premature decline of bald cypress and other wetland trees, pines, oaks and cabbage palms due to root exposure to salt. INT301R at p. 46.
 - a. Assuming the damage set forth in your photos is from root exposure to salt as you claim, was cooling tower drift the source of such salt? Aren't those trees located in tidal areas, or "former freshwater ponds contaminated with saltwater" as you state in INT303 at p. 2. Isn't seawater the source of the salt?
 - b. Given the large disparity between the salt concentration of seawater (NRCTEST at p. 160; PEF608 at p. 5) and the expected concentration of salt deposits from the LNP cooling towers based on various conservative scenarios (NRC001 at p. 5-24; NRCTEST at pp. 159-160; PEF600 at p. 7), what is your basis for claiming (or at least implying) that the tree damage in your photos is comparable to damage that will result from LNP salt deposition?

G. Crystal River Study

Dr. Bacchus's direct testimony claims that the salt drift study performed at Crystal River supports her opinion that salt drift impact from the LNP cooling tower will be significant. INT301 at p. 44. The following questions are designed to demonstrate that the Crystal River Energy Center ("CREC") study showed no significant impacts to vegetation due to salt deposits from the CREC cooling towers.

1. What is your basis for asserting that the CREC study showed "extensive death and destruction of native vegetation" in the vicinity of the CREC as a result of salt drift? INT301R at p. 44. Is there any specific information in the CREC study supporting your claim that salt drift was responsible for "extensive death and destruction of native vegetation"?
2. Do you have any scientific evidence indicating that the damage to vegetation in the vicinity of the CREC was due to cooling tower salt drift, rather than due to advancing sea level and resulting increases in salt intrusion into freshwater areas in the coastal habitats, as stated on pp. 22-23 of the CREC study (PEF607)?

H. Wildfires

Dr. Bacchus's direct testimony claims that dewatering from the LNP will result in destructive wildfires that will increase eutrophication (the process by which water bodies will receive excess nutrients) in the vicinity of the LNP from aerial deposition of particulate nitrogen. She also claims that prescribed burns and fire suppression will not be able to control wildfires in the vicinity of the LNP. INT301R at pp. 38-41. The following questions are intended to demonstrate that Dr. Bacchus lacks adequate scientific basis and factual or evidentiary support for those conclusions.

1. Have you analyzed the soil types and associated vegetation types and fuel loads in the vicinity of the LNP site to determine whether the projected amount of active dewatering in areas with those soil types will lead to more wildfires? If not, wouldn't one need to consider (as did Dr. Robertson, PEF400 at pp. 6-9) the actual soil characteristics, vegetation types, and fuel loads in and around the site, as well as the actual projected water table drawdowns, in order to properly evaluate the impacts of LNP dewatering on wildfires?
2. What scientific basis do you have for claiming that dewatering by the LNP will result in increased, destructive wildfires? Have you performed any studies or analyses to support that claim? (If so, why is it not in the record?)
3. In your direct testimony, you claim that eutrophication will increase in the aquatic environment in the vicinity of the LNP from aerial deposition of particulate nitrogen associated with wildfires caused by LNP dewatering. INT301R at pp. 38-39.
 - a. Given Dr. Robertson's rebuttal testimony (PEF404 at p. 2) that most nitrogen released into the air from a fire is in gaseous (non-nutrient) form, the great majority of particulate matter from a fire is convected to high elevations and thinly dispersed, and most

remaining ash that falls to the ground has transport distances of less than 100 meters, what is the scientific basis for your claim that waters in the vicinity of the LNP will receive excess nitrogen from wildfires caused by LNP dewatering?

- b. As an example of wildfires that will cause eutrophication, you cite a fire report that occurred in 2011 in the area of the LNP site. INT301R at p. 38; INT386. Does that report mention anything about eutrophication due to nitrogen (or any other nutrients) resulting from that fire? What evidence or documents have you provided to support your claim that wildfires at the LNP due to dewatering will result in eutrophication from nitrogen particles?
4. In your direct testimony, you claim that destructive wildfires will occur at the LNP because of man-made dewatering, and that such wildfires occur “only” in areas where the natural hydroperiod has been altered by excavations, groundwater pumping, or a combination of those actions. INT301R at p. 38. For support, you mention wildfires in the area of the Goethe State Forest that occurred in 2011 and May of 2012. INT301R at p. 38. You also provide a fire report that describes a 30-acre fire on the LNP site that occurred in 2011. INT301R at p. 38; INT386.
 - a. Have you provided any evidence comparing the soil types and associated vegetation types and fuel loads between the Goethe State Forest and the LNP site to demonstrate that observation of wildfire behavior in the Goethe State Forest can be applied to the LNP?
 - b. Have you provided any evidence or documents to support the claim that any of the wildfires you cite were in any way attributable to, or exacerbated by, man-made dewatering?
 - c. Isn't it true that droughts or other natural historical conditions are sufficient to explain the wildfires you cite? Isn't such an explanation consistent with your testimony that “multi-year drought conditions” currently exist at the LNP site? INT301R at p. 15.
5. Your testimony states that control of wildfires through prescribed burns and rapid response to fires in the vicinity of the LNP “will be impossible to achieve.” INT301R at p. 40. Dr. Robertson, who is a certified burn boss in Florida and other states, has testified that introduction of prescribed burning at regular intervals into flatwoods and pine plantation areas (similar to the LNP site) has, in fact, allowed wildfires to be rapidly contained before spreading over large areas. PEF404 at p. 3.
 - a. What is the basis for your conclusion that, despite Dr. Robertson's expert testimony, wildfires cannot be managed through controlled burns and rapid response? What is your level of experience regarding controlled burns and their effectiveness?

- b. You mention fires in the Goethe State Forest to support your position that prescribed burns are ineffective at controlling fires. INT301R at p. 40. Dr. Robertson testifies that the Goethe State Forest has not implemented controlled burns at the intervals necessary to help control wildfires. PEF404 at p. 3. Given Dr. Robertson’s testimony in that regard, how do fires that occurred in the Goethe State Forest support your position that prescribed burns are ineffective?
6. Dr. Robertson’s rebuttal testimony provides data showing that every wildfire since 2006 (the extent of available online data) within the township containing the LNP site has been rapidly extinguished by fire suppression efforts, limiting each fire to less than 45 acres (and limiting all but two of those fires to 5 acres or less) despite the fact there has been no controlled burning in that area. PEF404 at pp. 3-4; PEF410.
 - a. Given that data, how can you continue to claim that wildfire control, through fire suppression (which will increase in the vicinity of the LNP due to LNP resources onsite) and proposed controlled burning, will be “impossible to achieve” at the LNP?

I. Climate Change/Rainfall

Dr. Bacchus testified that the FEIS contained no analysis of the impacts of climate change on “ANY aspect” of the LNP. INT301R at p. 58 (emphasis in original). She also testified that the FEIS’s failure to consider the cumulative impact of construction and operation of the LNP plus climate change is a “fatal flaw.” INT301R at p. 62. The following questions are designed to point out that the FEIS actually did consider climate change, but that the potential impacts of climate change are too uncertain to quantify with accuracy or reliability.

1. Have you reviewed the information provided in the FEIS regarding global climate change, such as at NRC001 at pp. 2-180 through 2-183, 7-9, 7-12 through 7-20, 7-20 through 7-34, 7-42 through 7-44, and 7-44 through 7-47? If so, how can you reasonably continue to claim that there is no analysis of the impacts of climate change on “ANY” aspect of the proposed LNP?
2. Do you believe that it is possible to accurately (or even reasonably) predict the impact of global climate change on such things as sea level or precipitation, particularly over the time frame in which the LNP will operate (i.e., 40-60 years)? If so, what is the basis for that belief?
3. Please summarize your knowledge and/or experience with regard to climate change modeling. Please summarize your understanding of the accuracy of those models.
4. Isn’t it true that there are not any climate change models that are acknowledged or regarded by the scientific community to be reasonable, much less accurate?

5. In your direct testimony you state: “[T]here is no expectation that the rainfall averages of the past will continue into the future. A more relevant method than computing averages would be for the FEIS to use a ‘worst case’ scenario, such as during a multi-year drought similar to the conditions currently existing at the proposed LNP site.” INT301R at p. 15. On page 29 of your direct testimony, you similarly criticize the FEIS for relying on average annual rainfall of 53 inches.
 - a. Are you aware that, as Dr. Howroyd testified (PEF506 at p. 13), since 1980 the 10-year moving average of annual precipitation in Levy County has decreased from approximately 60 inches to 50 inches per year, which is only slightly less than the 53 annual inches of rainfall relied upon in the FEIS?
 - b. Are you also aware that, as Dr. Howroyd testified (PEF506 at p. 13), from 1940 to 1980, the 10-year moving average of annual precipitation in Levy County increased from approximately 50 inches per year to 60 inches per year?
 - c. Are you also aware that, as shown in PEF017, since 1915 the 10-year moving annual average of precipitation in Levy County has been between approximately 50 and 65 inches?
 - d. Are you also aware that, as set forth in the FEIS (NRC001 at p. 2-21), the 53 inches of annual rainfall relied upon in the FEIS is based on data from 1892 to 2009 that is taken from 13 weather stations in the LNP’s region?
 - e. Given all of these historical statistics, do you still believe that it was unreasonable for the FEIS to rely on a projection of 53 inches of annual future rainfall?
 - f. When trying to project rainfall amounts for a period of 40 to 60 years, isn’t it more reliable to look at long-term (e.g., 100 years) data, rather than just current drought conditions as your direct testimony recommends? (INT301R at p. 15).

J. Karst and Preferential Flow Paths

Dr. Bacchus refers to karst creating “preferential flow paths connecting wetlands in the vicinity of the LNP,” which she alleges “have not been considered and accurately identified.” INT301R at p. 24. The following questions address Dr. Bacchus’s lack of expertise in karst formations and geotechnical formations and her lack of any evidence contradicting the geotechnical data and information on karst set forth in the FSAR (PEF703), as described in the Testimony of Dr. Paul Rizzo (PEF700).

1. Dr. Bacchus, are you a geologist?
2. Are you qualified in the state of Florida, or any other state, to provide expert opinion on geotechnical formations?
3. Have you reviewed the materials in the FSAR (PEF703), as described in the testimony of Dr. Paul Rizzo (PEF700), regarding the

geotechnical/geological characteristics of the LNP site and surrounding area, the results of core drillings, the results of aerial and field inspections of the region surrounding the site, and the results of pump tests regarding the flow in the aquifer?

- a. If yes, how do you square the information and data on the LNP site formation in the FSAR, which served as the basis of the NRC Staff and ACRS safety findings regarding the geotechnical conditions of the site, with your testimony?
- b. If no, what is the basis of your testimony that the LNP site is subject to “preferential flow paths?”

K. Sinkholes

Dr. Bacchus stated that the increased weight of impounded water in stormwater ponds could cause sinkhole collapse. In support, Dr. Bacchus refers to sinkholes that opened up when the Suncoast Parkway was under construction. (INT301R at p. 32). The following questions address the facts that no sinkholes have been identified on the LNP site after a careful investigation, and that the weight of water, which is less than the weight of soil, in stormwater ponds would not cause sinkholes to collapse in any event.

1. Where the stormwater ponds at the LNP keep the normal water level in the ponds at the same level as the natural landscape, how can water, which is lighter than soil, increase the weight on the bottom of the ponds? (See PEF016 at pp. 9 -10).
2. Do you have any evidence of sinkholes at the LNP site?
3. Do you have any evidence of stormwater ponds causing sinkholes to collapse in the Avon Park Formation?

L. Evapotranspiration Rates

Dr. Bacchus asserts that stormwater ponds will dewater and not recharge the groundwater system. INT301R at p. 31. This is allegedly due to high rates of evaporation from the open water in the stormwater ponds. Id. at p. 31. The following questions challenge Dr. Bacchus’s reliance on her 2006 paper based on open pit mining (INT363) and a 2000 analysis of two lakes in Central Florida (INT433) with groundwater seepage, rather than data more relevant to the LNP site. See PEF016 at pp. 3-5 and PEF018.

1. Did you obtain evidence or conduct evaluations in support of your claimed rates of evaporation for the proposed LNP stormwater ponds from annual lake evaporation in the vicinity of the LNP site?
2. Did you review Dr. Griffin’s exhibit comparing published literature on evapotranspiration rates in Florida (PEF018)?
3. Why did you choose data from open pit mining near Miami (INT363) and lakes in Central Florida (INT433) with known groundwater replenishment and not data from closer locations in Levy County (PEF011) to support your arguments?

4. Isn't it true, as noted in the testimony of Dr. Griffin (PEF016 at p. 5) and of the NRC Staff (NRCTEST at p. 54) that the series of stormwater ditches and stormwater ponds at the LNP site will be a source of net recharge to the aquifer most of the year and cannot reasonably be foreseen to cause net passive dewatering based on more representative values for annual rainfall and annual evapotranspiration in North Florida's humid subtropical climate?

M. Salinity

Dr. Bacchus makes a number of arguments relating to "salinization" of the CFBC (which she refers to as the Withlacoochee Canal). INT301R at pp. 20 - 24. The following questions highlight the lack of any support for Dr. Bacchus's hypotheses.

1. Have you reviewed Dr. Griffin's rebuttal testimony (PEF016) and salinity data described therein (id. at pp. 14 - 17; PEF021; PEF022), which data was provided to the NRC and became part of the basis for the NRC's analysis of salinity changes in the CFBC (NRC001 at pp. 2-197, 4-140, 5-139)?
2. Are you aware that certain of the data include water quality monitoring data collected since 1997 by the University of Florida and Florida Department of Environmental Protection (PEF016 at p. 14, note 7; PEF022)?
3. Have you compared the volume of Gulf water flows into the CFBC twice daily during each high-tide cycle with the withdrawal rate from the cooling water intake structure?
4. You refer to "inadvertent groundwater withdrawals from the Withlacoochee Canal via permitted supply wells, which would result in that water body becoming saline." INT301R at p. 22. How could a "permitted" supply well inadvertently withdraw groundwater from the Withlacoochee Canal? What is the basis for that assertion? How much could it affect salinity in the CFBC?
5. What is the basis of your statement that "proposed withdrawals also would eliminate the lens of freshwater overlying the saltwater wedge in the tidally influenced Withlacoochee Canal, Withlacoochee River and tidal creeks" (INT301R at pp. 21-22)? How could this occur with constant tidal mixing?
6. Have you reviewed the flow of the Withlacoochee River from Lake Rousseau at the USGS gauge on the Bypass Canal (PEF012)? Isn't it true that the lowest recorded flow into the Withlacoochee River over the spillway is 86 cfs (PEF012 at p. 3)? In light of that data, how do you conclude that the NRC's estimated reduction of only 0.4 million gallons per day flow to the lower Withlacoochee River (or 0.6 cfs) could create LARGE adverse impacts (INT301R at p. 19)?

7. In light of the salinity data, tidal impacts, withdrawal rates from the cooling water intakes, and continued flow of water from Lake Rousseau, isn't it true that the NRC considered large quantities of available data and correctly evaluated that the net effect of removal of brackish water from the CFBC and the minimal potential reduction of freshwater flows due to groundwater withdrawal are expected to cause the brackish water in the CFBC to increase in salinity by a very small percent (the FEIS concluded that, during operation of the LNP units, the CFBC would experience elevated salinity slightly more frequently (89 percent of the time) than it currently does (86 percent of the time)? NRC001 at 5-10 to 5-14.

Respectfully Submitted,

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Dated: August 30, 2012

**UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION**

Before the Atomic Safety and Licensing Board

In the Matter of)	
)	Docket Nos. 52-029-COL
Progress Energy Florida, Inc.)	52-030-COL
)	
Combined License Application for)	
Levy County Nuclear Plant, Units 1 and 2)	ASLBP No. 09-879-04-COL

CERTIFICATE OF SERVICE

I hereby certify that the foregoing “Progress Energy Florida, Inc.’s Proposed Questions For the Board to Ask,” dated August 30, 2012, was provided to the Electronic Information Exchange for service, in camera, on the members of the Atomic Safety and Licensing Board, as required by the August 27, 2009 Initial Scheduling Order in this proceeding.

Respectfully Submitted,

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August 30, 2012

ATTACHMENT 4

Intervenors' Proposed Questions Submitted at the Evidentiary Hearing²

² The Intervenors also submitted a number of questions orally at the hearing. See Tr. at 1333-38. Because these questions are already in the record, we need not repeat them here.

Intervenors' Proposed Questions Regarding Groundwater Modeling

Questions for the NRC Staff:

1. Were you aware that the nuclear islands were not simulated in the local models before you finalized the EIS?
2. Were you aware that the local models included a non-existent river before you finalized the EIS?
3. How would inserting the nuclear islands into the M2 model affect the predicted spring flow at Big and Little King Springs?
4. How would inserting the nuclear islands affect the shape and magnitude of the predicted drawdown from the models?
5. Was any well coverage available for the south site when M2 was constructed?
6. If so, how many wells on the south site were used for calibration of the M2 model?
7. Of the 23 wells used for calibration, how many had continuous water level measurement?
8. Were the continuous water level data used to see if the model effectively predicted transient effects during droughts or floods?
9. How big a difference in heads between the USGS interpretation and actual measured heads would you need to see to label it inconsistent?
10. If there were preferential pathways under the south site, would you expect to see a symmetric cone of depression developing?
11. M1 vs. M2, we already have 2 very different drawdowns and extents based on 2 different conceptualizations – what could the addition of other features do?
12. Did they calibrate any model based on measured transmissivities?
13. If so, how many measurements did they use and where were those values measured?

Questions for PEF:

1. Did they use any real data on the actual flow of the Big and Little King springs for calibration beyond the information in the Springs of Florida?
2. During the maximum pumping transient runs, how did the predicted flow change at Big and Little King springs?

Intervenors' Proposed Questions Regarding Monitoring and Mitigation

Questions for PEF:

1. PEF305 Table 1 – does the EMP currently include any monitoring of Big and Little King springs and the springs along the Florida Barge Canal?
2. If so, what monitoring will be done? (e.g. continuous flow, periodic flow, calcium/magnesium ratio or other geochemistry)
3. How will the SPT determine whether preferential pathways are present?
4. Given the uncertainty, why didn't PEF do the APT before completion of the EIS to provide more certainty about aquifer characteristics?
5. PEF005A p44 – If an AWS is required, what is maximum permissible time for it to be implemented?
6. Is it likely that the plant would cease operation in the interim before the AWS is in place?
7. If the hydrological data exceeds the maximum threshold and PEF determines that the wellfield is causing that impact, what action will be taken?
8. How long will it take for that action to be taken?

Questions for NRC Staff:

1. Could a reduction of 1.8 feet in groundwater level cause a degradation in quality of the wetlands on or off the LNP site?
2. For example, could a 1.8 feet drawdown at Big King spring, cut off the spring flow that feeds those wetlands?

ATTACHMENT 5

PEF's Proposed Questions Submitted at the Evidentiary Hearing

PEF's Proposed Questions on Site Characterization

Questions for the NRC Staff:

1. Notwithstanding the fact that LNP's operational withdraws have been permitted for an annual average 1.58 mgd, are you aware that LNP's anticipated annual average operational withdrawals are to be around 1.25 mgd?
2. Assuming that there are preferential conduits in the area in the vicinity of the LNP wellfield—wouldn't the resulting higher transmissivity result in drawdowns of smaller magnitude and area?

Question for Dr. Bacchus:

1. What is the potentiometric gradient that would be needed to dislodge a plug in a relict sinkhole?

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of)
)
PROGRESS ENERGY FLORIDA, INC.) Docket Nos. 52-029-COL
) and 52-030-COL
 (Levy County Nuclear Power Plant)
 Units 1 and 2))
)
 (Combined License))

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing **MEMORANDUM AND ORDER (Providing Proposed Questions for Evidentiary Hearing on Contention 4A)** have been served upon the following persons by Electronic Information Exchange.

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Docket Nos. 52-029-COL and 52-030-COL

MEMORANDUM AND ORDER (Providing Proposed Questions for Evidentiary Hearing on Contention 4A)

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[Original signed by Clara Sola]

Office of the Secretary of the Commission

Dated at Rockville, Maryland
this 20th day of May 2013