UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
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	)	
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 FINDINGS OF FACT AND CONCLUSIONS OF LAW REGARDING CONTENTION 4A

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December 5, 2012

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I. INTRODUCTION

1. This partial initial decision rules on all outstanding issues regarding the Intervenors' challenge in Contention 4A to the NRC staff's (Staff) analysis in its final Environmental Impact Statement (FEIS) of environmental impacts from both dewatering and salt drift and deposition from building and operating the Levy County Nuclear Power Plant (LNP).[1] This proceeding relates to Progress Energy Florida's (PEF or Applicant) application for two combined construction permits and operating licenses (COL) to build and operate two nuclear

[1] The Intervenors were, at the time they filed their intervention petition, the Ecology Party of Florida, the Green Party of Florida, and the Nuclear Information and Resource Service. On May 17, 2012 the Intervenors filed a notice that the Green Party of Florida was withdrawing from the proceeding.

power plants at the LNP site in Levy County, Florida. Contrary to the Intervenors' claims, we find that the Staff's FEIS appropriately discussed the reasonably foreseeable environmental impacts from dewatering and salt drift and deposition. We conclude, therefore, as a matter of law, that the FEIS meets the requirements of the National Environmental Policy Act (NEPA) and the NRC's regulations in 10 C.F.R. Part 51.

II. BACKGROUND

A. General Procedural History

2. On July 28, 2008, PEF filed an application for COLs for two new reactors in Levy County, Florida. The Federal Register notice of docketing was published on October 14, 2008 (73 Fed. Reg. 60,726), and the Federal Register notice of hearing and opportunity to petition for leave to intervene (Hearing Notice) was published on December 8, 2008 (73 Fed. Reg. 74,532). On February 6, 2009, the Intervenors collectively filed a petition to intervene containing several contentions.[2] On July 8, 2009, the Board issued a Memorandum and Order granting the hearing request and admitting parts of Contentions 4, 7, and 8. Progress Energy Florida, Inc. (Levy County Nuclear Power Plant, Units 1 and 2), LBP-09-10, 70 NRC 51, 109 (2009).

3. Contention 4A is the remaining contention in this proceeding. As originally admitted, Contention 4 challenged the analysis in the Applicant's Environmental Report (ER) of impacts associated with dewatering and salt drift and deposition during construction and operation. Id. The Commission affirmed the admission of Contention 4 in ruling on PEF's

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[2] Petition to Intervene and Request for Hearing by the Green Party of Florida, the Ecology Party of Florida, and Nuclear Information and Resource Service (Feb. 6, 2009).

appeal of the Board's decision. Progress Energy Florida, Inc. (Levy County Nuclear Power Plant, Units 1 and 2), CLI-10-02, 71 NRC 27, 28-29 (2010).

4. The Staff issued the draft Environmental Impact Statement (DEIS) for the Levy project on August 5, 2010, and the Federal Register notice of availability for the DEIS was published on August 13, 2010. 75 Fed. Reg. 49,539. PEF then filed motions for summary disposition—one asserting that portions of Contention 4 related to active dewatering were moot[3] and another regarding parts of Contention 4 relating to salt drift and passive dewatering[4]—on September 30, 2010 and October 4, 2010. The Intervenors filed an amended Contention 4 relating to hydroecology on November 15, 2010.[5] The Staff opposed the admission of certain bases not present in the initial Petition and PEF opposed admission of the amended contention entirely.[6] The Board admitted this contention as Contention 4A, with the exception of certain bases, on February 2, 2011. Licensing Board Memorandum and Order (Admitting Contention 4A), at 22 (Feb. 2, 2011) (unpublished) On the same day, the Board issued Orders denying the motion to dismiss Contention 4 as moot and the motion for summary disposition. Progress Energy Florida, Inc. (Levy County Nuclear Power Plant, Units 1 and 2), LBP-11-01, 73 NRC __

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[3] Motion to Dismiss as Moot the Aspects of Contention 4 Related to Active Dewatering During Levy Nuclear Plant Operations (Sept. 30, 2010).

[4] Progress Energy's Motion for Summary Disposition of Contention 4 (Environmental Impacts of Dewatering and Salt Drift) with Regard to Salt Drift and Passive Dewatering (Oct. 4, 2010).

[5] Ecology Party of Florida, Green Party of Florida, and Nuclear Information and Resource Service Motion for Leave to Amend Contention 4 (Nov. 15, 2010).

[6] NRC Staff Answer to Joint Intervenors' Motion to Amend Contention 4 (Dec. 12, 2010); Progress Answer Opposing Joint Intervenors' Amended Contention 4 (Dec. 12, 2010).

(Feb. 2, 2011) (slip op.); Licensing Board Memorandum and Order (Denying Motion for Summary Disposition of Aspects of Contention 4) (Feb. 2, 2011) (unpublished). Contention 4A, as reframed by the Board, reads as follows:

CONTENTION 4A: The Final Environmental Impact Statement (FEIS) fails to comply with 10 C.F.R. Part 51 and the National Environmental Policy Act because it fails to specifically and adequately address, and inappropriately characterizes as SMALL, certain direct, indirect, and cumulative impacts, onsite and offsite, of constructing and operating the proposed LNP facility:

A. Impacts to wetlands, floodplains, special aquatic sites, and other waters, associated with dewatering, specifically:
   1. Impacts resulting from active and passive dewatering;
   2. Impacts resulting from the connection of the site to the underlying Floridan aquifer system;
   3. Impacts on Outstanding Florida Waters such as the Withlacoochee and Waccasassa Rivers;
   4. Impacts on water quality and the aquatic environment due to alterations and increases in nutrient concentrations caused by the removal of water; and
   5. Impacts on water quality and the aquatic environment due to increased nutrients resulting from destructive wildfires resulting from dewatering.

B. Impacts to wetlands, floodplains, special aquatic sites, and other waters associated with salt drift and salt deposition resulting from cooling towers (that use salt water) being situated in an inland, freshwater wetland area of the LNP site.

C. As a result of the omissions and inadequacies described above, the Final Environmental Impact Statement also failed to adequately identify, and inappropriately characterizes as SMALL, the proposed project's zone of:
   1. Environmental impacts;
   2. Impact on Federally listed species;
   3. Irreversible and irretrievable environmental impacts; and
   4. Appropriate mitigation measures.

Licensing Board Memorandum and Order (Admitting Contention 4A), at 1, Attachment A (Feb. 2, 2011) (unpublished).[7]

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[7] In this statement of position, the elements of the contention will be referred to either by part (Part A, B, and C) or subpart (Subpart A1, A2, etc.).

5. Contention 7, as admitted by the Board, challenged the failure to include an analysis of environmental impacts associated with the management of LLRW. Levy County, LBP-09-10, 70 NRC at 72-78 (2009). The Commission affirmed the admission of Contention 7, with the exception of the portion relating to the disposal of greater than class C waste. Levy County, CLI-10-02, 71 NRC at 46-48 (2010). Following the issuance of the DEIS, PEF filed a motion for summary disposition on Contention 7 on August 12, 2010.[8] In their Answer, the Intervenors agreed that the DEIS cured the omissions raised by Contention 7;[9] accordingly, the Board granted the motion and dismissed Contention 7. Licensing Board Memorandum and Order (Granting Motion for Summary Disposition of Contention 7 as Moot) (Sept. 8, 2011) (unpublished). Subsequently, the Intervenors filed an amended Contention 7[10] challenging the adequacy of the DEIS, which the Board denied on March 16, 2011. Licensing Board Memorandum and Order (Denying Contention 7A) (Mar. 16, 2011) (unpublished).

6. Contention 8, as admitted by the Board, challenged PEF's omission in its COLA of plans for long term management of low level radioactive waste (LLRW). Levy County, LBP-09-10, 70 NRC at 72-78 (2009). The Commission affirmed the admission of Contention 8, with the exception of the portion relating to the disposal of greater than class C waste. Levy County, CLI-10-02, 71 NRC at 46-48 (2010). Following PEF's amendment to its LLRW management

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[8] Motion for Summary Disposition of Contention 7 as Moot (Aug. 12, 2010).

[9] Response of Interveners to Progress Energy August 12, 2010 Motion for Summary Disposition on Contention Seven as Moot (Aug. 31, 2010).

[10] Motion for Leave to File a New, Timely Contention and Contention 7A: Inadequacy of the Levy DEIS with Respect to the Environmental Impacts of Low-Level Radioactive Waste (Oct. 4, 2010).

plan to further address long term storage, the parties filed a joint motion requesting the dismissal of Contention 8 on April 14, 2010.[11] The Intervenors then filed an amended Contention 8 challenging the adequacy of PEF's long-term LLRW management plan, which the Board admitted as Contention 8A on August 9, 2010. Licensing Board Memorandum and Order (Ruling on Joint Intervenors' Motion to File and Admit New Contention 8A) (August 9, 2010) (unpublished). PEF subsequently filed a motion for summary disposition on Contention 8A[12] that the Board denied, finding instead for the Intervenors. Progress Energy Florida, Inc. (Levy County Nuclear Power Plant, Units 1 and 2), LBP-10-20, 72 NRC 571, 575 (2010). The Commission denied the Staff's appeal of the Board's Order, ruling that it was not ripe for review. Progress Energy Florida, Inc. (Levy County Nuclear Power Plant, Units 1 and 2), CLI-11-10, 74 NRC __, __ (Sept. 27, 2011) (slip op. at 1). Following its submittal of supplemental RAI responses regarding its LLRW management plan, PEF filed a motion for summary disposition of Contention 8A.[13] On November 4, 2011, the Board granted summary disposition of Contention 8A. Progress Energy Florida, Inc. (Levy County Nuclear Power Plant, Units 1 and 2), LBP-11-31, 74 NRC __ (Nov. 4, 2011).

7. On July 9, 2012, the Intervenors filed a "Motion for Leave to File a New Contention Concerning Temporary Storage and Ultimate Disposal of Spent Reactor Fuel at

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[11] Joint Motion for Approval of Settlement and Dismissal of Contention 8 (April 14, 2010).

[12] Motion for Summary Disposition of Contention 8A (Aug. 27, 2010). The Staff filed its "Answer in Support of Progress Energy Florida's Motion for Summary Disposition of Contention 8A," on September 16, 2010.

[13] Progress Energy Florida, Inc's Motion for Summary Disposition of Contention 8A in Light of Revised Extended LLRW Plan (Aug. 27, 2011).

Levy Nuclear Plant." The Staff filed a Response to this Motion on August 2, 2012, and the Applicant filed its Answer on August 3, 1012. On August 16, 2012, this Board issued an Order holding this new contention in abeyance and stating that "until this pending contention is decided, the contested portion of this adjudicatory proceeding, and the jurisdiction of this Board, does not terminate." Licensing Board Order (Holding Proposed New Contention in Abeyance) at 1 (August 16, 2012) (unpublished).

B. Evidentiary Filings and Hearing

8. On June 26, 2012, the Intervenors, the Applicant and the Staff filed their pre-filed direct testimony in this case, along with exhibits and initial statements of position. The Staff's Pre-filed Direct Testimony was entitled "NRC Staff Testimony of Mallecia A. Sutton, Ann L. Miracle, Michael T. Masnik, J. Peyton Doub, Lara M. Aston, Dan O. Barnhurst, Lance W. Vail, Rajiv Prasad, Vince R. Vermeul, Kevin R. Quinlan, and Larry K. Berg Concerning Contention 4A." The Intervenors' Pre-filed Direct Testimony included the testimony of Mr. Gareth Davies, Dr. Timothy Hazlett, Mr. David Still and Dr. Sydney Bacchus. The Applicant's Pre-filed Direct Testimony included the testimony of Dr. Mitchell L. Griffin, Mr. James O. Rumbaugh, III, Mr. Jeffery M. Lehnen, Dr. William J. Dunn, Dr. Kevin M. Robertson, Dr. George C. Howroyd, and Dr. Eldon C. Blancher II.

9. On July 6, 2012, the Intervenors filed errata to their direct testimony, statement of position and exhibits, and they filed a motion to admit six new exhibits. On July 9, 2012, the Intervenors filed redline versions of their statement of position and testimony, a second erratum to their testimony, and a motion to admit the new versions of their direct testimony and exhibits. On July 18, 2012, the Board issued a Memorandum and Order admitting Intervenors' new exhibits, corrected exhibits and corrected testimony. Licensing Board Memorandum and Order (Ruling and Instructions Regarding Evidentiary Filings) at 3-5 (July 18, 2012) (unpublished).

10. On July 31, 2012, the parties filed their Pre-Filed Rebuttal Testimony and exhibits for Contention 4A. The Staff's Rebuttal Testimony was entitled "NRC Staff Pre-Filed Rebuttal Testimony of Ann L. Miracle, Michael T. Masnik, J. Peyton Doub, Lara M. Aston, Dan O. Barnhurst, Lance W. Vail, Rajiv Prasad, Vince R. Vermeul, Kevin R. Quinlan, Larry K. Berg, and Gerry L. Sitrewalt Concerning Contention 4A." The Applicant's Pre-Filed Rebuttal Testimony includes testimony from Dr. Griffin, Mr. Rumbaugh, Mr. Lehnen, Dr. Dunn, Dr. Robertson, Dr. Howroyd, Dr. Blancher, Dr. Paul C. Rizzo, and Mr. Peter F. Hubbell. The Intervenors' Pre-Filed Rebuttal Testimony includes testimony from Mr. Davies, Dr. Hazlett, Mr. Still, and Dr. Bacchus.

11. On August 10, 2012, the Applicant and Staff filed motions *in limine* to exclude portions of the Staff's, Applicant's, and Intervenors' Direct Testimony, Rebuttal Testimony and Initial and Rebuttal Statements of Position concerning Contention 4A. On August 22, 2012, the Intervenors filed an opposition to the Staff and Applicant's *in limine* motions. On September 6, 2012, the Board granted in part and denied in part the Staff and Applicant's motions *in limine.* The Board granted the Staff's motion to strike the Intervenors' references to Dr. Bacchus' DEIS comments, the Intervenors' claims that the Applicant's Environmental Monitoring Plan ("EMP") was not circulated for public comment, and discussions of alternatives to the proposed action. However, the Board denied the Staff and Applicant's requests to exclude the Intervenors' testimony related to alternative water supplies within the context of mitigation of environmental impacts. Licensing Board Memorandum and Order (Granting in Part and Denying in Part Motion in Limine and Motion to Strike) (Sept. 6, 2012) (unpublished). On August 30, 2012, the parties filed their proposed questions for the Board to ask the other arties to the Board *in camera*.

12. On September 21, 2012, the Board issued an Order requesting that the parties submit initial and rebuttal briefs on certain legal issues relevant to the evidentiary hearing to be

held on October 31, 2012 and November 1, 2012. Licensing Board Memorandum and Order (Regarding the Briefing of Certain Legal Issues) (Sept. 21, 2012) (unpublished). All three parties filed briefs in response to this Order on October 5, 2012, and reply briefs on October 12, 2012.

13. On October 31, 2012, the Board convened an evidentiary hearing, where it admitted pre-filed testimony and evidence into the record for Contention 4A. (See Official Transcript at 1088 to 1100 (hereinafter "Tr")), heard opening statements and took testimony regarding site characterization. The evidentiary hearing continued to November 1, 2012, where the Board took testimony regarding groundwater modeling and mitigation plans and the parties presented closing arguments on Contention 4A. See Tr. at 1572 to 1589. On November 20, 2012, the parties proposed corrections to the hearing transcript for October 31, 2012 and November 1, 2012. On December 3, 2012, the Board issued a Memorandum and Order adopting corrections to the official transcript and closing the evidentiary record regarding Contention 4A. Licensing Board Memorandum and Order (Adopting Corrections to the Official Transcript and Closing the Evidentiary Record Regarding Contention 4A) (unpublished).

14. The Board admitted the following pre-filed Staff exhibits into evidence: Ex. NRC000 to Ex. NRC0025, Ex. NRC027 to Ex. NRC048R, Ex. NRC050 to Ex. NRC066, Ex. NRC068 to Ex. NRC081, Ex. NRC090 to Ex. NRC092. Tr. at 1088-89.

15. The Board also admitted the following pre-filed Applicant exhibits into evidence: Ex. PEF000 to Ex. PEF015; Ex. PEF100 to Ex. PEF103; Ex. PEF200 to Ex. PEF217; Ex. PEF300 to Ex. PEF314; Ex. PEF400 to Ex. PEF403; Ex. PEF500 to Ex. PEF505; Ex. PEF600 to Ex. PEF607. Tr. 1088-89.

16. At the hearing, the Intervenors informed the parties that they were withdrawing several of their pre-filed exhibits. The Intervenors memorialized this with a Motion to Withdraw

Certain Exhibits on November 9, 2012. We granted this Motion and admitted the following Intervenors exhibits on December 3, 2012. Licensing Board Order (Admitting Intervenors' Exhibits and Granting Motion to Withdraw Exhibits) (unpublished): Ex. INT000 to Ex. INT009; Ex. INT101 to Ex. INT105; Ex. INT201 to Ex. INT218; Ex. INT301 to Ex. INT307; Ex. INT309 to Ex. INT333; Ex. INT335 to Ex. INT352; Ex. INT354 to Ex. INT 391; Ex. INT393 to Ex. INT403; Ex. INT405 to Ex. INT406; Ex. INT410; Ex. INT412; Ex. INT414 to Ex. INT415; Ex. INT418 to Ex. INT419; Ex. INT428 to Ex. INT429; Ex. INT431 to Ex. INT435; Ex. INT437 to Ex. INT438.

C. Terminology

17. At the beginning of the oral hearing, this Board set forth certain naming conventions to clarify the terminology used throughout this case. Tr. at 1128-31. For this decision we will use the same terminology. When this Board uses the term "LNP site" we mean the entire property owned by PEF as shown on Figure 2-3 of the FEIS. Ex. NRC001A at 2-5. When we say "North Property," we mean the northern area of the property on that figure, which is where the Applicant proposes to build the nuclear island. When we say the "South Property," we mean the southern portion of PEF-owned land on that figure. The South Property is the proposed location for the groundwater wells.

18. In this case, there are three groundwater models discussed in all of the parties' testimony. The first is a regional model created by the South West Florida Water Management District (SWFWMD), called the District Wide Regulation Model 2 (DWRM2). We refer to this model as the "Regional Model." The Applicant also created two local scale versions of the Regional Model. The Applicant submitted the first model with its Environmental Report (ER) and we will refer to that as "Model 1." The Applicant provided the second local-scale model in response to a Staff request. We refer to this second model as "Model 2."

19. Throughout this Order we will refer to the terms "SMALL", "MODERATE" and "LARGE" used by the Staff in the FEIS and its testimony to denote determinations regarding levels of impact to particular environmental resources. The terms are discussed in Chapter 1 of the FEIS (Ex. NRC001A at 1-3 - 1-4) and are codified in Table B-1 of 10 C.F.R. Part 51, Subpart A, Appendix B. They are defined there as follows:

> SMALL – Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
>
> MODERATE – Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.
>
> LARGE – Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

III. LEGAL AND REGULATORY REQUIREMENTS

A. General NEPA Requirements

20. The contention at issue in this case arises under the National Environmental Policy Act ("NEPA"), and the NRC's regulations in Part 51 that implement that statute. 42 U.S.C. §§ 4321 *et seq*; 10 C.F.R. Part 51. NEPA requires that an agency prepare an Environmental Impact Statement (EIS) before approving any major Federal action that will significantly affect the quality of the human environment. 42 U.S.C. § 4332(2)(C). The NRC requires its Staff to prepare an EIS prior to issuing a COL. 10 C.F.R. § 51.20(a)(2).

21. Under NEPA, the NRC is required to take a "hard look" at the environmental impacts of a proposed action, as well as reasonable alternatives to that action. See Louisiana Energy Servs., L.P. (Claiborne Enrichment Center), CLI-98-3, 47 NRC 77, 87-88 (1998). This "hard look," however, is tempered by a "rule of reason" that requires agencies to address only impacts that are reasonably foreseeable – not remote and speculative. See, e.g., Long Island Lighting Co. (Shoreham Nuclear Power Station, Unit 1), ALAB-156, 6 AEC 831, 836 (1973).

Along the same line, NEPA requires that an agency consider only "reasonably foreseeable" indirect effects of a proposed licensing action and "does not call for certainty or precision, but an *estimate* of anticipated (not unduly speculative) impacts." See Louisiana Energy Services, L.P. (National Enrichment Facility), CLI-06-15, 63 NRC, 687, 698 (2006); Louisiana Energy Servs. L.P. (National Enrichment Facility), CLI-05-20, 62 NRC 523, 536 (2005) (emphasis in original). Moreover, "NEPA gives agencies broad discretion to keep their inquiries within appropriate and manageable boundaries." Louisiana Energy Servs., L.P., CLI-98-3, 47 NRC at 103. Similarly, environmental impacts should be discussed in proportion to their significance. 10 C.F.R. § 51.45(b)(1).

22. During its environmental review, the Staff "has discretion to rely on data, analyses, or reports prepared by persons or entities other than agency staff, including competent and responsible state authorities." See, e.g., Public Service Co. of Oklahoma (Black Fox Station, Units 1 and 2), LBP-78-28, 8 NRC 281, 282 (1978). It is also appropriate to give greater weight to an expert body's analysis in the subject area of its expertise. See Carolina Power & Light Company (Shearon Harris Nuclear Power Plant, Units 1, 2, 3, and 4), ALAB-490, 8 NRC 234, 241 (1978). Ultimately, though, the Staff is responsible for all information used in the EIS and thus must conduct an independent evaluation of this information. 10 C.F.R. § 51.41; see also Exelon Generation Co. (Early Site Permit for Clinton ESP Site), LBP-05-19, 62 NRC 134, 155 (2005). Therefore, "although the Staff need not replicate the work done by another entity, it must independently review and find relevant and scientifically reasonable any outside reports or analyses on which it intends to rely." See Louisiana Energy Services, L.P. (National Enrichment Facility), LBP-06-8, 63 NRC 241, 259 (2006).

23. Similarly, when relying on mitigation plans, there is no requirement that the mitigation plan be completely formulated and adopted. Robertson v. Methow Valley Citizens

Council, 490 U.S. 332, 352 (1989). In Robertson, the Supreme Court held that the Forest Service need not have a completed state mitigation plan to rely on in order for its EIS discussion of mitigation to be adequate, stating that "[s]ince it is those state and local governmental bodies that have jurisdiction over the area in which the adverse effects need be addressed, and since they have the authority to mitigate them, it would be incongruous to conclude that the Forest Service has no power to act until the local agencies have reached a final conclusion on what mitigation measures they consider necessary." Id. at 352-53.[14]

24. NEPA does not require the use of the best scientific methodology. See Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc. (Pilgrim Nuclear Power Station), CLI-10-11, 71 NRC 287, 315-316 (2010). As NEPA does not require certainty or precision or the use of the best methodology, the Staff need not prove, and this Board need not find, that the Staff's approach is the most accurate or was performed with the best methodology. See LES, CLI-05-20, 62 NRC at 536 (stating that NEPA does not require certainty or precision); Pilgrim, CLI-10-11, 71 NRC at 315 (stating that NEPA does not require use of the best methodology). Under NEPA, an agency is free to select its own methodologies so long as they are reasonable. See Pilgrim, CLI-10-11, 71 NRC at 316. In addition, NEPA must be construed "in the light of

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[14] We are aware that another Licensing Board recently denied a summary disposition request, in part, because the Staff and Applicant relied on a mitigation plan that was not an NRC requirement. Detroit Edison Co. (Fermi Nuclear Plant, Unit 3), LBP-12-23, 76 NRC __ (Slip op. at 26) (November 9, 2012). While this Board is not required to follow the decisions of other Licensing Boards, we find that we do not need to reach the question of whether we agree with the Fermi Board's analysis here, because the two cases are distinguishable. The Fermi Board held that "the DEIS fails to identify any statutory or regulatory requirements that will mandate implementation of the Conservation Plan and the additional monitoring the DEIS states will be necessary." Id. In contrast, here, the monitoring plans are included in the Florida Department of Environmental Protection's Conditions of Certification, and are thus requirements for the Applicant.

reason if it is not to demand virtually infinite study and resources." Id. (quoting Natural Res. Def. Council v. Hodel, 865 F.2d 288, 294 (D.C. Cir. 1988)). An EIS is not intended to be a research document reflecting the latest technology, data, and methods. Id. at 37. Because there "will always be more data that could be gathered," agencies "must have some discretion to draw the line and move forward with decisionmaking." Id. (quoting Town of Winthrop v. FAA, 535 F.3d 1, 11-13 (1st Cir. 2008).

B. Burden of Proof

25. An applicant generally has the burden of proof in a licensing proceeding. 10 C.F.R. § 2.325. However, in cases involving NEPA contentions, the burden shifts to the NRC because the NRC, not the applicant, has the burden of complying with NEPA. See, e.g., Duke Power Co. (Catawba Nuclear Station, Units 1 & 2), CLI-83-19, 17 NRC 1041, 1049 (1983). Nevertheless, because "the Staff, as a practical matter, relies heavily upon the Applicant's ER in preparing the EIS, should the Applicant become a proponent of a particular challenged position set forth in the EIS, the Applicant, as such a proponent, also has the burden on that matter." Louisiana Energy Servs., L.P. (Claiborne Enrichment Center), LBP-96-25, 44 NRC 331, 338-39 (1996), rev'd on other grounds by Louisiana Energy Servs., L.P. (Claiborne Enrichment Center) CLI-97-15, 46 NRC 294 (1997), citing Pub. Serv. Co. of New Hampshire (Seabrook Station, Units 1 and 2), ALAB-471, 7 NRC 477, 489 n.8 (1978).

26. "NRC hearings on NEPA issues focus entirely on the adequacy of the NRC Staff's work." Southern Nuclear Operating Co. (Early Site Permit for Vogtle ESP Site), CLI-07-17, 65 NRC 392, 395 (2007). Therefore, in challenging the EIS, intervenors must identify, with some specificity, the alleged deficiencies in the NRC's NEPA analysis. See Hydro Res., Inc. (2929 Coors Road, Suite 101, Albuquerque, NM 87120), CLI-99-22, 50 NRC 3, 13 (1999). In order to advance a claim under NEPA, the intervenor must allege with adequate support that

the NRC Staff has failed to take a "hard look" at one or more significant environmental questions, meaning that the Staff has unduly ignored or minimized pertinent environmental effects of the proposed action. Duke Energy Corp. (McGuire Nuclear Station, Units 1 & 2; Catawba Nuclear Station, Units 1 & 2), CLI-03-17, 58 NRC 419, 431 (2003) (discussing what an intervenor must allege, with adequate support, to litigate a NEPA claim). As the Commission has stated, "[o]ur Boards do not sit to 'flyspeck' environmental documents or to add details or nuances. There may be mistakes in the EIS, but it is the intervenor's burden to show their materiality and significance. If the ER (or EIS) on its face 'comes to grips with all important considerations' nothing more need be done." Clinton ESP, CLI-05-29, 62 NRC at 811 (quoting Systems Energy Resources, Inc. (Early Site Permit for Grand Gulf Site), CLI-05-4, 61 NRC 10, 13 (2005)). Finally, "in an adjudicatory hearing, to the extent that any environmental findings by the Presiding Officer (or the Commission) differ from those in the FEIS, the FEIS is deemed modified by the decision." Hydro Resources, Inc. (P.O. Box 15910, Rio Rancho, NM 87174), CLI-01-04, 53 NRC 31, 53 (2001).

C. Expert Witnesses

27. An expert opinion is only admissible if the witness is competent to give an expert opinion and adequately states and explains the factual basis for the expert opinion. Duke Cogema Stone & Webster (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-05-04, 61 NRC 71, 81 (2005). An admissible expert opinion must be "based upon sufficient facts or data to be the product of reliable principles and methods that the witness applied to the facts of the case." Id. at 80. In addition, a party bears the burden of demonstrating that its witness is qualified to serve as an expert. Duke Energy Corp. (Catawba Nuclear Station, Units 1 and 2), CLI-04-21, 60 NRC 21, 27 (2004). "A witness may qualify as an expert by knowledge, skill, experience, training, or education to testify [i]f scientific, technical, or other specialized

knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue." Id. at 27-28 (internal quotation marks omitted, alteration in original).

IV. Findings of Fact for Contention 4A

A. Expert Witnesses

28. The parties in this proceeding put forth the testimony of twenty witnesses. The Board finds that all of the witnesses are qualified as expert witnesses in the subject matters in which they provided testimony. A summary of the witnesses' professional qualifications is provided below.

1. Staff Witnesses

29. The Staff presented a total of twelve expert witnesses in its direct and rebuttal pre-filed testimony. The Staff witnesses are (1) Mallecia A Sutton, (2) Dr. Ann L. Miracle, (3) Dr. Michael T. Masnik, (4) J. Peyton Doub, (5) Lara M. Aston, (6) Dan O. Barnhurst, (7) Lance W. Vail, (8) Dr. Rajiv Prasad, (9) Vince R. Vermeul, (10) Kevin R. Quinlan, (11) Larry K. Berg, and (12) Dr. Gerry L. Stirewalt. We find that all of the Staff's witnesses are well-qualified as experts in the subject matters in which they provided testimony.

30. Ms. Mallecia A. Sutton is a Project Manager in the Environmental Projects Branch 1 of the Office of New Reactors (NRO) at the NRC. Ex. NRC090 at A1(a); Ex. NRC002. Ms. Sutton has a Bachelor of Science degree in Biology, and she has worked as an environmental project manager at the NRC for five years. Ex. NRC090 at A1(a); Ex. NRC002. At the NRC, Ms. Sutton was the environmental project manager for the Vogtle COL application, which was the first COL issued by the NRC. Ex. NRC002. Ms. Sutton also worked for the U.S. Army Corps of Engineers for six years as an environmental project manager and biologist. Id.

31. Dr. Ann L. Miracle is a scientist in the Environmental Assessment Group, Earth Systems Science Division, Energy and Environment Directorate at the Pacific Northwest

National Laboratory (PNNL). Ex. NRC090 at A1(b). Dr. Miracle is a technical reviewer on aquatic resources for the Levy COLA. Id. Dr. Miracle wrote the descriptive information provided in Sections 2.4 (Ecology), 4.3 (Impacts from Construction), 5.3 (Ecological Impacts from Operation), 7.3 (Aquatic Ecosystems- Cumulative Impacts), and 9.3 (Alternative Sites) of the FEIS. Id. at A2(b). Dr. Miracle has a Bachelor of Arts in Biology from the University of Virginia, a Master of Science in Molecular Genetics from the University of Florida, and a Doctor of Philosophy in Molecular Immunology from the University of South Florida, where she was involved in research to examine population dynamics and development of cartilaginous fish, including sharks and skates in Gulf coastal waters. Id. at A3(a); Ex. NRC003. Dr. Miracle has worked as an aquatic ecologist on two NRC EISs. Id. She also has extensive knowledge of this portion of Florida from almost 6 years of graduate study, and 4 years of employment with the Florida Marine Research Institute (now part of FDEP) and the University of South Florida. Ex. NRC090 at A3(a).

32. Dr. Michael T. Masnik is the Water and Ecology Team Leader, in the Division of Site Safety and Environmental Analysis, NRO, NRC. Id. at A1(c). He is also an aquatic ecology technical reviewer for the Levy COLA. Id. Dr. Masnik oversaw the work of Dr. Miracle in preparing the FEIS. Dr. Masnik has over 35 years of experience assessing impacts of nuclear power on aquatic biota, including numerous assessments at all three of Florida's operating nuclear sites. Id. at A3(b). This includes working as a lead technical reviewer for several endangered species assessments related to operation of the Crystal River Energy Complex (CREC) and serving as the NRC Project Manager for the license renewals of both the St. Lucie Plant and the Turkey Point Plant. Id. Dr. Masnik has been involved with the assessment of impacts to aquatic ecology related to the building and operation of the LNP for over 5 years beginning with the August 2007 pre-application audit of the LNP site and visiting the proposed

alternative sites. Id. Dr. Masnik holds a Bachelor of Science in Conservation from Cornell University, a Master of Science in Zoology from Virginia Polytechnic Institute and State University, and a Doctor of Philosophy in Zoology also from Virginia Polytechnic Institute and State University. Ex. NRC004.

33. Mr. Joseph Peyton Doub is an Environmental Scientist in the Division of Site Safety and Environmental Analysis, NRO, NRC, and has been employed by the NRC for four years. Ex. NRC090 at A1(d). He received a B.S. in Plant Sciences from Cornell University in 1982 and an M.S. in Botany from the University of California at Davis in 1984. Ex. NRC005 at 1. He maintains active certifications as a Professional Wetland Scientist (PWS) and Certified Environmental Professional (CEP). Id. Since joining the NRC, Mr. Doub has reviewed or is presently reviewing terrestrial ecology matters on eight COL and ESP applications. Id. at 2. He was also the lead author of revision 2 to Regulatory Guide 4.11, "Terrestrial Environmental Studies for Nuclear Power Stations." Id. As the lead terrestrial ecology reviewer for the LNP application, he participated in the acceptance review of the application, site audits, development of requests for additional information (RAIs) and review of RAI responses, preparation of FEIS sections, oversight of contractors working on the FEIS, and participation in public meetings and response to public comments. Ex. NRC090 at A63. Before working at the NRC, Mr. Doub was a Senior Environmental Scientist for Tetra Tech NUS, Inc., where he performed numerous terrestrial ecology and wetlands reviews in support of major federal permit applications, including two COL applications. Ex. NRC005 at 3-4. Mr. Doub has over 25 years of professional experience in mapping, characterizing, and evaluating possible impacts to terrestrial habitats, especially wetlands. Staff Testimony at A3(c). He has performed wetland delineations in over 15 states, including several in Florida. See id. and Ex. NRC005 at 1. For example, in 1995 and 1996, he served as the lead wetland scientist on a project to map land

use and cover in the Suwannee River Water Management District, which is situated north of the LNP site. Ex. NRC090 at A3(c).

34. Ms. Lara M. Aston has been employed by PNNL as a Scientist since 1999, and she currently works in the Coastal Ecosystem Research Group, Marine Sciences Laboratory, Energy and Environment Directorate of PNNL. Ex. NRC090 at A1(e) and Ex. NRC006 at 1. She received her B.S. in Environmental Science from Western Washington University in 1999 and M.S. in Environmental Science from the University of Washington in 2004. Ex. NRC006 at 1. Ms. Aston has over 12 years of professional experience in ecological assessment, characterization, and restoration of wetland systems. Ex. NRC090 at A3(d). For the past five years, Ms. Aston has been a Terrestrial Ecology subject matter expert (SME) and a Non-radiological Human Health SME and Resource Coordinator for NEPA Compliance in performing work for the NRC. Ex. NRC006 at 1. During this time she has contributed to multiple terrestrial and wetlands ecology analyses for COL, ESP, and license renewal applications for reactors in Florida, South Carolina, and North Carolina. Id. at 1-2. As a terrestrial ecology reviewer for the LNP application, she contributed to the development and writing of terrestrial and wetlands ecology sections of the FEIS. Ex. NRC090 at A2(e).

35. Mr. Dan O. Barnhurst is a hydrologist in the Division of Site Safety and Environmental Analysis, NRO, NRC. Ex. NRC090 at A1(f). He is a technical reviewer for hydrological alterations, water use, and water quality issues associated with the LNP COLA. Id. Mr. Barnhurst is a licensed professional geologist with 12 years of experience in hydrogeological areas including hydrogeochemistry; aquifer characterization; numerical modeling; and design of sampling plans, monitoring well networks and remediation systems. Id. at A3(e). Prior to coming to the NRC, Mr. Barnhurst did substantial work analyzing the long-term impact of multiple reactors on groundwater quality and quantity at the Department of

Energy's Savannah River Site. Id. Since coming to the NRC in 2008, Mr. Barnhurst has provided technical oversight to impact analyses of reactor building and operation on both ground and surface water quantity and quality for EISs at sites in the southeast and Florida. Id. Mr. Barnhurst has a Bachelor of Science in Environmental Geology and a Masters of Science in Geology from Brigham Young University. Ex. NRC007.

36. Mr. Lance W. Vail is a Senior Research Engineer in the Hydrology Group, Environmental Technology Division, Energy and Environment Directorate of PNNL. Ex. NRC090 at A1(g). He is a technical reviewer for PNNL's contract with the NRC on hydrological alterations, water use, and water quality issues associated with the LNP COLA. Id. Mr. Vail has 30 years of experience at PNNL, where he has focused on the nexus of water resources and energy resources. Id. at A3(f). Often this research has provided a characterization of hydrological alterations required by ecologists to support their assessment of ecological impacts. Id. For the NRC, he has been involved in a variety of research and regulatory reviews, including updates to hydrology-related guidance documents, including working on numerous EISs for applications for ESPs, License Renewals, and COLs. Id. Mr. Vail holds a Bachelor of Science degree in environmental resources engineering from Humboldt State University and a Masters of Science degree in civil engineering from Montana State University. Ex. NRC008.

37. Dr. Rajiv Prasad is a Scientist in the Hydrology Group, Environmental Technology Division, Energy and Environment Directorate of PNNL. Ex. NRC090 at A1(h). He is a technical reviewer for PNNL's contract with the NRC on surface water alterations, water use, and water quality issues associated with the LNP COLA. Id. Dr. Prasad has worked at PNNL for the last 10 years where his research has focused on understanding the workings of the hydrologic systems, variability of snow processes, characterization of hydrologic conditions

for aquatic habitat restoration, effects of climate change, and application of hydrologic principles to further NRC Staff guidance. Id. at A3(g). Starting in 2003, Dr. Prasad worked on the first four ESP reviews (North Anna, Clinton, Grand Gulf, and Vogtle) both on the safety as well as the environmental aspects of the review. Id. Dr. Prasad was also the lead hydrologist for the South Texas Project COL environmental review. Id. He has often worked closely with terrestrial and aquatic ecologists to provide them hydrologic characterization needs for their ecological impact assessments. Id. Dr. Prasad has a Bachelor of Engineering in civil engineering from the Regional Engineering College in Durgapur, India, a Master of Technology in civil engineering from the Indian Institute of Technology, and a Doctor of Philosophy in Civil and Environmental Engineering from Utah State University. Ex. NRC009.

38. Mr. Vince R. Vermeul is a Senior Research Engineer in the Environmental Systems Group, Earth Systems Science Division, Energy and Environment Directorate of PNNL. Ex. NRC090at A1(i). He is a technical reviewer for PNNL's contract with the NRC on groundwater alterations, use, and quality issues associated with the LNP COLA. Id. Mr. Vermeul was the primary author of the groundwater portions of Sections 2.3, 4.2, 5.2, and 7.2 of the FEIS. Id. at A2(i). Mr. Vermeul has over 22 years of experience as a research engineer with a focus on hydrologic and geochemical characterization, environmental monitoring, interpretation of hydrologic testing datasets, and developing/demonstrating groundwater remediation technologies. Id. at A3(h). Mr. Vermeul has been involved in numerous remedial investigations and the development/deployment of groundwater remediation technologies at Department of Energy, Department of Defense, and Environmental Protection Agency sites located across the country. Id. Projects specifically related to energy resources have included environmental monitoring of oil shale development, tracer methods for engineered geothermal systems, and environmental monitoring of carbon capture and sequestration in deep geologic

formations. Id. Mr. Vermeul has a Bachelor of Science in agricultural engineering and a Masters of Science in civil engineering (environmental) both from Oregon State University. Ex. NRC008.

39. Mr. Kevin R. Quinlan is a Physical Scientist specializing in meteorology in the Division of Site Safety and Environmental Analysis, NRO, NRC. Mr. Quinlan, who holds a Master of Science in Atmospheric Science from the University of Alabama and a Bachelor of Science in Meteorology from Millersville University, has five years of experience in meteorology and atmospheric science. While earning his Master of Science, he conducted research on rainfall patterns for Hurricane Emily (2005) and is well-versed in multiple computer data and modeling systems. Ex. NRC090 at A3. He has been employed at the NRC since 2008. His work focuses on conducting confirmatory analyses using the NRC's guidance document, NUREG-1555, Environmental Standard Review Plan-Standard Review Plans for Environmental Reviews for Nuclear Power Plants (ESRP), Section 2.3, which focusing on information related to regional and local climatology, onsite meteorological monitoring programs, and atmospheric dispersion estimates for COL and ESP applications. Ex. NRC013. Mr. Quinlan also provides technical support and analysis for the Staff's drafting of environmental impact statements. For the Levy COL review, Mr. Quinlan has been involved in the development of the DEIS and FEIS. Id. In conjunction with PNNL staff, he assisted in editing sections of the FEIS related to meteorology and air quality. Id.

40. Dr. Larry K. Berg is a Research Scientist in the Atmospheric Chemistry and Meteorology Technical Group, Atmospheric Sciences and Global Change Division, Energy Directorate at PNNL. Staff Testimony at 3. He has been a research scientist at PNNL for ten years. In this role, Dr. Berg primarily researches cloud parameterizations, boundary-layer meteorology, turbulence, mesoscale modeling, and atmospheric dispersion. Id. Dr. Berg holds

a Doctor of Philosophy in Atmospheric Sciences and a Master of Science in Atmospheric Science from the University of British Columbia. Id. He holds a Bachelors of Science in Meteorology from Pennsylvania State University. Id. Dr. Berg assists the NRC Staff with environmental reviews. He also assisted the Department of Energy by planning an Atmospheric Radiation Measurement field campaign to investigate the relationship of boundary-layer cumulous clouds to the land surface. Id. Specifically, for the Levy COL review, Dr. Berg was the technical reviewer for PNNL's contract with the NRC on meteorology and air quality resource issues as well as the primary drafter of sections of the Levy DEIS and FEIS pertaining to salt drift, climatology, atmospheric dispersion, meteorology and air quality impacts from building, operation, and cumulative impacts, as well as air quality impacts at alternative sites. Id.

41. Dr. Gerry L. Stirewalt is a Senior Geologist in the Geosciences and Geotechnical Engineering Branch, of the Division of Site Safety and Environmental Reviews, NRO. Ex. NRC091 at A3. Dr. Stirewalt was the lead geologist for the Staff's review of the LNP COL. Id. at A4. Dr. Stirewalt has over 40 years of experience in surface and subsurface geological site characterizations. Id. at A5. While at the NRC, he has reviewed Final Safety Analysis Evaluation Report Sections 2.5.1, "Basic Geology and Seismic Information", and 2.5.3, "Surface Faulting", for nine ESP or COL applications, and has provided testimony at uncontested hearings for the Vogtle ESP and V.C. Summer COLs. Id. Dr. Stirewalt has a Doctor of Philosophy in Structural Geology from the University of North Carolina at Chapel Hill. Ex. NRC070.

2. Applicant Witnesses

42. The Applicant produced nine witnesses in support of its testimony. The Applicant's witnesses are (1) Dr. Mitchell L. Griffin, (2) James O. Rumbaugh, (3) Jeffery D.

Lehnen, (4) Dr. William J. Dunn, (5) Dr. Kevin M. Robertson, (6) Dr. George C. Howroyd, (7) Dr. Eldon C. Blancher, (8) Dr. Paul C. Rizzo, and (9) Peter G. Hubbell. We find that all of the Applicant's witnesses are well-qualified as experts in the subject matters in which they provided testimony.

43. Dr. Mitchell Lee Griffin is a Principal Technologist in Water Resources with CH2M HILL. Ex. PEF001 at 1. He holds a Doctor of Philosophy in Agricultural Engineering from Purdue University, a master of science in Agricultural Engineering, and a Bachelors of Science in Civil Engineering both from the University of Kentucky. Dr. Griffin's career spans over thirty years and he is a registered professional engineer in Florida, Georgia, and Louisiana. Id.; see also Ex. PEF003 at 1. For the past six years, Dr. Griffin has evaluated water resource issues related to the Levy Nuclear Plant. Ex. PEF001 at 1. He is the surface water resources engineer for the Levy Project and in this capacity provides technical support on the National Pollutant Discharge Elimination System (NPDES) permit application and conducting senior review of surface water hydrologic evaluations. He is also knowledgeable about passive and active dewatering issues related to LNP, stormwater, and the effects of dewatering on surface waters, including Outstanding Florida Waters (OFWs). Id. at 2. Dr. Griffin contributed to the Levy Environmental Report as well as the Site Certification Application and the NPDES permit application.

44. Mr. James O. Rumbaugh's testimony addresses the design and calibration of the regional computer model used in this case. Ex. PEF100. Mr. Rumbaugh holds a Masters in Geology from Penn State and a Bachelor of Science in Geology from Susquehanna University and is a licensed Professional Geologist in Florida. Ex. PEF102. He designed and calibrated the regional groundwater model used by the South West Florida water Management District (SWFWMD), which is the subject of significant testimony in this case. Ex. PEF100.

45. Mr. Jeffrey D. Lehnen's testimony addresses computer modeling and the effects on water resources due to dewatering at the LNP site. Ex. PEF200. Mr. Lehnen and his team performed the groundwater modeling supporting the COLA, which was also used in the FEIS. Id. Mr. Lehnen is a Senior Hydrologists with CH2M Hill, Inc. and he holds a Bachelors degree in Geology from the University of Florida and is licensed by the State of Florida as a Professional Geologist. Ex. PEF202.

46. Dr. William J. Dunn is a founder, partner, and principal scientist at the firm of Dunn, Salsano, & Vergara Consulting, LLC. Ex. PEF302. He holds a Doctor of Philosophy in Systems Ecology from the University of Florida and has 35 years of experience as an environmental scientist and project manager for environmental and water resource management projects. Id. Dr. Dunn's testimony addresses the potential impacts on water resources from active dewatering during construction and operation of the LNP. Ex. PEF300.

47. Dr. Kevin M. Robertson is a Fire Ecology Research Scientist and the Fire Ecology Program Director at Tall Timbers Research Station and Land Conservancy, where he conducts research on the ecological impacts of fire. Ex. PEF402. He holds a Doctor of Philosophy and a Masters degree in Plant Biology from the University of Illinois at Urbana Champaign. Id. Dr. Robertson's testimony focuses on the portions of Contention 4A that allege that dewatering associated with the construction and operation of the LNP will increase the occurrence of wildfires and that these fires will also cause nutrient impacts to the aquatic environment. Ex. PEF400.

48. Dr. George C. Howroyd is a Vice President and Technology Fellow at CH2M HILL. Ex. PEF500 at 1. He holds a Doctor of Philosophy in Mechanical Engineering, a Master of Science degree in Mechanical Engineering, and a Bachelor of Science degree in Mechanical Engineering, from the University of Waterloo, in Ontario, Canada. Id. Since 1984, Dr. Howroyd

has been licensed as a professional engineer in Georgia and since 1993, he has been licensed as a professional engineer in Mississippi. Id. Also, he is certified by the American Meteorological Society as a Certified Consulting Meteorologist. In 2010, Dr. Howroyd was appointed by the Governor of Georgia to the Georgia State Board of Registration for Professional Engineers and Land Surveyors. Id. He has over thirty years of experience as an environmental and engineering consultant performing air quality and environmental evaluations and assessments of industrial facilities, including nuclear and fossil fueled power plants.

49. Dr. Eldon C. Blancher II, is a Chief Scientist and Chief Executive Officer of Sustainable Ecosystem Restoration, which is an environmental consulting company. He holds a Doctor of Philosophy Environmental Engineering Sciences as well as a Masters degree in Zoology and Physiology from Louisiana State University, and a Bachelors degree in biological sciences from the University of New Orleans. Ex. PEF600 at 1. He is certified by the American Academy of Environmental Engineers as an Environmental Scientist in Biology and is also a member of the Water Environment Federation. Id. Throughout his thirty year career, he has specialized in assessing the impacts of the discharges of various substances on wetland and aquatic systems and has performed impact analyses for numerous habitats, including habitats throughout Florida.

50. Dr. Paul C. Rizzo provided Rebuttal Testimony regarding the lack of preferential flowpaths due to the presence of karst at the LNP site. Ex. PEF700. Dr. Rizzo and his team assessed the geologic and geotechnical conditions of the LNP sire to develop a plan for designing and constructing the LNP's foundations. Id. Dr. Rizzo is the founder of Paul Rizzo Associates, Inc., a 300-person international engineering firm that works extensively in the global nuclear industry, and he holds a Bachelor of Science, Masters of Science and Doctor of

Philospohy in Civil Engineering from Carnegie Institute of Technology and is a registered Professional Engineer in 36 states, including Florida. Ex. PEF702.

51. Mr. Peter G. Hubbell is the principal and senior hydrologist for Water Resource Associates, Inc. Ex. PEF802. Mr. Hubbell holds a Bachelor of Science in Hydrology and Water Resource Management from the University of Maryland and spent much of his career at SWFWMD, where he served as Executive Director for his last nine years at the agency. Id. He provided Rebuttal Testimony related to water use permitting and water resource management in Florida to respond to criticisms in the Initial Pre-filed Testimony of Mr. David Still (Ex. INT201R). Ex. PEF800.

3. Intervenors Witnesses

52. The Intervenors presented four witnesses in support of their testimony. The Intervenors' witnesses are (1) Mr. Gareth Davies, (2) Dr. Tim Hazlett, (3) Mr. David Still, and (4) Dr. Sydney Bacchus. We find that all of the Intervenors' witnesses are well-qualified as experts in the subject matters in which they provided testimony.

53. Mr. Davies is a consultant hydrogeologist for Cambrian Ground Water Co. and also works for the Tennessee Department of Environment and Conservation in the Department of Energy Oversight Office. Ex. INT001. He holds a M.S. in Geology from the University of Southern Mississippi and a B.S. from Millsaps College. Ex. INT002. Mr. Davies' has professionally focused on karst and carbonate geology. Id. He provided testimony regarding the hydrogeology of karst regions.

54. Dr. Hazlett is president and CEO of DHI Water & Environment, Ins., a consulting service business in the U.S. and Canada. Ex. INT101. He holds a Doctor of Philosophy and Masters of Arts in Hydrogeology from Johns Hopkins University. Ex. INT102. Dr. Hazlett has been writing and using groundwater models since 1988. Id. He provided testimony on

hydrogeology, integrated groundwater-surface water modeling, and the use of numerical models.

55. Mr. David Still is a consultant on technical and policy issues related to water management in Florida. Prior to consulting, Mr. Still was employed at the Suwannee River Water Management District ("SRWMD"). IN101 at 1. He served for fourteen years, from 1992 to 2004, as a regulator overseeing SRWMD's regulatory programs and then as the Executive Director from 2008 to 2012. Mr. Still is a professional engineer registered in Florida. Id. He earned his bachelor's degree in agricultural and biological engineering and a master's degree in engineering from the University of Florida. Id.

56. Dr. Sydney Bacchus is a hydroecologist employed by Applied Environmental Services, LLC. Ex. INT302. She holds a Doctor of Philosophy in Hydroecology from the University of Georgia and a Masters of Science. in Botany and Ecology from Florida State University. Id. For approximately eight years, she worked for the predecessor agency to the Florida Department of Environmental Protection on water resources and preservation issues. Id. Dr. Bacchus' testimony addresses her disagreement with the FEIS' analysis of impacts to terrestrial and aquatic ecosystems due to the construction and operation of the proposed LNP units. Ex. INT301.

B. Dewatering Portions of Contention 4A – Subpart A

57. Part A of Contention 4A challenges the FEIS's analysis of impacts to wetlands, floodplains, special aquatic sites, and other waters, associated with dewatering. This portion of contention 4A specifically challenges the FEIS's analysis of: (1) Impacts resulting from active and passive dewatering; (2) Impacts resulting from the connection of the site to the underlying Floridan aquifer system; (3) Impacts on Outstanding Florida Waters such as the Withlacoochee and Waccasassa Rivers; (4) Impacts on water quality and the aquatic environment due to

alterations and increases in nutrient concentrations caused by the removal of water; and (5) Impacts on water quality and the aquatic environment due to increased nutrients resulting from destructive wildfires resulting from dewatering.

58. We discussed three cross-cutting issues at the oral hearing; specifically, site characterization, groundwater modeling, and the reliance on the Florida Department of Environmental Protection's Conditions of Certification (COC). Therefore, while we will touch on each of the subparts of Contention 4A, our decision below primarily focuses on these three topics. Our decision on Part A of Contention 4A is organized as follows: (1) site characterization, (2) groundwater hydrology, including modeling, (3) surface water hydrology, (4) terrestrial ecology, including mitigation measures, and (5) aquatic ecology. We believe that these topics cover all of the issues raised in Part A of Contention 4A. After considering the evidence presented, we find that the FEIS took the appropriate hard look at each of the issues in part A of Contention 4A.

1. Site Characterization

59. The first topic discussed at the evidentiary hearing was site characterization. A fundamental tenet of many of the Intervenors' claims is that the site is underlain by well-connected karst features. The Staff and Applicant dispute this claim. For the reasons discussed below, we find the Staff and Applicant evidence more persuasive and we conclude that the Staff and Applicant properly characterized the site, and find that the FEIS took the required hard look at site-characterization, meeting NEPA's rule of reason.

a. Staff Testimony

60. Staff hydrologists Mr. Lance W Vail, Dr. Rajiv Prasad, Mr. Vince Vermeul, and Mr. Daniel Barnhurst discussed site characterization in their Direct and Rebuttal testimony. The Staff's Rebuttal Testimony also included the testimony of Dr. Gerry L. Stirewalt, a geologist who

worked on the Staff's safety review. Mr. Vail, Dr. Prasad, Mr. Vermeul, and Mr. Barnhurst testified in their Direct Testimony that to gain an understanding of the LNP site, they used several sources of information. Ex. NRC090 at A17. These sources included the Applicant's ER, public comments at the NRC's scoping meeting and on the DEIS, interactions with other Federal and state agencies, publications and historical data collected from agencies and universities and site visits. Id. Mr. Vermeul, Dr. Prasad, Mr. Vail, and Mr. Barnhurst further testified that they used regional information from the Florida Geological Survey (FGS), SWFWMD and the United States Geological Survey (USGS) to help characterize the site, and then compared this information to site-specific data. Ex. NRC090 at A41. Two of the more commonly used references that Mr. Vail, Dr. Prasad, Mr. Vermeul, and Mr. Barnhurst used were texts by the USGS that provided a description of the hydrogeology of Florida. Id. citing Ex. NRC019; Ex. NRC020. The Staff experts also used information published by the FGS and the USGS Ground Water Atlas of the United States to help determine the site's regional characteristics. Ex. NRC076; Ex. NRC018.

61. Mr. Vail, Dr. Prasad, Mr. Vermeul, and Mr. Barnhurst's Direct Testimony stated that this information shows that the Upper Floridan aquifer in the area of the LNP is productive, but that estimated transmissivities[15] fall well below those that would be indicative of a well-developed karst system. Ex. NRC091 at A41 citing Ex. NRC018 at 14; see also Tr. at 1155 (Barnhurst). At the hearing, all parties agreed that transmissivities that are indicative of karst are in the 250,000 to 1,000,000 feet squared per day (ft^2/d) range or more. Tr. at 1170-71

[15] Transmissivity is a hydraulic property that describes the ease with which groundwater can move through an aquifer system. Ex. NRC090 at A41.

(Vermeul); 1402 (Rumbaugh); 1419 (Lehnen); 1440 (Hazlett). As Mr. Vermeul testified at the hearing, according to the regional studies, the LNP site sits in an area of transmissivities that range from 50,000 to 100,000 ft^2/d. Tr. at 1169.

62. Dr. Stirewalt, Mr. Vail, Dr. Prasad, Mr. Vermeul, and Mr. Barnhurst's Rebuttal Testimony stated that the Avon Park Formation is the uppermost bedrock unit underlying the LNP site and it is comprised of dolomitized limestone [$CaMg(CO_3)_2$]. Ex. NRC091 at A26 citing Ex. NRC078 at 2-100. Because dolomitization decreases the rate of dissolution and limits void development, karst features would develop at a much slower rate than in pure limestone made up of calcium carbonate [$CaCO_3$]. Id. Dr. Stirewalt, Mr. Vail, Dr. Prasad, Mr. Vermeul, and Mr. Barnhurst's Rebuttal Testimony cited a study that found that about 60 percent $CaCO_3$ is necessary to form karst and around 90 percent may be required to fully develop karst. Ex. NRC091 at A26 citing Ex. NRC077 at 194. These witnesses stated that 18 of the 20 samples collected from the Avon Park Formation in the North Property contained less than 50 percent $CaCO_3$, indicating a high degree of dolomitization. Id. citing Ex. NRC078 at 2-100. At the hearing, Dr. Stirewalt stated that the boreholes drilled on the North Property further confirmed the regional data by showing that the composition, variability, fracturing and dolomitization within the Avon Park was consistent with regional studies. Tr. at 1133. Additionally, Mr. Vermeul, Mr. Vail, Dr. Prasad, and Mr. Barnhurst's Direct Testimony stated that the site-specific hydraulic conductivity values ranged from 62,000 to 69,000 ft^2/d, which is within the range predicted by the regional data, and is not indicative of well-connected karst. Id.

63. Mr. Barnhurst testified at the hearing that regional information from the USGS shows sinkholes at the LNP to be solution type sinkholes, which are characteristic of surficial karst dissolution, but are not evidence of well-connected karst. Tr. at 1147-48. Dr. Stirewalt,

Mr. Vail, Dr. Prasad, Mr. Vermeul, and Mr. Barnhurst similarly stated in their Rebuttal Testimony that the USGS shows the LNP site to be located in a region where limestone is bare or thinly covered and sinkholes are few, generally shallow, broad, and developed gradually. Ex. NRC091 at A25 citing Ex. NRC076 at Figure 2.5.1-237. They further stated that while there are karst features at the LNP site, neither the USGS nor site characterization data indicate deep collapse sinkholes or subsurface voids and caverns. Ex. NRC091 at A25. Dr. Stirewalt, Mr. Vail, Dr. Prasad, Mr. Vermeul, and Mr. Barnhurst further testified that field observation and data reveal shallow, broad, surficial dissolution features that host cypress swamps and other forested wetlands at the LNP site; they explained that such shallow dissolution features are floored by silts and clays that limit infiltration and net recharge to the groundwater system. Id. citing Ex. NRC076 at 2.5-73. They stated that in their expert opinion, the presence of these wetlands onsite indicate limited connectivity to the Floridan Aquifer System. Id.

64. Mr. Vermeul, Mr. Vail, Dr. Prasad, and Mr. Barnhurst's Direct Testimony also stated that, as predicted by the regional data, the site-specific hydrogeologic and geophysical characterization of the LNP site found no indication of well-developed karst. Ex. NRC091 at A41 citing Ex. NRC016 at 2.5-97. In their Rebuttal Testimony, Dr. Stirewalt, Mr. Vail, Dr. Prasad, Mr. Vermeul, and Mr. Barnhurst provided more details regarding the site characterization done by the Applicant and reviewed as part of the Staff's safety review. Specifically, regarding the lineaments proposed to exist on the site by the Intervenors, they stated that, while Vernon (Ex. INT369) and Faulkner (Ex. NRC370) identified lineaments, no evidence exists to equate all lineaments with faults. Ex. NRC091 at A30. Dr. Stirewalt reiterated this point in his testimony at the hearing. Tr. at 1149. According to Dr. Stirewalt, Mr. Vail, Dr. Prasad, Mr. Vermeul, and Mr. Barnhurst's Rebuttal Testimony, site characterization data discussed in Section 2.5.1.4.2.5.1 of the Advanced Final Safety Evaluation Report indicated that these lineaments and potentially

related subsurface features, such as dissolution-enlarged fractures, do not result in interconnected features capable of enhancing groundwater flow in the vicinity of the LNP site. Ex. NRC091 at A30 citing Ex. NRC078 at 2-98. The Staff witnesses further stated that the density of identified linear features at the North Property is generally consistent with the USGS interpretation of regional transmissivity distribution. Ex. NRC091 at A30 citing Ex. NRC018 at 14.

65. Mr. Vermeul, Mr. Vail, Dr. Prasad and Mr. Barnhurst also testified that they used site-specific characterization, monitoring data, and regional studies from the FGS and the USGS to validate conceptual models and conclusions drawn, in part, from groundwater modeling. Ex. NRC090 at A41. While characterization did not include drilling boreholes or aquifer testing on the South Property, this Direct Testimony shows that the Staff used multiple lines of evidence to understand the nature of the South Property and potential impacts of pumping; including characterization performed on the North Property, observations made on the South Property, data from regional studies conducted by the USGS and FGS and data from the regional model. Mr. Barnhurst and Mr. Vermeul testified that the Regional Model provided useful information regarding the transmissivities on the South Property because the SWFWMD used inverse modeling to calibrate the Regional Model to the USGS potentiometric surface and estimate the spatial distribution of model parameters. Tr. at 1157, 1159-1160. While the regional model shows some areas with transmissivities indicative of well-developed karst features, Mr. Vail, Dr. Prasad, Mr. Vermeul, and Mr. Barnhurst stated in their Rebuttal Testimony, and show in an exhibit, that these areas occur south of Lake Rousseau, approximately 6 miles south of the southern boundary of the South Property and possibly within the Ocala Formation, which was not found to underlie the site. Ex. NRC091 at A21; Ex. NRC076 at Figure 2.5.1-244. Even if the conclusions drawn from these multiple sources are incorrect regarding the South Property,

Mr. Vermeul testified at the hearing that this will be determined during the aquifer performance testing required by the COCs. Tr. at 1394. Mr. Barnhurst noted that the aquifer performance testing is required 5 years before the use of a well that is pumped at greater than 100,000 gallons per day. Tr. at 1395.

66. The Intervenors claimed in their Direct Testimony that the Staff should have done more site-characterization such as dye tracer tests. In their Rebuttal Testimony, Mr. Vail, Dr. Prasad, Mr. Vermeul, and Mr. Barnhurst stated that the amount of information available to the Staff was sufficient for it to do a proper analysis and noted that it was sufficient to meet the State of Florida's process as well. Ex. NRC091 at A11. They further testified that "if springs or large-scale dissolution channels where conduit-dominated flow was known or expected to occur were present beneath the LNP site, the recommended tracing methods might be appropriate. However, given that no onsite sinkholes or large-scale preferential flow features have been identified, it is unclear how the recommended tracing experiments could be implemented under these site conditions." Id. Similarly, Mr. Vermeul testified at the hearing that the tracer tests proposed by the Intervenors would be difficult to perform at the LNP site because these tests are usually done in a place where it is known that water is entering a karstic feature, and those areas are not present at the LNP site. Tr. at 1153-54.

67. Mr. Barnhurst, Mr. Vermeul and Dr. Stirewalt all testified that they did not see any evidence of sinkholes during their site visits at either the North or South Property. Tr. at 1192-94. Additionally, as Mr. Barnhurst testified, Exhibit NRC076 shows the location of known sinkholes and there are none in the North or South Properties. Mr. Barnhurst stated that while there is still uncertainty regarding some aspects of the South Property, the uncertainty is bounded by regional studies and by its proximity to the characterization that was performed under the North Property. Tr. at 1201.

b. Applicant Testimony

68. The Applicant's Direct Testimony regarding site characterization was primarily provided by Mr. Lehnen. In its Rebuttal Testimony, the Applicant also provided testimony from Dr. Rizzo who, like Staff witness Dr. Stirewalt, worked on the safety aspects of the COLA. Mr. Lehnen's Direct Testimony agreed with the Staff that the LNP site is founded on the Avon Park Formation, which is a dolomitic formation. Ex. PEF2000 at A11. He stated that the site does not overlie the "Hawthorn Group" or the relatively easily-dissolved limestone and phosphorus deposits within the Suwannee and Ocala formations. Id. In his Rebuttal Testimony, Dr. Rizzo expanded on this point stating that the Avon Park Formation is a highly dolomitized carbonate rock formation that is resistant to the type of dissolution that creates new karst phenomena such as the preferential conduits that the Intervenors claim occur at the LNP site. Ex. PEF700 at A9.

69. Dr. Rizzo's Rebuttal Testimony described in detail the site-characterization done by the Applicant. Id. at A13. He particularly focused on the 118 borings done on the site and described how he designed this program to discover any large-scale fractures underneath the nuclear island. Id. Dr. Rizzo stated "we did not find evidence of conduit flow or preferential flow paths that would challenge the validity of groundwater analyses performed with conventional porous media codes or methodologies." Id. at A9. He testified that the number, spacing, diameter, type and depth of the boring was consistent with and even exceeded industry practice. Id. at A13. He further testified that drilling the amount of borings suggested by Intervenor witness Mr. Davies would be impractical, unrealistic, and inconsistent with industry standards. Id.

70. Dr. Rizzo also described the grout testing done at the North Property, which found that the narrow vertical fractures found in the Avon Park were too narrow in width to be continuous conduits or preferential flow paths. Id. at A10, A13. As Dr. Rizzo testified at the

hearing, "if you pump cement grout into a borehole under a very controlled, in this case computerized monitoring conditions you can determine how far the grout goes, how big the void you are filling with the grout and the pressure it takes to move it. In some respects this is comparable to a tracing program that was discussed earlier today. Instead of using a tracer, use grout to determine the extent of solution activity along fractures or along bedding plan[e]s." Tr. at 1210. Dr. Rizzo testified that he designed the mix used for the testing to have the viscosity of water and included additives to restrict set-up to push for the most distance for the grout, as opposed to having it solidify. Tr. at 1348-49. This is opposed to the construction design where the grout will setup when mixed with water; for the grout testing program the Applicant was trying to map voids not have the grout setup. Id.

71. In addition to site-specific information from the North Property, Dr. Rizzo's Rebuttal Testimony stated that the Applicant investigated other regional information, including quarry faces, stream banks, surface manifestations, aerial lineaments and road cuts. Ex. PEF700 at A13. In no case did the borings or fracture investigation provide evidence of conduit flow or preferential flow pathways. Id. As Dr. Rizzo stated at the hearing, "we went to the quarries, road cuts, and river cuts adjacent to Site and looked for fracture patterns and we found fracture patterns in the Avon Park at the Gulf Hammock Quarry, along the Waccasassa River to the west of the Site, and in road cuts in various locations. We were able to map these fractures and get their spacing, see what the material is in the fractures, the width of the fractures and be able to project them back toward our site." Tr. at 1209. Dr. Rizzo further testified that they looked closely at the Cross Florida Barge Canal (CFBC), which is south of the South Property and saw nothing that would be consistent with a conduit type structure. Tr. at 1219-20. Mr. Lehnen also testified at the hearing that two monitoring wells were drilled on the southern end of

the North Property, which is about two miles from the proposed wellfield, and those wells showed the presence of the Avon Park formation. Tr. at 1238-39.

72. Mr. Lehnen and Dr. Rizzo stated in their Rebuttal Testimony that -- based on their in-depth site-characterization activities -- there is no evidence of sinkholes that are connected to the Upper Floridan Aquifer at the LNP site. Ex. PEF218 at A10; Ex. PEF700 at A18. Dr. Griffin also testified that during the Applicant's work to identify wetlands, the Applicant had numerous staff on both the North and South Properties for months and they did not identify features like sinking streams or swallets. Tr. at 1340-41. He additionally stated that there are no creeks on site. Id. at 1341. Further, Dr. Rizzo stated that he toured up and down the CFBC both on foot and on boats, and while they saw seeps along the bank of the canal – as expected – they saw nothing that would be considered a spring, or that provides evidence of preferential pathways. Tr. at 1351.

73. Mr. Lehnen provided testimony at the hearing on whether Big King and Little King Springs are evidence of conduits. Mr. Lehnen stated that for Model 2 he used information from the Florida Geologic Society Springs of Florida records for the spring flows. Tr. at 1269. He stated that given the small amount of flow in the springs – about five million gallons per day combined – and the observed difference in hydraulic head between the spring and the Floridan Aquifer, it is unlikely that the springs are connected to a large conduit system. Id. at 1269-70. Instead, it is more likely that the springs are fed by seeps or other smaller scale discharge features. Id. at 1269-70. Mr. Lehnen also testified that the Intervenors' conceptual model – of a large interconnected pathway being cut off that directly affects a wetland or spring – is unlikely to occur. Id. at 1272-73. Mr. Lenhen testified that a conduit would not exist in a vacuum providing a direct connection from point A to point B. By definition, large conduits are an expression of interconnected dissolution activity and thus will be fed by a network of finer and

finer dissolution features and fracture networks. Tr. at 1274-76. According to Mr. Lehnen, this further supports his position that there is no evidence of preferential pathways at the LNP site.

c. Intervenors Testimony

74. The Intervenors' testimony primarily claimed that the LNP site is underlain by large-scale karst features. Mr. Davies argued in his Direct Testimony that the LNP site is underlain by carbonate karst formations. Ex. INT001R at A4. Mr. Still (Ex. INT201R at A4), Dr. Bacchus (Ex. INT301R at A12) and Mr. Hazlett (Ex. INT101R at A6) make similar claims. Mr. Davies also testified that the FEIS did not adequately characterize this karst because it assumed a porous medium underneath the site. Id. at A12. He stated that the FEIS should have looked at further site-characterization and as an example states that that one thousand borings per acre would be needed to discover a 1-meter solid elliptical object in the subsurface. Id. at A13. This translates into over three million boreholes at a site the size of the LNP site in order to find one karst related feature. Consequently, he testified that the 118 borings at LNP are "less than the optimum number needed for an accurate analysis of conduits." Id. At the hearing he also testified that injected tracers should be used to map the conduits at the LNP site. Tr. at 1317. Similarly, Dr. Hazlett stated that the modeling done at the site was inadequate because of insufficient site characterization, and he recommended dye tracers to gain a "more realistic" understanding of the site. Ex. INT101R at A5. However, Mr. Davies testified at the hearing that he is not aware of any areas in the Avon Park formation where tracer tests have been performed. Tr. at 1319

75. In Rebuttal Testimony, Mr. Davies disagreed with the Staff and Applicant's characterization of dolomitic limestone, arguing that it can still have large conduits. Ex. INT501R at A11. His Rebuttal Testimony further stated that Little King and Big King Spring are likely fed by conduit flow, and therefore, there is a possibility that they could be cut off by

dewatering at the LNP site. Ex. INT501R at A7-8. In his Rebuttal Testimony, Dr. Hazlett again argued that more site characterization is necessary to model karst features at the site, including flow tracing and mapping of existing wetlands and karst features. Ex. INT601 at A4, A13. At the hearing, Dr. Hazlett stated that additional boreholes may not have a good probability of finding conduits, so a better approach is to monitor the wetlands and do pumping tests. Tr. at 1328.

76. At the hearing, Mr. Davies testified that he agreed that the Avon Park formation underlies the site and that it consists of dolomitic limestone. Tr. at 1306-07. When asked whether he has any evidence of karst at the LNP site, the only evidence that Mr. Davies pointed to was Dr. Bacchus' statement that she saw springs along the CFBC. Tr. at 1322.

77. Dr. Bacchus testified in her Direct Testimony that there are many relict sinkholes aligned along fracture networks at or near the site, which are an indication of preferential flow paths. Ex. INT301R at A12, A16, A22. At the hearing, Dr. Bacchus testified that it is possible for even relict sinkholes that are in-filled to have their plugs dislodged, reconnecting them to the aquifer. Tr. at 1284. She additionally stated in her Direct Testimony that the FEIS did not properly identify other underlying karst features such as relict sinkholes, fractures, faults, swallets and other karst conduits. Id. at A20. For support of the existence of some of these features, she cited documents from Vernon and Faulkner from the USGS. Id. at A21. She also stated that she has observed some of these features, including sinking streams, in the vicinity of the LNP site. Id. at A23; Tr. at 1289.

d. Board Findings

78. The Board finds that the site characterization developed by the Staff and Applicant was sufficient for the FEIS to provide a "hard look" at the project's impacts, consistent with the NEPA "rule of reason." The Staff testimony shows that the it looked at multiple sources

of data to characterize the site in the FEIS. This data included information from the FGS, SWFWMD, USGS, and the Applicant's modeling efforts. Information from the Applicant's extensive site characterization activities was consistent with the regional information. For example, the results of the 118 borings and the measured transmissivity values on the North Property were consistent with the regional characteristics shown in the literature reviewed by the Staff. Additionally, Dr. Rizzo testified that the grout test program at the North Property was specifically designed to determine the presence and size of any cavities, and it did not find evidence of any large-scale karst cavities.

79. While the same amount of characterization was not performed on the South Property, the Applicant and Staff witnesses persuasively argued that there is no reason to expect site characterization conclusions regarding the South Property to be incorrect. This is because of the South Property's proximity to the North Property and the fact that regional characterizations were validated on the North Property and indicate that both properties are underlain by the same hydrogeological formation with similar properties. The Intervenors provided no evidence specific to the LNP site to contradict this testimony. Further, Dr. Rizzo testified that the Applicant inspected the CFBC and quarries in the area to map possible lineaments or other features back to the LNP site, and they found no evidence to show that these features would exist on the South Property. Additionally, Dr. Griffin testified that while doing wetlands delineations, the Applicant spent significant time on both the North and South Property, and they found no visible features such as sinkholes or swallets that are indicative of large-scale karst development. Similarly, Dr. Stirewalt, Mr. Vermeul and Mr. Barnhurst testified that they have not seen any indication of well-developed karst at the South Property during any of their site visits, or in looking at the regional information. In sum, while Dr. Bacchus provided some examples of swallets in the vicinity of the LNP site, the Intervenors did not provide any

specific evidence that contradicts the detailed Staff and Applicant testimony regarding characterization of the North or South Property.

80. No party disputes that the LNP site is underlain by the dolomitized Avon Park Formation. While Mr. Davies argued that the Avon Park Formation may have large conduits, he provides no evidence to support this claim. We find persuasive the Applicant and Staff testimony and exhibits that demonstrate that the Avon Park formation is less susceptible to dissolution than other calcium-carbonate limestone in Florida. All of the Intervenors' evidence regarding large-scale karst features, or sinkholes, are from areas in the State that are underlain by other forms of limestone, or are from other states and countries. Further, the only support provided for preferential flow at the LNP site was from Dr. Bacchus who claimed she saw springs along the CFBC. However, Dr. Rizzo testified that these were seeps, not springs, and in any event, Dr. Bacchus provided no persuasive evidence corroborating her claim. Additionally, Mr. Lehnen provided convincing testimony that Big King and Little King Spring are not the result of large, interconnected preferential pathways.

81. We further find unconvincing the Intervenors' calls for further testing at the LNP site, such as dye tracer testing. First, the Applicant and Staff provided strong evidence that well-connected karst does not exist at the site, which is the basis underlying many of the Intervenors' recommendations. Further, we find Mr. Lehnen's explanation credible that if the majority of groundwater flow was coming from large-scale preferential pathways it would have been identified during the site-characterization activities. We are also persuaded by Mr. Vermeul's testimony that it is not clear how these tests would be performed at the LNP site given the lack of any obvious well-connected karst features. Mr. Davies admitted that he was unaware of tests of this sort being done at any area in the Avon Park Limestone. In fact, what Dr. Hazlett recommends – not performing more borings or testing but doing wetlands monitoring

– appears to be exactly what the Staff did in the FEIS by relying on the COCs, which include detailed provisions for wetlands monitoring and aquifer performance testing.

82. We also find persuasive Dr. Rizzo and Mr. Lehnen's testimony that the amount of characterization done at this site is consistent with what the SWFWMD, the agency responsible for permitting groundwater withdrawals in this area of Florida, require. This provides strong evidence that the site-characterization met industry standards. NEPA is not meant to be a research project or require endless study. Entergy Nuclear Generation Co. (Pilgrim Nuclear Power Station), CLI-10-11, 71 NRC 287, 315-16 (2010). We find that because the Applicant met the industry standard level of site-characterization, and the Staff carefully analyzed this work, the amount of site-characterization data available to support impact assessments was reasonable. As such, we find that the FEIS took the required "hard look" at site-characterization data and meets NEPA's rule of reason.

2. Groundwater Hydrology and Modeling

83. Groundwater hydrology is an important part of the analysis of environmental impacts from dewatering. All three parties provided testimony on groundwater hydrology in their direct and rebuttal testimony. At the hearing, we focused our second panel on disagreements among the parties regarding groundwater modeling. In particular, the Applicant claimed that Model 1 is the most accurate model, and the Intervenors claim flaws in both models because they are equivalent porous media models. After considering all of the evidence, we find the Staff and Applicant evidence more persuasive and find that the Staff and Applicant's groundwater hydrology analysis, including their approach to modeling, sufficient to support the conclusions in the FEIS.

a. Staff Testimony

84. In their Direct Testimony, Mr. Vermeul, Mr. Vail, Dr. Prasad and Mr. Barnhurst testified that for the groundwater hydrology analysis, in accordance with Sections 2.3, 4.2, and 5.2 of NUREG-1555, the Environmental Standard Review Plan (ESRP) (Ex. NRC013; Ex. NRC014), the Staff evaluated the Applicant's conceptual groundwater model to determine if it was sufficiently conservative. Ex. NRC090 at A30-32. To develop a conceptual model, in addition to site-characterization data, and information from SWFWMD and the USGS, Mr. Vermeul, Mr. Vail, Dr. Prasad and Mr. Barnhurst stated that they also used information from the Applicant's groundwater models. Ex. NRC090 at A14. The Applicant provided the Staff with two local-scale models. Both models were based on a SWFWMD-developed model called the District Wide Regulation Model (DWRM2), which we referred to as the Regional Model at the hearing. Id. at A38. The DWRM2 model incorporated geohydrologic characterization data and interpretations collected by the USGS and other agencies. Id. The Applicant created a local-scale sub-model of DWRM2 as part of its Site Certification Application for the State of Florida, and submitted with its ER, which we referred to as Model 1. Id.

85. Mr. Vermeul, Mr. Vail, Dr. Prasad and Mr. Barnhurst testified in their Direct Testimony that Model 1 showed a poor fit to the local potentiometric surface at the LNP site, meaning that the measured water levels at the site did not match the results of the model. Id. at A45. As Mr. Vermeul testified at the hearing, the measured hydraulic heads at the LNP site were off by about 10 feet from predicted the head values in Model 1. Tr. 1371-72. Therefore, Mr. Vermeul, Mr. Vail, Dr. Prasad and Mr. Barnhurst testified that they asked the Applicant to provide a recalibrated model. Ex. NRC090 at A45. The Applicant's recalibrated version of the model – referred to as Model 2 – used local empirical data to obtain a better fit between the observed and model-predicted water levels in the vicinity of the site. Id. The Applicant

provided the Staff with a detailed description of this model and the recalibration process. Id. Mr. Vermeul, Mr. Vail, Dr. Prasad and Mr. Barnhurst stated in their Direct Testimony that they did not make any determination as to the relative merits between the two models, recognizing that both models are subject to uncertainty, but they found that comparing the models provided useful information. Id. at A46. For example, Mr. Vermeul testified at the hearing that comparing the results of the two models provided the Staff with information regarding the models' sensitivity. Tr. at 1391. Mr. Vermeul, Mr. Vail, Dr. Prasad and Mr. Barnhurst testified in their Direct Testimony that in those areas where the Staff used model data to assist in making an impact determination, the Staff used Model 2 because it provided a better fit to local conditions, and because it was the more conservative model. Ex. NRC090 at A46.

86. Mr. Vermeul, Mr. Vail, Dr. Prasad and Mr. Barnhurst's Direct Testimony noted that both models provided sufficient information for an analysis of groundwater usage, because under both Model 1 and Model 2, the usage at the site is a very small percentage of the overall regional groundwater resource. Ex. NRC090 at A51. For example, according to Mr. Vermeul, Mr. Vail, Dr. Prasad, and Mr. Barnhurst, Model 1 estimated that LNP groundwater usage would be about 0.4 percent of the total water flux, and Model 2 showed that it would use about 0.8 percent. Id. Therefore, both models show that from a water usage standpoint, LNP will use a relatively small percentage of the water flux. Id. However, Mr. Vermeul, Mr. Vail, Dr. Prasad and Mr. Barnhurst's Direct Testimony stated that the Staff did not use either model as the sole basis for any impact determinations for drawdown impacts to wetlands. Id. at A47.

87. According to Mr. Vermeul, Mr. Vail, Dr. Prasad and Mr. Barnhurst, instead of using only the model for its analysis of impacts to wetlands, the Staff also relied on the Applicant's compliance with the FDEP COCs. Id. Mr. Vermeul, Mr. Vail, Dr. Prasad and Mr. Barnhurst's Direct Testimony stated that the complexities that prevented using the model for

quantifying potential wetlands impacts included: the complex site hydrologic conditions, including natural annual variability in the groundwater level; model parameter uncertainties; and the relatively small water-level changes that have been shown in the literature to result in wetlands impacts. Id. at A51. They also stated that the approach of using modeling as a scoping level technique for determining wetlands impacts, while also relying on future monitoring, is consistent with the State of Florida's groundwater-use permitting process. Id. Further, Mr. Vermeul, Mr. Vail, Dr. Prasad and Mr. Barnhurst's Direct Testimony stated that the above uncertainties will be largely reduced once the Applicant performs the aquifer performance testing that is required by the COCs. Id. at A41.

88. In their Rebuttal Testimony, Mr. Vermeul, Mr. Vail, Dr. Prasad and Mr. Barnhurst reiterated that the Applicant's models were only one part of the Staff analysis, and that the models alone were insufficient to make wetlands impact determinations. Ex. NRC091 at A7; Ex. NRC090 at A38, A42, A44, A45. Regarding some of the recommendations made by the Intervenors in their Direct Testimony regarding extra complexities that could be added to the modeling, Mr. Vermeul, Mr. Vail, Dr. Prasad and Mr. Barnhurst testified that there can be several appropriate conceptual models at a site, and some of the Intervenors' suggestions may be appropriate conceptual models. Ex. NRC091 at A8. However, these witnesses emphasized that adding additional conceptual models would not change the Staff's determination that the model alone is insufficient for making wetlands impact determinations, and would not change the Staff's conclusions. Id. at A8; Ex. NRC090 at A31-35.

89. Many of the Intervenors' claims challenged whether the type of model used by the Applicant, and reviewed by the Staff, was appropriate at the LNP site. Specifically, the Intervenors challenge the use of an equivalent porous media model, and assert that the Staff should have incorporated additional hydrologic complexity into the model. Ex. NRC091 at A9.

As Mr. Vermeul, Mr. Vail, Dr. Prasad and Mr. Barnhurst stated in their Rebuttal Testimony, equivalent porous media models, like the one developed by the Applicant, are often used in environments like the LNP site. Id. at A10. They further stated that SWFWMD uses this approach and it is a standard industry practice as described in the published literature. Id. citing Ex. NRC071; Ex. NRC072. According to Mr. Vermeul, Mr. Vail, Dr. Prasad and Mr. Barnhurst's Rebuttal Testimony, attempts to model discrete fractures or dissolution features, as suggested by the Intervenors, over an area as large as that encompassed by the Applicant's model would be technically difficult and even if successful, the model would still be subject to significant uncertainty. Id. Therefore, according to Mr. Vermeul, Mr. Vail, Dr. Prasad and Mr. Barnhurst's Rebuttal Testimony, adding the complexity sought by the Intervenors would not change the Staff's approach of only using the model as one piece of information in its analysis and it would not change the Staff's impact determinations. Id.

b. Applicant Testimony

90. In their Direct Testimony, the Applicant's witnesses provided extensive testimony on why Model 1 was an accurate model and the correct one to use for analyzing impacts in this case. In his Direct Testimony, Mr. Lehnen stated that PEF developed Model 1 as part of the LNP's Florida Site Certification process and based it on the SWFWMD's pre-existing DWRM2 model (Regional Model). Ex. PEF200 at A34. PEF's expert witness James Rumbaugh designed and calibrated the DWRM2 for the SWFWMD. Ex. PEF100 at A3. Mr. Rumbaugh's Direct Testimony stated that in his professional opinion the predicted drawdown values and regional aquifer flow rates obtained from Model 1 are realistic. Ex. PEF100 at A20. Mr. Rumbaugh further testified that Model 1 relies on the DWRM2's existing calibration and, therefore, is based on "an exhaustive characterization of local conditions." Id. at A18. Thus, Model 1's application

was "consistent with the SWFWMD's recommended practice for groundwater use permit applicants within [the SWFWMD's] jurisdiction." Id.

91. Mr. Lehnen's Direct Testimony stated that he regards Model 1 as more accurate than Model 2 because Model 2 used a calibration target – the T&J Ranch Well – that he considered inappropriate. Ex. PEF200 at A42. Therefore, he agreed with Mr. Rumbaugh that Model 1 is the more accurate model. Id. Mr. Lehnen's Direct Testimony also stated that the Applicant considered recalibrating Model 1 based on 2007 USGS data, as requested by the Staff, but that they rejected this calibration on the recommendation of SWFWMD staff, "who advised that the existing calibration of the DWRM2 would be better representative of local conditions." Ex. PEF200 at A34. Mr. Rumbaugh testified that the SWFWMD does not recommend recalibrating local-scale models – as the Staff requested – because SWFWMD believes that the existing calibration has resulted in reliable predictions since the model's introduction in 2007. Ex. PEF100 at A15. However, Mr. Lehnen agreed with the Staff that either model can be used for an analysis of groundwater usage estimates, because in both models the LNP site only uses a very small percentage of the total water moving through the system. Ex. PEF200 at A24.

92. In their Rebuttal Testimony, the Applicant's witnesses also discussed the Intervenors' claimed that the modeling is insufficient at the LNP site. Mr. Rumbaugh's Rebuttal Testimony stated that it is general practice among hydrogeologists in Florida to use an equivalent porous media model in geologic conditions such as at the LNP site. Ex. PEF104 at A14, 15. Mr. Lehnen stated that, even if the geologic formation underlying the LNP site did not support using porous media assumptions for groundwater modeling, the Intervenors incorrectly identify the consequences. Ex. PEF218 at A7. He testified that the presence of preferential conduits would improve hydraulic conductivity and transmissivity. Id. Accordingly, preferential

conduits of the type described by Mr. Davies would actually diminish the magnitude of drawdowns and the size of the drawdown area, rather than increase them as Mr. Davies contended. Id.

93. Mr. Lehnen and Mr. Rumbaugh also testified that the type of groundwater modeling that informed the analysis in the FEIS has been used in the water permitting process by all Florida water districts (including the SWFWMD) for many years, and has produced reliable results. Ex. PEF104 at A6; Ex. PEF218 at A16. According to Mr. Lehnen, expanding the scope of the existing groundwater model to account for the relationship between ground and surface water – as suggested by the Intervenors – would risk adding increased uncertainty to the modeling process. Ex. PEF218 at A16. He further testified that it would be extremely expensive to compile and process the significant amount of site-specific data that would be needed. Id. Such data may not even be available over the long period of time that is necessary to perform proper integrated modeling. Id. In addition, according to Mr. Rumbaugh, using a surface water/groundwater model would not have been appropriate at LNP given the small amount of groundwater that will be withdrawn by the LNP relative to the flow through the aquifer. Ex. PEF104 at A7. Mr. Rumbaugh's Rebuttal Testimony also noted that the software Dr. Hazlett recommends using is untested in Florida. Id. at A8.

94. At the hearing, Mr. Rumbaugh testified that to his knowledge all of the other water management districts in Florida – except for possibly Northwest Florida of which he is unaware – use a MODFLOW based program, like the models here, for their permitting decisions. Tr. at 1397. Mr. Rumbaugh also testified that in going from the Regional Model to a local-scale model, local information like lakes, rivers and wetlands are added to the local scale model grid. Tr. at 1407. Mr. Lehnen noted that one such feature added for Model 1 and Model 2 was the Big King and Little King Springs. Tr. at 1415. Mr. Lehnen also testified that while

there was a difference between the measured water levels at the LNP site and head predictions based on Model 1, he did not find this unusual given the natural variation in the Upper Floridan Aquifer at the LNP site. Tr. at 1425-26.

c. Intervenor Testimony

95. The Intervenors' testimony on this topic primarily criticized the FEIS's reliance on an equivalent porous media model, and suggested several enhancements to the modeling done by the Applicant and reviewed by the Staff. For example, in his Direct Testimony, Mr. Davies stated that there are many differences between the LNP site and a porous media because of the presence of preferential flowpaths; thus, the use of a porous media model was inappropriate. Ex. INT001R at A8, A10. Mr. Davies testified that because of this flaw "the FEIS probably contains many uncertain parameters, and assessments of impacts are unreliable." Id. at A10. He further stated that a mischaracterization could result in either larger drawdowns than predicted or that a larger area could be affected. Id. at A14. He additionally stated that because of the possibility of large-scale conduits, a model area larger than 20 square miles should have been evaluated. Id. at A15. Dr. Hazlett similarly criticized the modeling done in the FEIS, stating that it cannot predict how changes will occur over time, it omitted salinity interactions with the CFBC, it is not well-suited to predict how pumping of the Floridan aquifer will affect levels or salinity in the surficial aquifer, and it assumes that the aquifers themselves are uniform, which they are not. Ex. INT101R at A3.

96. In their Rebuttal Testimony both Mr. Davies and Dr. Hazlett made similar claims. Mr. Davies again testified that the porous media assumptions in the models are inaccurate, and therefore thee models could underestimate the magnitude and timing of impacts. Ex. INT501R at A4. Dr. Hazlett's Rebuttal Testimony also recommended further site characterization activities and the construction of an integrated surface water and groundwater model to more

accurately show drawdowns in wetlands. Ex. INT601 at A17. He stated that by using this approach, the drawdowns would no longer appear radial, but would be more in a star pattern along the paths of least resistance. Id.

97. At the hearing, Mr. Davies agreed that equivalent porous media models are used for making water resource management decisions at other locations that exhibit well-developed karst. Tr. at 1428-29. While he would recommend other approaches than the one used here, all would ultimately still be based on equivalent porous media models. Tr. at 1429. Mr. Davies, Dr. Hazlett and Dr. Bacchus also agreed with the Staff that the models themselves are insufficient for making wetlands impact determinations. Tr. at 1451.

d. Board Findings

98. The Board finds the Staff and Applicant testimony persuasive that the FEIS adequately analyzed groundwater hydrology issues, including modeling. The evidence shows that the Staff took a hard look at the groundwater impacts in this case. The Staff first reviewed Model 1 provided by the Applicant. As the Applicant argued, Model 1 was peer reviewed and accepted by the SWFWMD for making water-resources decisions in this part of Florida. As Mr. Rumbaugh and Mr. Lehnen testified, the Regional Model, which Model 1 was based upon, has undergone significant calibration and testing and it has a history of accurately showing wetlands drawdowns in this part of Florida. The FEIS likely would have met NEPA's rule of reason by only using Model 1 because it used a well-accepted methodology for this area of Florida. However, as Mr. Vermeul testified at the hearing, because Model 1 did not match site-specific conditions, the Staff asked the Applicant to recalibrate the model, which resulted in the Applicant recalibrating Model 1 to create Model 2. This is strong evidence that the Staff took a hard look; it did not merely rely on the Applicant's submission, but took the required independent look at the results and requested revisions.

99. We further find the Staff's testimony regarding how it used the models provides persuasive evidence that the Staff took the required hard look. Mr. Vermeul testified that comparing the two models worked as a sensitivity analysis and provided more information to the Staff on the groundwater resource. Additionally, Mr. Vermeul, Mr. Vail, Dr. Prasad and Mr. Barnhurst testified that they used the model as a scoping-level tool for determining wetlands drawdown, also relying on specific portions of the COCs such as the required aquifer performance testing. They stated that this approach of using the model as a scoping level tool for identifying possible wetlands drawdowns, and then relying on adaptive management techniques is consistent with the approach commonly used by SWFWMD, who are responsible for permitting water users in this area of Florida. In all, it is clear that by evaluating both model runs and the specifics of the COCs the Staff took the required hard look at the groundwater resource.

100. The Intervenors' arguments to the contrary are unpersuasive. While the Intervenors argue that the FEIS should not rely on an equivalent porous media model at this site, Mr. Davies acknowledged at the hearing that porous media models are widely used in the industry. We are also persuaded by the literature cited by Mr. Vermeul, Mr. Vail, Dr. Prasad, and Mr. Barnhurst that shows that porous media models have been used at sites like the LNP site, and by Mr. Rumbaugh's testimony that models like his are used throughout the state of Florida. This is strong evidence that the Staff used a reasonable approach in the FEIS. Further, while the Intervenors suggest many techniques that could add complexity to the models – such as an integrated groundwater/surface water model, or showing salinity interactions – they provided no evidence demonstrating the use of these techniques at a site like the LNP site. Conversely, Mr. Rumbaugh provided testimony demonstrating that an integrated surface water and groundwater model is not feasible at the LNP site, and Mr. Vermeul, Mr. Vail, Dr. Prasad,

and Mr. Barnhurst's testimony stated that adding these additional complexities would not have changed their analysis. It is not enough for an intervenor to point out potential flaws in an EIS because, "in an NRC adjudication it is the Intervenors' burden to show their significance and materiality." Exelon Generating Co. (Early Site Permit for Clinton ESP Site), CLI-05-29, 62 NRC 801, 811 (2005). Here, given the persuasive explanation provided by the Staff and Applicant, we do not find the Intervenors have demonstrated the significance of their complaints about the adequacy of the groundwater modeling in the FEIS. While their experts provided suggestions on ways to improve the model, they have neither provided evidence showing these techniques are appropriate or possible at a setting like the LNP site, nor shown why the purported flaws in the FEIS are material. Thus, we find that the FEIS approach to groundwater hydrology was reasonable, and the Staff took the required hard look.

3. Surface Water Hydrology and Passive Dewatering

101. The primary surface-water hydrologic issues challenged in Contention 4A are the potential environmental impacts of passive dewatering and impacts to floodplains. For the purposes of this decision, we define passive dewatering to mean non-mechanistic dewatering, or dewatering that is not active dewatering. Ex. NRC090 at A39; Ex. PEF001 at A23. After considering the evidence, we find the Staff and Applicant's analysis of surface water impacts reasonable, and find that the FEIS took the required hard look at surface water impacts.

a. Parties Testimony

102. The Applicant's witness Dr. Griffin detailed the stormwater systems at the LNP site. In his Direct Testimony, Dr. Griffin explained that the LNP project includes features specifically designed to avoid the types of activities that would cause passive dewatering. Ex. PEF001 at A7. Dr. Griffin testified that there will be no landscape profile modifications associated with the LNP that could lead to passive dewatering. Id. at A25. He then provided

considerable detail regarding the design of the stormwater ponds and other structures at the LNP site and describes why they will limit impacts from passive dewatering. Id. at A27-30. Dr. Griffin's Direct Testimony also discussed SWFWMD's Basis of Review plan (Ex. PEF006) and why meeting these requirements will also ensure that the stormwater system at the LNP will not result in large environmental impacts. Id. at A32. Dr. Griffin concluded that by meeting these requirements "runoff flow rates at the LNP site and South Property boundary will not exceed existing runoff rates." Id. at A34.

103. In their Direct Testimony, Staff witnesses, Dr. Prasad, Mr. Vermeul, Mr. Vail, and Mr. Barnhurst also explained the stormwater systems at the LNP site and they largely agreed with Dr. Griffin. They stated that there will be three retention and infiltration ponds (also referred to as stormwater ponds) at the LNP site. Ex. NRC090 at A52. Dr. Prasad, Mr. Vermeul, Mr. Vail, and Mr. Barnhurst also testified that the site will be graded so that water runs away from the plant through drainage ditches that convey the water to these three ponds. Id. Their Direct Testimony concluded that during normal years, the bottom of these ponds would be above the groundwater table for most of the year, and equal to the groundwater table during the wettest part of the year. Id. at A55. Dr. Prasad, Mr. Vermeul, Mr. Vail, and Mr. Barnhurst further testified that during the wettest season, there would be some seepage from groundwater into the ponds, but it would be minimal. Id. Therefore, Dr. Prasad, Mr. Vermeul, Mr. Vail, and Mr. Barnhurst found – similar to Dr. Griffin's findings -- that there would not be passive dewatering from the stormwater ponds. Id. at A56.

104. Both the Staff and Applicant witnesses also addressed potential impacts to floodplains, which is one portion of Contention 4A. Dr. Prasad, Mr. Vermeul, Mr. Vail, and Mr. Barnhurst testified that they reviewed two analyses by the Applicant to determine whether the Applicant must provide compensation for loss of floodplain storage and historical basin storage

(HBS). Id. at A58. For the Applicant, Dr. Griffin's Direct Testimony also described these two analyses. Ex. PEF001 at A341. Dr. Prasad, Mr. Vermeul, Mr. Vail, and Mr. Barnhurst testified that the State of Florida requires applicants to compensate for any encroachment on the 100-year floodplain that may result in loss of flood storage, either storage loss or HBS loss. Ex. NRC090 at A57. After analyzing both of the Applicant's analyses, Dr. Prasad, Mr. Vermeul, Mr. Vail, and Mr. Barnhurst testified that the Applicant could easily compensate for both the loss of floodplain storage and HBS. Id. at A58-A61. Dr. Griffin agreed, finding that construction and operation of the LNP will not decrease the amount of stormwater reaching the groundwater under the site. Ex. PEF001 at A41. Dr. Griffin's Direct Testimony also provided details on why even with occasional evaporation loss due to drought conditions, the series of stormwater ditches that direct stormwater from the LNP plant to the stormwater ponds "will be a source of net recharge to the aquifer and cannot reasonably be foreseen to cause net passive dewatering." Id. at A44-45.

105. These analyses by the Applicant and Staff are largely unchallenged by the Intervenors. Neither the Intervenors' Initial nor Response Statements of Position mentioned the words "passive dewatering" or explained how their testimony relates to the portions of Contention 4A that challenge passive dewatering; consequently, it is unclear to this Board what portions of their testimony the Intervenors believe support the passive dewatering portions of Contention 4A. Nevertheless, the Board has examined several statements in the Intervenors' testimony, summarized below, that identify concerns that are apparently related to passive dewatering within the meaning of Contention 4 as initially submitted.

106. In his Direct Testimony, Mr. Still stated that he is concerned that construction of the nuclear islands and pumping of groundwater could disturb existing flow paths, and cause passive dewatering. Ex. 201R at A4. Mr. Still also testified that the terminology used in the

FEIS regarding the stormwater management system is inconsistent and confusing. Id. at A14. In her Direct Testimony, Dr. Bacchus also stated that the FEIS failed to properly analyze passive dewatering impacts due to the construction of the LNP, especially due to the excavation. Ex. INT301R at A28. She also testified that the FEIS underestimates impacts from stormwater ponds because it ignores natural water-flow patterns, and because – in her professional opinion – stormwater management practices have not been successful in preventing harm to ecosystems in the past. Id. at A30-31. Dr. Bacchus also claimed that the FEIS did not appropriately consider salinity, because she asserted that the FEIS only considered salinity within the Withlacoochee canal [CFBC], and that the FEIS ignores seasonal components. Id. at A17-19.

107. In his Rebuttal Testimony, Dr. Griffin testified that Dr. Bacchus' claims regarding evaporative losses at the stormwater ponds lack merit, stating that it is not true that rainfall in dry months never exceeds evapotranspiration. Ex. PEF016 at A7-10. In their Rebuttal Testimony, Staff witnesses Dr. Prasad, Mr. Barnhurst, Mr. Vail, and Mr. Vermeul agreed with Dr. Griffin's conclusions. Ex. NRC091 at A49. Moreover, according to Dr. Griffin, data make it clear that precipitation on the LNP stormwater ponds will offset evaporation for the majority of the year on average, and runoff from the LNP's raised power block will provide additional stormwater volume for percolation into the aquifer. Ex. PEF016 at A9.

108. In response to Dr. Bacchus's salinity arguments, Dr. Prasad, Mr. Vermeul, Mr. Vail, and Mr. Barnhurst testified that Dr. Bacchus stated that the Staff only addressed salinity in the Withlacoochee Canal [CFBC], when in fact the Staff evaluated salinity in the entire water system. Ex. NRC091 at A43. Dr. Prasad, Mr. Vermeul, Mr. Vail, and Mr. Barnhurst further testified that Dr. Bacchus is incorrect in stating that the FEIS did not consider seasonal variations when determining salinity when the Staff conservatively chose the lowest monthly

data from 13 weather stations when doing its analysis, thereby taking into account seasonal variations. Id. at A44.

b. Board Findings

109. First, we note that the Intervenors never specified what portions of their testimony they believe support the claims in Contention 4A that the FEIS analysis of impacts to floodplains and impacts from passive dewatering was inadequate. While it is true that the Staff has the burden of proof in NEPA cases, the Intervenors must identify, with some specificity, the alleged deficiencies in the NRC's NEPA analysis. See Hydro Res., Inc. (2929 Coors Road, Suite 101, Albuquerque, NM 87120), CLI-99-22, 50 NRC 3, 13 (1999). It is up to the Intervenors to show the significance and materiality of any mistakes in the FEIS. Exelon Generation Co. (Early Site Permit for Clinton ESP Site), CLI-05-29, 62 NRC 801, 811 (2005). In the absence of this information, this Board was forced to try and determine which portions of the Intervenors testimony we felt supported these portions of Contention 4A.

110. When looking at the testimony provided, we find for the Applicant and Staff regarding issues related to surface water hydrology, including passive dewatering. The Applicant and Staff testimony provide significant details regarding the design of the stormwater systems at the LNP site. In particular, Dr. Griffin details the design of the stormwater features and how they will prevent what is referred to as "passive dewatering" in Contention 4A. Further, both the Staff and Applicant provided persuasive analyses showing that if any passive dewatering occurs, it will be minimal. While Dr. Bacchus stated that there will evaporative losses from the wet retention ponds, she has not provided specific evidence to refute the analysis provided by the Staff and Applicant.

111. Additionally, Contention 4A, challenged the FEIS analysis of impacts to floodplains. In Dr. Griffin's testimony and in the testimony of Dr. Prasad, Mr. Vermeul, Mr. Vail

and M. Barnhurst, the Staff and Applicant witness discuss two floodplains analyses. We find these in-depth discussions of the two floodplains analysis persuasive and we see no evidence put forth by the Intervenors disputing them. Similarly, while Dr. Bacchus claimed that the FEIS ignored certain salinity interactions, the Rebuttal Testimony of Dr. Prasad, Mr. Vail, Mr. Barnhurst and Mr. Vermeul demonstrated that her claims are incorrect. In particular, they demonstrate that the FEIS considered salinity impacts outside the CFBC and show how the FEIS considered seasonal variations. Therefore, we find that the FEIS took a hard look surface water impacts, including impacts to floodplains and impacts from passive dewatering.

4. Terrestrial Ecology

112. The terrestrial ecology review included an analysis of the impacts of building and operating the proposed LNP units on wetlands. Each party provided written testimony addressing the parts of the contention relevant to terrestrial ecology, much of which was focused on dewatering impacts to wetlands. At the hearing, our questions concentrated on mitigation and monitoring requirements for these impacts. After considering the testimony and evidence on the record, we agree with the Staff that the FEIS includes an adequate analysis of terrestrial ecology impacts, that it reasonably accounts for the wetland monitoring and mitigation requirements in the FDEP COCs, and that the terrestrial resource impact conclusions reflect that the Staff took the “hard look” required by NEPA.

a. Staff Testimony

113. Mr. Doub and Ms. Aston explained in their Direct Testimony that the Staff followed guidance in ESRP sections 2.4.1, 4.3.1, 5.3.3.2, 4.7, and 5.11 and considered the COCs for assessing potential impacts on terrestrial ecology, including wetlands, associated with building the proposed LNP facilities. Ex. NRC090 at A94, A99, and A228. Their testimony also described their methodology for analyzing operational dewatering impacts to wetlands given the

lack of directly applicable guidance in the ESRP—considering drawdown projections from the hydrology review, literature analyses on the relationship between groundwater drawdown and wetland impacts, and the wetland monitoring and mitigation requirements in the COCs. Id. at A94, A100, and A101.

114. Mr. Doub testified that the Staff inclusively interpreted the term "wetlands" to include areas meeting either or both of the Federal and State of Florida definitions. Id. at A92. Mr. Doub and Ms. Aston testified that they used no artificial spatial boundary in evaluating which wetlands in the regional landscape could be subject to adverse effects during operations. Id. at A107. They stated that they performed a quantitative analysis that considered all wetland drawdown effects predicted by the more conservative of the two groundwater models (Model 2), in conjunction with a comprehensive SWFWMD literature review (Ex. NRC041) that analyzed the relationship between groundwater drawdown and potential adverse ecological effects on wetlands. Ex. NRC090 at A103; NRC091 at A55; Ex. NRC041 at 3-4. Even though their quantitative analysis indicated that as much as 2093 ac of wetlands could be adversely affected, Mr. Doub and Ms. Aston concluded that adverse wetland impacts would be unlikely because of the monitoring and mitigation requirements imposed on the Applicant by the COCs. Ex. NRC090 at A104 and A106; Ex. NRC091. at A55. It is the protective requirements imposed by the COCs, Mr. Doub and Ms. Aston testified, that provided the confidence needed to conclude that wetland drawdown impacts would not be greater than MODERATE. EX. NRC090 at A106; EX. NRC091 at A55. Mr. Doub and Ms. Aston determined that operational dewatering may result in MODERATE impacts to conservatively account for the possibility that "that adverse wetland impacts might ensue before the monitoring effort is capable of initially detecting the effects." Ex. NRC091 at A53.

115. For both the building and operational phases, Mr. Doub testified that the Staff considered the potential direct, indirect, and cumulative impacts to terrestrial resources. Ex. NRC090 at A93. Mr. Doub and Ms. Aston testified that active dewatering during the building phase would have minimal impacts on wetlands due to measures that the Applicant would take to isolate the excavations from the surrounding aquifer, pump seepage water into infiltration trenches, and following the protective construction dewatering requirements in the COCs. Id. at A96, A98, and A99; Ex. PEF005 at 53-55. They testified that operational impacts to wetlands attributable to active dewatering would be solely due to groundwater pumping from the proposed production wells. Id. at A100. So-called passive dewatering impacts, Mr. Doub and Ms. Aston testified, would be related to storm water management measures during both the building and operating phases, and would be minimal. Id. at 108. They testified that the effects of the storm water management measures on wetland hydrology and ecology would be minimal because storm water runoff would be directed to ponds or trenches built to allow captured storm water to recharge the surficial aquifer or flow into wetlands in a manner mimicking natural overland flow. Id. For their analysis of cumulative impacts attributable to active and passive dewatering, Mr. Doub and Ms. Aston testified that the primary contributor to terrestrial impacts would be the proposed operational groundwater pumping. Id. at A110. They stated in their testimony that incremental impacts of this pumping would not foreseeably result in greater than MODERATE cumulative impacts due to the requirements in the COCs. Id.

116. Contrary to the claims of the Intervenors, Mr. Doub and Ms. Aston testified that their analysis of wetland impacts considers impacts to wetland hydroperiods. Ex. NRC091 at A53. Because there is no confining layer between the surficial aquifer and most area wetlands, Mr. Doub and Ms. Aston testified that that the FEIS analysis of the effects of lowering the water table inherently included a consideration of possible changes in the hydroperiod of the wetlands

connected to that water table. Id. Moreover, they testified that the SWFWMD literature review (EX. NRC041) and the COCs considered by the Staff include the concept of hydroperiod. Ex. NRC041; Ex. NRC090 at A101; Ex. NRC091 at A53, A54, and A55. In particular, the COCs incorporate the performance review standard requirements that "wet season water levels shall not deviate from their normal range" and "wetland hydroperiods shall not deviate from their normal range and duration to the extent that wetlands plant species composition and community zonation are adversely affected." Ex. NRC091 at A54. With respect to wetland impacts, moreover, Mr. Doub and Ms. Aston testified that wetlands in the LNP vicinity are adapted to a range of seasonal and annual water levels and that short term fluctuations of as long as several years would not result in irreversible alterations. Id. at A56.

117. At the hearing, Mr. Doub testified about the level of information in the COCs that he needed to make a decision as to whether it was reasonable to partially rely on the COCs in the FEIS. Tr. at 1531-33. He testified that in his judgment the prescriptive nature of the COCs provided the confidence needed to conclude in the FEIS that the EMP and other COC requirements would be adequate to preclude LARGE terrestrial and wetland impacts. Tr. at 1532-33; Ex. NRC091 at A55. In their Direct Testimony, Mr. Doub and Ms. Aston indicated that the COCs provisions requiring detailed environmental monitoring and the investigation of an alternative water supply source to use in the event monitoring reveals potential adverse impacts to wetlands were particularly instrumental to their FEIS conclusions. Ex. NRC090 at A105. Additionally, in their Rebuttal Testimony they highlighted the applicability of four SWFWMD performance review standards incorporated by the COCs that are rigorous standards to prevent adverse impacts to wetlands. Ex. NRC091 at A54, A55, and A63.

118. The Intervenors also alleged in Contention 4A that certain nutrient pollution impacts affecting regional waterways (eutrophication) would occur as a result of LNP

dewatering due to the reduced ability of the affected wetlands to prevent nutrients from entering OFWs or other surface waters and from wildfires that could cause harmful nutrient levels in the wetlands. Mr. Doub and Ms. Aston testified that they considered the role that wetlands play in reducing nutrient entry into surface waters, but that the requirements of the COCs would prevent dewatering impacts from significantly degrading this ecological function of wetlands. Ex. NRC090 at A163 and A175. Mr. Doub and Ms. Aston also contradicted, in their Rebuttal Testimony, Dr. Bacchus' claim that the FEIS does not address the potential risk of wildfires related to operational dewatering. Ex. NRC091 at A58. This topic was addressed in the FEIS (Ex. NRC001A at 5-31), which acknowledged that, even though wetland drying could result in an increased risk of wildfires, several factors would reduce the risk of catastrophic wildfires. Id. at A58-A59. Mr. Doub and Ms. Aston testified that the COCs would effectively prevent widespread wetland drying due to dewatering, that the Applicant's proposed onsite wetland mitigation includes efforts to reduce fuel loads conducive to the spread of uncontrolled wildfires, and that the Applicant's onsite fire response is expected to be capable of preventing uncontrolled fires. Id. They also referenced a paper by the Florida Cooperative Extension Service (Ex. NRC079), which indicates that prescribed fires can promote seed germination and resprouting for many native species and prevent the accumulation of undergrowth capable of fueling catastrophic wildfires. Id. at A59.

b. Applicant Testimony

119. Much of the Applicant's testimony relating to Contention 4A's arguments regarding dewatering impacts to terrestrial ecology reinforces points made by the Staff. Dr. Dunn agreed that consideration of impacts to hydroperiods is embedded throughout the FEIS, particularly through the FEIS' consideration of the SWFWMD literature review (Ex. NRC041) and the COCs. Ex. PEF315 at A6. He also testified that wetlands in the LNP area have been

so altered by silviculture activities that Dr. Bacchus' reference to their "natural hydroperiod" is largely inapplicable. Ex. PEF315 at A5. Dr. Dunn also agreed with the FEIS's assessment that the testing, monitoring, and mitigation requirements of the COCs, specifically the Aquifer Performance Testing Plan, the EMP, and the potential implementation of an alternative water supply will prevent LARGE impacts to wetlands, though unlike the Staff, he does not believe that wetland impacts could be greater than SMALL. Ex. PEF315 at A12.

120. Mr. Hubbell's Rebuttal Testimony controverts the Direct Testimony of Mr. Still and supports the Staff's determination that the COCs provide a set of prescriptive and rigorous requirements that would limit unacceptable impacts to wetlands. He described many of the mitigation and monitoring plans in the COCs and stated that they ensure that groundwater pumping "is monitored, analyzed and managed in a way that supports the best management practices in both the construction and operation of the LNP . . . to ensure the impacts on water resources and the environment will be SMALL." Ex. PEF800 at A7 and A11.

121. Dr. Robertson provided written testimony rebutting Dr. Bacchus' claims that dewatering associated with the LNP will cause destructive wildfires that will impact wetlands and water quality. His testimony agreed with the Staff testimony that any contribution from dewatering to the occurrence of wildfires would be minor. Ex. PEF404 at A5. He further testified that destructive, long-lasting wildfires are primarily associated with drought, not man-made dewatering. Id. He also cited specific successful prescribed fire programs, in response to testimony by Dr. Bacchus that such programs are not successful, and notes that such success depends on following proper fire intervals. Id. at A6.

122. At the hearing, the oral testimony of Dr. Dunn and Mr. Hubbell was focused on the topics of mitigation and monitoring provided for by the COCs. Dr. Dunn testified regarding the implementation of the Applicant's proposed wetland monitoring program, which he

described as “very extensive” given the small amount of projected drawdown. Tr. at 1481. He testified that regardless of whether Model 1 or Model 2 is more correct, the environmental monitoring program would still function to capture the intended near field, far field, and beyond area of influence data. Tr. at 1478. Thus, he testified, the Applicant’s monitoring would measure the ecological parameters and the surficial aquifer system on the wetland sites. Tr. at 1479. Based on the monitoring data, Dr. Dunn testified that SWFWMD would apply quantitative assessment techniques based on its Wetland Assessment Procedure to monitor risks to wetland health. Tr. at 1490-92.

123. Dr. Dunn also testified that in his experience, it may take a long time—potentially 5-10 years—before changes to wetland ecology can be noticed following significant hydrologic changes. Id. at 1497. However, Mr. Hubbell then testified that hydrologic data would be predictive of whether an ecological impact will occur before it can be directly observed. Id. at 1498. He further testified that frequent reporting of groundwater levels and water quality will allow SWFWMD to quickly detect impact trends based on deteriorating hydrologic conditions. Id. at 1499. Mr. Hubbell also testified that in his experience, adaptive management mitigation techniques had been used successfully in the SWFWMD management area. Id. at 1509-10. Mr. Hubbell also cited one example of a public water supply project that SWFWMD required be shut down due to adverse wetland impacts. Id. at 1496.

c. Intervenors Testimony

124. In her Direct Testimony applicable to the portions of Contention 4A regarding dewatering impacts to terrestrial ecology, Dr. Bacchus stated that preferential flow paths on the site would lead to hydroperiod impacts in the wetlands associated with those fractures due to pumping associated with the LNP. Ex. INT301R at A12. She emphasized that hydroperiod considerations are important because seasonal variations in water levels may be relevant to

seasonal lifecycle patterns of some species, such as certain frogs and birds, that reproduce in wetlands and other surface water features during periods when water availability is limited. Id. at A13. Dr. Bacchus testified that, in her opinion, the FEIS did not address adverse impacts to hydroperiods in its analysis of wetland impacts. Id. at 15. She also testified that the FEIS does not address the hydroperiod alterations that would be caused by passive dewatering during construction and evaporative loss from storm water ponds. Id. at A28. Dr. Bacchus also testified that the controlled burns called for by the Applicant's proposed Wetland Mitigation Plan would not, based on her account of the historical failure of prescribed fire programs, succeed in preventing catastrophic wildfires. Id. at A37. As a result, she testified, uncontrolled fires would cause vegetation death, erosion, and nutrient pollution in wetlands and surface waters. Id.

125. Dr. Bacchus's oral testimony on the terrestrial dewatering impacts portion of the contention was largely in response to the Board's questions on mitigation and monitoring requirements in the COCs. She testified that the adequacy of monitoring well locations was dependent on the location of fractures on the site; because the monitoring locations have not yet been selected, it is impossible to judge whether the proposed monitoring would be adequate. Tr. at 1537-38. She also testified that, in her opinion, the only way to perform meaningful monitoring on the wetlands was to install monitoring instruments in every depressional wetland on the greater than 5000-acre site because all wetlands may not respond to drawdown in the same way. Id. She was not aware of any similar monitoring effort performed on a comparably sized site. Id. at 1540-41.

126. Mr. Still also provided testimony that the NRC's reliance on the COCs in the FEIS was misplaced because the permitting process was defective. Ex. INT201R at A3, A19. He testified in rebuttal that the COCs should have been based on Model 2. Ex. INT701R at A8. He

also testified that, in his opinion, the proposed environmental monitoring would not be effective because preferential pathways will lead to wetland impacts beyond the near field. Id. at A12.

d. Board Findings

127. Based on the testimony and evidence on the record we find in favor of the Staff and the Applicant with respect to the portion of Contention 4A relating to impacts to terrestrial ecology, including wetlands. We agree with the Staff and the Applicant that the FEIS included an analysis of the reasonably foreseeable direct, indirect, and cumulative impacts attributable to active and passive dewatering during the building and operation of the LNP. The testimony of Mr. Doub and Ms. Aston supports our conclusion that the FEIS reasonably considered numerous reliable sources of information that, taken together, indicate how the proposed activities would impact the terrestrial environment. Among others, these sources of information include applicable guidance from the ESRP, the ER, consultation with the U.S. FWS, personal site observations, Model 2, the comprehensive SWFWMD literature review of the relationship between groundwater drawdown and wetland impacts, and the COCs.

128. We find credible the testimony of Mr. Doub and Ms. Aston that wetland systems in the area of the LNP site, which have a history of prior disturbance, are adapted to a range of groundwater fluctuations such that temporary disturbances would not result in destabilizing alterations. See Ex. NRC090 at A98. We further agree with the testimony of Mr. Doub, Ms. Aston, and Mr. Hubbell that the prescriptive environmental monitoring requirements in the COC provide a reliable basis for the Staff's conclusion that destabilizing impacts to wetlands would not occur because environmental monitoring requirements will allow SWFWMD to enforce the COCs' prohibition on adverse impacts. See Ex. NRC091 at A53; Tr. at 1498-99.

129. We also agree that the COCs require measures—whether use of an alternative water supply (AWS) or other mitigation—that must be approved by SWFWMD and implemented

by the Applicant in the event that adverse impacts are detected or predicted. And we agree with Mr. Doub, Ms. Aston, and Dr. Dunn that the suite of requirements in the COCs for aquifer performance testing, an EMP, hydrologic monitoring, and associated data reporting will provide enough information to determine whether these mitigation alternatives are needed. See Ex. NRC090 at A106; Ex. PEF315 at A5; Tr. 1531-32. We also find that the requirements in the COCs are sufficiently detailed for the Staff to have reasonably relied on them for its NEPA analysis; to have ignored these legal requirements would not have served NEPA's purpose of considering reasonably foreseeable environmental impacts. See Robertson, 490 U.S. 332, 352 (an agency should discuss available mitigation so that it and other interested groups and individuals can properly evaluate the severity of adverse effects). It was also reasonable to assume that the Applicant would follow applicable laws, such as the COCs. Private Fuel Storage, LLC (Independent Spent Fuel Storage Installation), CLI-01-9, 53 NRC 232, 235 (2001) ("in the absence of evidence to the contrary, the NRC does not presume that a licensee will violate agency regulations wherever the opportunity arises.") Finally, we agree with the Staff and the Applicant that dewatering impacts are not likely to result in catastrophic wildfires, and, therefore, noticeable impacts from nutrient pollution are not reasonably foreseeable. Considering the above information, we agree with the Staff and the Applicant that it is not reasonably foreseeable that LARGE impacts to wetlands and other terrestrial resources would occur due to dewatering associated with the LNP.

5. Aquatic Ecology

130. Contention 4A raises the issue of impacts to Special Aquatic Sites, Outstanding Florida Waters (OFWs) and other waters due to active and passive dewatering. While aquatic ecology issues were not discussed at the oral hearing, we find that the written record provides

ample evidence for us to conclude that the FEIS took the required hard look at dewatering impacts to aquatic ecology.

a. Parties Testimony

131. The majority of the aquatic ecology testimony was provided by Staff witnesses Dr. Masnik and Dr. Miracle. Dr. Masnik and Dr. Miracle's Direct Testimony stated that they followed guidance from Sections 2.4.2, 4.3.2, 5.3.1.2, 4.7, and 5.11 of the ESRP in addressing impacts to aquatic ecology in the FEIS. Ex. NRC090 at A77. Additionally, they participated in site visits, reviewed the Applicant's ER and responses to RAIs, reviewed public scoping comments and comments on the DEIS, performed a literature review, and interacted with other state and Federal agencies. Id. at A73.

132. Dr. Masnik and Dr. Miracle testified that they analyzed possible direct, indirect and cumulative impacts to the mud flats and submerged aquatic vegetation (SAV), which are the only "special aquatic sites"[16] that could be affected by LNP. Id. at A128. The Applicant's witness, Dr. Dunn testified that there are no "special aquatic sites" at issue. Ex. PEF300 at A5 n2. We found no evidence from the Intervenors specifically addressing special aquatic sites. According to Dr. Masnik and Dr. Miracle, because neither the mud flats nor SAV are near any areas that would be affected by building activities, and because the groundwater hydrologists found only localized impacts from dewatering for both building activities and operations, they

[16] Dr. Masnik and Dr. Miracle state that "special aquatic sites" are defined by the Environmental Protection Agency (EPA) in 40 C.F.R. § 230.3(q-1) as "either large or small areas possessing special ecological characteristics of productivity, habitat, wildlife protection or other important and easily disrupted ecological values." Ex. NRC090 at A75. Special aquatic sites include fish and wildlife sanctuaries and refuges, wetlands, mud flats, vegetated shallows, coral reefs, and riffles and pool complexes. Id. The Staff did not use the term, "special aquatic sites" in the FEIS, preferring to use the individual descriptor associated with the resource in question (i.e. wetlands, refuges, etc). Id.

found that there would be no direct or indirect impacts from the building or operation of the LNP to SAV or mudflats. Ex. NRC090 at A126 – A127. For passive dewatering impacts to SAV, the Staff hydrologists found that there would only be minor salinity impacts offsite and found that these minor changes would not negatively affect SAV because the biota in SAV are not sensitive to minor changes in salinity. Id. For mudflats, Dr. Masnik and Dr. Miracle found that because of the distance of the mudflats from the LNP site, and because mud flats occur in tidal zones, minor fluctuations in salinity levels from the LNP site would not negatively affect mud flat habitats. Id. at A131.

133. Dr. Masnik and Dr. Miracle also testified that they used ESRP Sections 2.4.2, 4.3.2, and 5.11 to determine the impacts to aquatic ecology in "other waters" from dewatering. Id. at A136. Because the hydrologists found that there would be little change to the flows at Little King and Big King Springs, the Staff testified found that it is unlikely that LNP dewatering would impact any aquatic biota at these springs. Id. at A135. Dr. Miracle and Dr. Masnik also considered the CFBC an "other water" as used in Contention 4A and analyzed impacts to the CFBC and its freshwater springs from building activities in Section 4.3.2 of the FEIS, and from operations in Section 5.3.2 of the FEIS. Id. at A137. They analyzed possible direct impacts to aquatic biota in the CFBC due to building the barge facility, intake and pumphouse installation, and placement of the blowdown pipeline. Id. Dr. Masnik and Dr. Miracle found that impacts to aquatic biota in other waters from building activities would be unnoticeable. Id. at A137. They also testified that operational dewatering activities will be localized to the LNP site; therefore, operational dewatering would not affect "other waters." Id. Because of the unnoticeable impact to "other waters" from LNP dewatering, Dr. Masnik and Dr. Miracle found that incremental impacts from the LNP to any cumulative impacts to aquatic biota in other waters would also be minor. Id. at A138.

134. Contention 4A also challenges impacts to Outstanding Florida Waters. According to Dr. Masnik and Dr. Miracle, "[a]s stated in Section 403.061(a)(27) of the Florida Statutes, the designation, Outstanding Florida Water (OFW), is approved by the Environmental Regulation Commission under the FDEP. Fla. Stat. Ann. § 403.061(a)(27) (2010). An OFW is considered a specific category of waterbody that is worthy of special protection due to its natural attributes such that the waterbody has exceptional recreational or ecological significance. The Withlacoochee River is an OFW as is the Withlacoochee Riverine and Lake System which includes all portions of the Withlacoochee River." Id. at A157. The Applicant's witness, Dr. Dunn agreed that the only relevant OFW in the vicinity of the LNP site is the lower Withlacoochee River from the Gulf of Mexico to the Inglis Lock Bypass Channel (excluding the isolated segment of that watercourse between Lake Rousseau and the CFBC). Ex. PEF300 at A25. Dr. Masnik and Dr. Miracle did not find any direct impacts on OFWs from LNP dewatering, because building activities will be either on the site or in the CFBC, which is not an OFW. Ex. NRC090 at A167. The Staff witnesses also analyzed possible indirect and cumulative impacts to OFWs. Id. at A168 – A169. For indirect impacts, Dr. Masnik and Dr. Miracle found that because building and operational impacts from dewatering are minor and will occur mainly on the LNP site, there will be no indirect impact to OFWs from dewatering. Id. at A171. For the same reasons, the Staff testified that the LNP site would have only a minor contribution to any cumulative impacts to OFWs. Id. at A170.

135. To put the Levy operational groundwater withdrawals in perspective with respect to the Withlacoochee Riverine and Lake System OFW, Dr. Masnik and Dr. Miracle compared the LNP operational groundwater withdrawal flow to the flow of the Withlacoochee River below Lake Rousseau. Id. at A171. They conservatively assumed that the entire LNP operational groundwater withdrawal (1.58 Mgd annual daily average total withdrawal and 5.8 Mgd potential

maximum daily withdrawal) was withdrawn from the Withlacoochee River near the production wellfield. Id. USGS streamflow records over the last 37 years reported an average daily discharge of 687 Mgd through the bypass channel to the lower Withlacoochee River. Id. According to Dr. Masnik and Dr. Miracle, even if the entire annual average daily withdrawal of 1.58 Mgd and the potential maximum daily withdrawal of 5.8 Mgd at the LNP site were non-mechanistically withdrawn from the Withlacoochee River basin in the vicinity of the LNP wellfield, it would only represent 0.2 percent of the annual mean flow and 0.8 percent of the flow from the maximum groundwater withdrawal. Id. Dr. Masnik and Dr. Miracle testified that this reduction in flow would have no detectable impact on the distribution and abundance of aquatic biota inhabiting the Withlacoochee Riverine and Lake System OFW. Id. In all, the Dr. Miracle and Dr. Masnik found that building and operating LNP would have SMALL impacts on aquatic ecology, and the cumulative impacts would be SMALL to MODERATE. The possible MODERATE impact is primarily due to past actions of the Crystal River Energy Complex, and LNP would only be a minor contributor to these cumulative impacts. Id. at A65, A81, A132, A141.

136. Dr. Dunn agreed with these findings, stating that, under both groundwater models, the impact of dewatering on the flow of groundwater to the Withlacoohee River would be SMALL. Ex. PEF300 at A17. He also testified that dewatering caused by the LNP will not alter the surface water hydrology of either the Withlacoochee River or the Waccasassa River. Id. Dr. Dunn stated that: “it is my professional opinion that construction dewatering will not adversely impact the wetlands and aquatic ecosystems on or in the vicinity of the LNP site and South Property. Neither will it have an adverse impact on any other water resources or ecosystems.” Id. at A13. Regarding potential nutrient increases in aquatic ecosystems, Dr. Dunn’s Direct Testimony stated that “[t]here is no clear mechanism for increasing nutrient

concentrations within wetlands and aquatic ecosystems and their underlying aquifers on or in the vicinity of the LNP site without adding an external source depositing additional nutrients on the properties and thereby increasing the input side of the equation. ... No such external sources exist on and in the vicinity of the LNP site." Id. at A40. Dr. Dunn concluded that in his professional opinion, "the cumulative impacts to wetlands, floodplains, special aquatic sites, and other waters, including the UFA and SAS, from passive dewatering and active dewatering during construction and operation of the LNP are not greater than SMALL." Id. at A42.

137. In their Rebuttal Testimony, Dr. Masnik and Dr. Miracle responded to several claims made by Dr. Bacchus in her Direct Testimony. Dr. Bacchus criticized the Staff's analysis of salinity impacts to essential fish habitat (EFH). Ex. INT301R at A18. Dr. Masnik and Dr. Miracle explained that Dr. Bacchus' argument only selectively quotes from the FEIS, and demonstrated that her argument is incorrect by citing where the Staff's EFH analyzed salinity interactions. Ex. NRC091 at A67. Additionally, Dr. Masnik and Dr. Miracle stated that Dr. Bacchus' concerns regarding salinity impacts to vegetation important for manatees and green sea turtles lack merit. Ex. INT301R at A19. Dr. Masnik and Dr. Miracle testified that, as described in the Intervenors' own exhibit, the CFBC does not provide a significant source of food for manatees. Ex. NRC091 at A68 citing Ex. INT383 at 8. Therefore, according to Dr. Masnik and Dr. Miracle the minor salinity changes to the CFBC from the LNP will have only a minor affect on any areas that manatees use for feeding. Ex. NRC091 at A68. Similarly, according to Dr. Masnik and Dr. Miracle, Dr. Bacchus' claims regarding salinity impacts to vegetation consumed by green sea turtles lack merit because turtle grasses, a preferred food of the green sea turtle, thrive in coastal waters at higher salinities, and do not tolerate influxes of fresh water. Ex. NRC091 at A68; Ex. NRC045 at 20. Thus, according to Dr. Masnik and Dr.

Miracle, a reduction in freshwater due to the LNP would be advantageous to turtle grass. Ex. NRC091 at A68.

b. Board Findings

138. The Board finds for the Staff and the Applicant regarding the aquatic ecology issues in Contention 4A. The primary aquatic ecology issues in Contention 4A are impacts to OFWs, special aquatic sites, and "other waters." The testimony of Dr. Masnik and Dr. Miracle systematically described how the Staff performed its analysis of aquatic impacts to these resources and persuasively justified why the conclusions in the FEIS were reasonable. Dr. Masnik and Dr. Miracle showed how they used a systematic approach to analyzing aquatic ecology impacts and found impacts from building and operation to be SMALL and for cumulative impacts to be SMALL to MODERATE, with LNP having only a minor contribution to the possible MODERATE cumulative impacts. Dr. Dunn's testimony supports the Staff's conclusions, with the exception that he believes all impacts would be SMALL. The only aquatic ecology issues raised by Dr. Bacchus are claims regarding salinity, the Staff's EFH analysis, and food sources for turtles and manatee. We find that Dr. Masnik and Mr. Miracle's Rebuttal Testimony persuasively responded to each of these claims, and showed that the FEIS properly analyzed each of these issues. We found no aquatic ecology testimony in the Intervenors' Rebuttal Testimony. Therefore, we find that the Staff and Applicant's arguments persuasive and find that the FEIS took the required hard look at aquatic ecology impacts from dewatering. Specifically, we find that the claims in Contention 4A that the FEIS did not properly analyze impacts to OFWs, special aquatic sites and "other waters" lack merit.

6. Overall Conclusions for Part A of Contention 4A

139. Part A of Contention 4A challenges the analysis in the FEIS of impacts to wetlands, floodplains, special aquatic sites, and other waters from dewatering. In the sections

above, we provided our findings regarding those portions of Part A of Contention 4A that appeared in dispute among the parties based on the parties' filings in this proceeding. It is not clear to the Board whether the Intervenors made claims for all of the subparts in Part A of Contention 4A, as the Intervenors' Statement of Positions did not explicitly address all subparts of Contention 4A. In their Initial Statements of Position both the Staff and Applicant went through every subpart of the contention and provided citations for testimony that supported their assertions. While the Staff has the burden of proof in NEPA cases, the Intervenors must identify, with some specificity, the alleged deficiencies in the NRC's NEPA analysis. See Hydro Res., Inc. (2929 Coors Road, Suite 101, Albuquerque, NM 87120), CLI-99-22, 50 NRC 3, 13 (1999). It is up to the Intervenors to show the significance and materiality of any mistakes in the FEIS. Exelon Generation Co. (Early Site Permit for Clinton ESP Site), CLI-05-29, 62 NRC 801, 811 (2005). After reviewing the entire record, including the central issues discussed in more detail above, we find the Staff and Applicant position persuasive with respect to each subpart of Part A of Contention 4A, including those that the Intervenors did not clearly address in their testimony.

140. In particular, for the reasons discussed above, we find that the FEIS's discussion of impacts to wetlands, floodplains, special aquatic sites, and other waters due to dewatering was sufficient for the FEIS to provide a "hard look" at LNP's direct, indirect and cumulative impacts, consistent with the NEPA "rule of reason." Therefore, we find that the FEIS properly addresses impacts to wetlands, floodplains, special aquatic sites, and other waters, associated with dewatering. Specifically, we find that the FEIS took the required hard look at: (1) Impacts resulting from active and passive dewatering; (2) Impacts resulting from the connection of the site to the underlying Floridan aquifer system; (3) Impacts on Outstanding Florida Waters such as the Withlacoochee and Waccasassa Rivers; (4) Impacts on water quality and the aquatic

environment due to alterations and increases in nutrient concentrations caused by the removal of water; and (5) Impacts on water quality and the aquatic environment due to increased nutrients resulting from destructive wildfires resulting from dewatering. Consequently, we find for the Staff and Applicant regarding Part A of Contention 4A.

C. Part B of Contention 4A – Salt Drift and Deposition

141. Subpart B of Contention 4A challenges the Staff's analysis of impacts to wetlands, floodplains, special aquatic sites, and other waters associated with salt drift and salt deposition from the building and operation of the LNP cooling towers. The Applicant's witnesses testified that their findings are consistent with the Staff's conclusions in the FEIS. After carefully considering the testimonies of all parties, the Board finds that the Staff's analysis complied with NEPA. Accordingly, Part B of Contention 4A has no merit.

1. Meteorology

142. The Intervenors challenged the FEIS's analysis of salt drift and deposition, claiming that it does not adequately assess impacts. The Staff and Applicant testimony described how these impacts were developed in the Applicant's ER and considered in the FEIS. To determine air quality impacts from salt drift and deposition, the Applicant in its ER calculated maximum salt deposition rates, which the Staff independently verified using the US EPA approved AERMOD model. Dr. Howroyd, a witness for the Applicant prepared these calculations. Ex. PEF500 at A8 and A17. As a result of the AERMOD calculations, the Staff found in the FEIS that the maximum deposition rates it calculated were not substantially different from the Applicant's. Ex. NRC090 at A87.

143. To inform the Staff's salt drift calculations, Dr. Berg and Mr. Quinlan, witnesses for the Staff, testified that they used National Weather Service data to compare wind speeds at Gainesville and the LNP site. Ex. NRC090 at A87. Similarly, Dr. Howroyd, witness for the

Applicant, testified that he used meteorological data from Gainesville because it is the nearest and most representative National Weather Service location to the LNP site. Ex. PEF500 at A18. As a result of this comparison, the Staff and Applicant both found that the two sites had similar wind speeds and thus concluded that Gainesville and the LNP site had similar salt dispersion characteristics. Ex. NRC090 at 87; see also Ex. PEF500 at A18.

144. Further, the Staff and Applicant witnesses testified that their analyses both relied on the Applicant's use of drift abatement measures at the LNP site when assessing total salt drift and deposition rates. Ex. NRC090 at 86; see also Ex. PEF500 at A8, A14, and A16. Also Dr. Howroyd noted that PEF will be able to control the concentration of salt drift by balancing makeup water and blowdown flow rates. PEF500 at A13.

145. Dr. Bacchus disagreed with the Staff and Applicant's findings and instead testified that the Staff's wind speed data was not representative of the LNP site and therefore was not accurate to predict drift and deposition rates. Ex. INT301 at A38. However, her argument, as the Staff explained in its Rebuttal Testimony, is flawed because Dr. Bacchus' complaint is that wind data from Tampa does not correlate to wind data at the LNP site. Id. Dr. Berg and Mr. Quinlan have clearly stated that they compared wind data from Gainesville, not Tampa, and found little variation between Gainesville and the LNP site. Ex. NRC091 at A72. Dr. Howroyd likewise confirmed the Staff's finding using wind data from Gainesville. Ex. PEF506 at A6.

146. As such, after considering the testimony of the Staff and Applicant witnesses regarding the Staff's independent evaluation and confirmation of the Applicant's findings, the Board finds Dr. Bacchus' testimony on this issue to be unpersuasive. The Staff persuasively explained its basis for finding the Gainesville data to be representative of conditions at the LNP site as well as for the conservatism of its associated analysis of deposition rates, and Dr.

Bacchus' claims (including her misapprehension as to the location actually used for comparing wind speeds) do not reveal any error in the Staff's approach. Accordingly, the Board finds that the Staff took a hard look with respect to salt drift and deposition rates at the LNP site.

147. Dr. Bacchus also asserted that the Staff failed to consider naturally occurring salt deposition at the LNP site. Ex. INT301 at A38. Looking at the Staff's testimony, it is clear that this is incorrect. Dr. Berg stated that he did in fact consider naturally occurring salt at the site and found such concentrations to be small. NRC091 at A74. Because the Levy site is inland, in his testimony Dr. Berg argued that this will contribute to small salt deposition because naturally occurring salt concentrations decrease with distance from the coast. Ex. NRC091 at A74. The Staff therefore claimed that naturally occurring salt deposition will be minor. Id. Dr. Howroyd's testimony for the Applicant confirmed that naturally occurring salt is predicted to be negligible. Ex. PEF506 at A10.

148. The Intervenors also took issue with the location of maximum salt deposition in the FEIS, arguing that it should be to the southwest rather than to the west of the cooling towers. Ex. INT301 at A38. However, Dr. Berg and Mr. Quinlan's testimony clearly articulated why the Staff's description was accurate as it was predicted using the AERMOD model and using observed wind directional data at Gainesville and LNP sites. Ex. NRC091 at A75. Likewise, Dr. Howroyd also testified that when running the model, the maximum predicted salt deposition rate was located west of the cooling towers. Ex. PEF 500 at A24; see also Ex. PEF506 at A7. The Board finds the Staff and Applicant testimony persuasive and finds that contrary to the Intervenors' claims, the Staff's analysis in the FEIS regarding the applicable meteorological data was adequate.

2. Water Quality

149. The Intervenors also asserted that salt drift will cause LARGE adverse impacts on the aquatic ecosystem in the vicinity of the LNP site. Ex. INT301 at A3 and A35. In particular, they claimed that increases in salinity in surface waters will be caused by evaporation and not loss of surface waters as the FEIS explained. Id. at A35. Also, Dr. Bacchus testified that the FEIS is inaccurate because it discusses salt increases in terms of average precipitation and does not consider drought periods which she contended will cause higher salt concentrations. Id. 150. After considering these assertions, the Board finds that the Staff's conclusions are persuasive with respect to salt drift impacts on water quality and aquatic resources. First, both the Staff and Applicant followed guidance in NUREG 1555, ESRP 5.3.3.2. Ex. NRC090 at A223; Ex. PEF600 at A12. Dr. Miracle and Dr. Masnik found that salt deposition from cooling tower drift would not measurably affect the closest major freshwater bodies, such as Lake Rousseau and the Withlacoochee River. Id. at Ex. NRC090 at A223; Ex. NRC001 at 5-55. Also, the amounts of salt deposition would be minimal and any salt deposited would be diluted by rainfall and/or surface waters. Ex. PEF600 at A11. Dr. Prasad, Mr. Barnhurst, Mr. Vail and Mr. Vermeul in their Direct Testimony described how they used a conservative analysis to determine that salinity of surface runoff, containing the maximum estimated salt deposition, would essentially be freshwater and thus would not noticeably increase salinity of nearby aquatic resources. Ex. NRC090 at A199. Also, Dr. Prasad, Mr. Barnhurst, Mr. Vail and Mr. Vermeul evaluated the maximum estimated salt deposit using a one-month dry period, which in turn allowed the Staff to assume a maximized salinity. NRC091 at A200. From this, Dr. Miracle and Dr. Masnik concluded that because the maximum salt deposition rate will decrease with distance from the LNP site boundary, salt deposition is not expected to even reach the Withlacoochee River or other freshwater bodies. Id. at A222.

151. Moreover, relying on guidance in NUREG-1555, ESRP 2.4.2 and ESRP 5.3.1, as well as the AERMOD model, Dr. Miracle and Dr. Masnik found that salt deposition rates decrease as distance increases from the LNP site boundary. Ex. NRC090 at A222. As for the Applicant's position, Dr. Blancher testified that salt drift and deposition from the LNP would not cause adverse impacts on aquatic resources. To arrive at this conclusion, he used these maximum predicted deposition rates calculated by Dr. Howroyd to then evaluate the impacts of salt deposition on aquatic resources at the LNP site. Ex. PEF600 at A8. Consequently, Dr. Blancher found that even under drought conditions, the salt concentrations would be too small to adversely impact aquatic resources on and offsite. Id. at A9. Dr. Blancher also testified that because rainfall is expected to dilute deposited salt to downstream waterbodies, which have a higher salinity, there will be a minimal effect on aquatic as well as terrestrial resources. Ex. PEF600 at A13.

152. In terms of impacts to aquatic biota, the Staff also concluded that salt drift and deposition impacts would be small. Ex. NRC090 at A225; Ex. NRC001 at 5-26 and 5-47. Dr. Miracle and Dr. Masnik found that biota inhabiting waterbodies near the coast would not be adversely affected by salt drift or deposition as they are already salt tolerant from residing in estuarine environments that may already have elevated salinities. Ex. NRC090 at A224; see also Ex. PEF600 at A24. Based on these findings, the Board agrees with the Staff's analysis that salt drift is not expected to measurably affect the closest major freshwater bodies. Moreover, the Board concurs with the Staff's conclusion that there will only be minor impacts to aquatic biota from salt drift and deposition. Ex. NRC090 at A225 and A226; Ex. NRC001 at 7-23 and 7-24.

153. With respect to water quality impacts from salt drift and deposition, the Intervenors asserted that droplets of brackish water released during operation could result in

deposition on and subsequent damage to wetlands and aquatic resources. Ex. INT301 at A19 and A38. In her testimony, Dr. Bacchus claimed that salt drift and deposition will result in salinity adversely affecting the wetlands, floodplains, and other habitats on the LNP site. Ex. INT301 at A38. Dr. Bacchus also stated that makeup water for the LNP will be brackish due to the increased salinity and surface withdrawals from the Withlacoochee Canal [CFBC] and cooling tower drift may contain concentrations of salt that could affect special aquatic sites and other aquatic resources when deposited. Id. at A19; see also Ex. NRC090 at A198.

154. The Staff's testimony however, refutes Dr. Bacchus' claims. Employing a conservative analysis to determine the maximum areal deposition rate and thus estimate salinity, Dr. Prasad, Mr. Barnhurst, Mr. Vail and Mr. Vermeul found surface water salinity rates to be much smaller than the rate commonly used for brackish water. Ex. NRC091 at A76. The Board agrees that the Staff's analysis for determining salinity was conservative because the Staff used the maximum onsite deposition both for onsite as well as offsite areas. Ex. NRC090 at A200. Also as Dr. Prasad, Mr. Barnhurst, Mr. Vail and Mr. Vermeul's Direct Testimony stated, the Staff evaluated the maximum estimated salt deposit using a one-month dry period, which in turn allowed the Staff to assume a maximized salinity. Id. This estimated runoff salinity remained below the threshold for brackish water. In turn, the Staff concluded that the LNP salt drift and deposition would not result in noticeable impacts to nearby aquatic features. Id. Additionally, Dr. Prasad, Mr. Barnhurst, Mr. Vail and Mr. Vermeul noted that due to more frequent and more abundant precipitation, the salinity of runoff would be less than the estimated maximum salt deposit. Ex. NRC090 A199-200; Ex. NRC001 at 5-20.

155. Further, Dr. Bacchus claimed that because the Gulf of Mexico will be the ultimate source of the LNP's cooling water, she contended that the salinity in the Withlacoochee Canal [CFBC] will become salt water, causing death to surrounding vegetation. Ex. INT301 at A19.

As such, she stated that the FEIS does not consider LARGE impacts to nearby species and increased salinities will destabilize the resource. Id. Despite these claims, the Applicant and Staff's testimony adequately explained that due to freshwater flow into the CFBC, the makeup water from the CFBC would have a lower salinity than waters of the Gulf of Mexico. Ex. NRC090 at A198-A199; see also Ex. PEF500 at A11. The Staff's analysis, as Dr. Prasad, Mr. Barnhurst, Mr. Vail and Mr. Vermeul testified, is based on the likely salinity from the runoff and is estimated to be much smaller than brackish water. As such, the Board agrees with the Staff's conclusion that salinity in the CFBC will not become saline to the point that it would cause LARGE impacts to the species in the CFBC. Id. at A198.

156. Dr. Bacchus additionally contended that a significant amount of salt drift will occur to the southwest, thereby affecting the Levy supply wells which are situated south of the nuclear island. Ex. INT301 at A38. In return, she testified that this will cause dewatering which will increase groundwater contamination from salt drift deposition. As a result, she asserted that the FEIS fails to consider cumulative damage from the synergistic effects of droughts, changes to natural hydroperiods, and stress to vegetation from salt drift. Ex. INT301 at A38. However, both the Applicant and Staff testimony persuasively refutes these arguments. First, Dr. Blancher testified that Dr. Bacchus' claims about drought effects is without merit, as the Applicant calculated low salinity levels even in drought conditions. As such, the Applicant analyses indicated that cumulative impacts from salt drift are predicted to be minimal. Ex. PEF608 at A15. For the Staff, Dr. Berg likewise countered Dr. Bacchus' assertion by explaining why the FEIS's description of the location of maximum salt deposition, to the west of the cooling towers, is accurate. Ex. NRC091 at A75; see also Ex. PEF506 at A6. To accurately predict wind direction and hence, salt deposition at the LNP site, both the Staff and Applicant relied on five years of meteorological data from Gainesville. Ex. NRC091 at A75; see also Ex. PEF500 at

A19. Dr. Prasad, Mr. Barnhurst, Mr. Vail and Mr. Vermeul testified that they estimated surface water salinity using the maximum areal salt deposition rate. Ex. NRC091 at A76. In doing so, Dr. Prasad, Mr. Barnhurst, Mr. Vail and Mr. Vermeul found that consideration of the variation in the salt deposition pattern was not necessary because even if wind direction predicted by the Staff were to deviate, the impacts from salt drift and deposition would still be SMALL. Ex. NRC091 at A.76; Ex. NRC090 at A198-A200.

157. Moreover, in its testimony, the Staff explained that the FEIS analyzed salt deposition from rainfall and runoff following a period of drought and found that using the maximum salt deposition rate, the Staff found that salt drift and deposition would not result in a noticeable increase in salinity of nearby aquatic features. Ex. NRC090 at A199; see also Ex. NRC091 at A81. Likewise, Dr. Blancher assessed impacts using a worst case scenario of a 100 year drought in Levy County and the highest projected salt deposition rate. Ex. PEF600 at A18; Ex. PEF608 at A7. Even factoring in the worst case scenario (which NEPA does not require, as it is an assessment of the reasonably anticipated environmental impacts, see Robertson, 332 U.S. at 359), the Applicant concluded that salt drift would not measurably affect vegetation on the LNP site or in nearby areas. Ex. PEF600 at A18 and A20. Moreover, Dr. Blancher testified that rainfall would be able to mitigate any potential effects from salt deposition on vegetation. Id. at A20. Therefore, he concluded that there would not be measurable salt drift impacts on waterbodies in and around the LNP site. Ex. PEF600 at A24. This is because as salt moves downstream from salt drift, it will not change downstream salinities as these waterbodies are already estuarine. Id. These findings effectively counter Dr. Bacchus' claims that the FEIS is inaccurate, specifically her claims that the FEIS discusses salt increases in terms of average precipitation and does not factor in drought periods, which she asserted will cause higher salt concentrations. Ex. INT301 at A35. Thus, the Board finds the Staff's and Applicant's position to

be persuasive that surface water salinity on the LNP site does not approach the salinity of brackish water and thus would not adversely affect the ecology of wetlands, floodplains, and other habitats on and surrounding the LNP site.

158. Finally, the Intervenors also asserted that the FEIS does not account for increased salinities from salt drift and deposition to OFWs. Ex. INT301 at A4. Specifically, Dr. Bacchus contended that the FEIS incorrectly discusses salt increases in relation to average precipitation amounts and does not consider greater salt concentrations. She claimed that greater salt concentrations will occur during drought periods. She also asserted that the analysis in the FEIS is inadequate because it only relies on one year of data. Id. However, Dr. Prasad, Mr. Barnhurst, Mr. Vail and Mr. Vermeul's testimony showed that they employed a conservative estimate of surface water salinity by relying on a uniform maximum salt deposition rate on LNP onsite and offsite areas during a one-month dry period. Ex. NRC091 at A76; Ex. NRC090 at A198-200. After calculations, Dr. Prasad, Mr. Barnhurst, Mr. Vail and Mr. Vermeul found the surface water salinity to be much less than that of brackish water. Ex. NRC091 at A76. The Staff therefore concluded that runoff generated from areas of maximum salt deposition from operation of the LNP cooling towers would be essentially fresh water and would not result in a noticeable increase in the salinity of the surface water and aquatic features. Ex. NRC090 at A206. Further, as explained above, Dr. Blancher assessed impacts using a worst case scenario of a 100 year drought in Levy County and the highest projected salt deposition rate and still found no noticeable impacts from salt drift and deposition. Ex. PEF600 at A18; Ex. PEF608 at A7. Thus, after reviewing the testimonies of the parties regarding salt drift and deposition impacts to water quality and aquatic features, the Board finds the Staff's testimony to be persuasive. The Intervenors' claims with respect to this issue have no merit.

3. Ecology

159. In terms of terrestrial ecological impacts due to salt drift and deposition, Dr. Bacchus stated that the FEIS fails to adequately address potential impacts from salt drift on wetlands, floodplains, special aquatic sites, and other waters. Ex. INT301 at A38. She likewise claimed that the FEIS does not account for "cumulative damage" to wetlands caused by drought and salt drift. She points in particular to what she describes as the "extensive death and destruction" of native vegetation at the nearby Crystal River Energy Complex (CREC). Ex. INT301 at A38.

160. Both the Staff and Applicant disagreed with Dr. Bacchus' assertion. Mr. Doub and Ms. Aston testified that that to inform the Staff's determinations, they first looked at terrestrial habitats on the LNP site and in the surrounding landscape, including wetlands and other terrestrial habitats situated in the 100-year floodplain. Ex. NRC090 at A201; Ex. NRC001A at 5-19 to 5-26. To analyze potential impacts to wetlands and other terrestrial habitats, Mr. Doub and Ms. Aston followed guidance in NUREG 1555, ESRP 5.3.3.2, which addresses possible impacts to terrestrial ecosystems from operation of heat-discharge systems and effects of cooling tower drift on vegetation. Ex. NRC013 at 5.3.3.2-4; see also Ex. NRC091 at A73. In addition, Mr. Doub and Ms. Aston also relied on NUREG-1437, Section 4.3.5.1, which includes a literature review on potential ecological effects on natural plant communities resulting from salt drift from cooling tower operation. Ex. NRC090 at 203; Ex. NRC057 at 4-42 to 4-45. The Applicant also primarily relied on NUREG1555 and NUREG 1437, the Generic Environmental Impact Statement for License Renewal of Nuclear Plants, to assess salt drift and deposition impacts on vegetation. Ex. PEF506 at A9. The Staff witnesses, Mr. Doub and Ms. Aston, additionally referenced the results from the 14 year CREC salt-drift monitoring study completed during operation of the CREC cooling towers. Ex. NRC090 at A204, A212; Ex.

NRC058. In addition, Dr. Blancher, witness for the Applicant, reviewed the CREC study and concluded that there was not visible damage to vegetation near CREC. Ex. PEF600 at A25. He likewise testified that even though the CREC study did note some damage to vegetation from salt drift, it was minor, not "extensive" as Dr. Bacchus claimed. Ex. PEF608 at A8.

161. Dr. Bacchus criticized the Staff's use of the CREC study in the analysis and asserted that the monitoring conducted at CREC was "flawed" because the reports were not based on an adequate number of years of operational monitoring. Ex. INT301 at A38. As a result, she contended that the CREC study is not a reliable predictor of salt drift at the LNP site. Ex. INT301 at A38. However, as Mr. Doub and Ms. Aston explained in their Rebuttal Testimony, this report was only used as supplemental evidence because it provided "the geographically closest record observations of possible salt drift injury to vegetation relative to the LNP site." Ex. NRC091 at A77; Ex. NRC090 at A204. The Applicant's testimony also indicated that the Staff used the CREC study as supplemental evidence. Ex. PEF506 at A12. Mr. Doub and Ms. Aston testified that they used the CREC site for comparison because both sites also have similar habitats and the CREC report indicated that only minor salt drift damage occurred to some wetland plant species present at both sites. Ex. NRC091 at A77, A79. The Applicant reached this same conclusion when reviewing the CREC study. In fact, Dr. Blancher stated that since both CREC and LNP have similar types of vegetation, it was a useful tool for assessing potential impacts to vegetation at the LNP site. Ex. PEF600 at A26. Further, the CREC report indicated that only minor salt drift damage occurred to some species present at both sites. Ex. NRC091 at A77, A79; Ex. NRC001A at 5-23. Ultimately, the Board finds that the Staff and Applicant's reasoning (including the use of the CREC study) is persuasive, and because Dr. Bacchus's testimony made no attempt to counter these points, the Board finds the Intervenors' position with respect to the CREC study unconvincing.

162. Dr. Bacchus also took issue with the Staff's use of corn as an indicator species for assessing impacts to surrounding vegetation from salt drift and deposition. Ex. INT301 at A38. Dr. Bacchus contended that using data regarding the response of corn to salt drift is not relevant to an analysis of potential salt drift impacts on native vegetation surrounding the LNP site (because corn is not a native species at the LNP site). Ex. INT301 at A38. However, Mr. Doub and Ms. Aston testified for the Staff that the use of corn as an indicator species for estimating the response of vegetation to salt drift is a conservative approach, as corn is one of the most sensitive plant species known with respect to salt drift, and therefore this supports the findings in the FEIS. Ex. NRC091 at A78. Similarly, Dr. Blancher testified for the Applicant that corn was used to develop NUREG-1555 because it is a common indicator species and he noted that .Dr. Bacchus failed to cite valid references to support her claim that cypress is more sensitive than corn. Ex. PEF608 at A6. Also, Dr. Blancher agreed with the FEIS' conclusion that projected salt concentrations would not be enough to impact even sensitive species on and offsite. Id.

163. The Board is not persuaded by Dr. Bacchus' testimony on this issue. As indicated in the Staff testimony regarding the CREC study, the Staff looked at salt deposition monitoring studies that were conducted at eighteen power plants study across various locations over several years. Ex. NRC091 at A78; Ex. NRC057 at 4-39 to 4-40. This study, which referenced both cultivated species (such as corn) and native species (such as dogwood and red maple), found that vegetation damage from salt drift was only observed at three of the eighteen plants surveyed. Id. The Board therefore agrees with the Staff that their analysis is applicable to the LNP site as it was based on the best available data for analyzing the effects of salt drift on cultivated and native vegetation in different areas. Ex. NRC091 at A78.

164. Dr. Bacchus also claimed that the Staff's analysis of cumulative impacts from salt drift was inadequate because it did not consider the effects on vegetation from introduction to the soil of salt originating from cooling tower drift. Ex. INT301 at A38. Mr. Doub and Ms. Aston asserted that such impacts were analyzed and specifically point to the lack of overlap of CREC cooling tower drift and LNP drift. Ex. NRC091 at A80. The Staff evaluated the operation of the cooling towers at CREC and found that since the LNP cooling towers will be located 9 miles northeast of CREC, salt deposition from both sources would not overlap. Ex. NRC091 at A80; Ex. NRC001 at 7-23 and 7-24. As such, as Mr. Doub and Ms. Aston's testimony explained, the Staff found that cumulative impacts from salt drift would be minimal and are not expected to noticeably affect terrestrial resources or vegetation at the LNP site. Ex. NRC091 at A80. The Board finds the Staff's analysis to be reasonable and supported by both historical evidence and modeling results. Since Dr. Bacchus' testimony does not attempt to counter this portion of the Staff's analysis, the Board does not find Dr. Bacchus' testimony, nor the Intervenors' dispute to be persuasive.

165. Mr. Doub and Ms. Aston also considered the effects of salt drift on terrestrial wildlife and concluded it to be unlikely that salt toxicity would affect animals living in the habitat near the LNP site. Ex. NRC090 at A216; Ex. NRC001 at 5-25. Consistent with the Staff's position, Dr. Blancher found that impacts to amphibians and other flora and fauna due to salt drift was expected to be small. Ex. PEF600 at A23. From these results, the Staff concluded that the terrestrial ecology impacts, including impacts from salt drift and deposition, would be SMALL to MODERATE. Ex. NRC090 at A216; Ex. NRC001 at 5-47. Dr. Bacchus criticized the FEIS conclusions, yet her testimony does not explain how salt drift and deposition could impact wildlife near the LNP site. Ex. INT301 at A38. Because Dr. Bacchus does not support her

assertion, the Board finds the Staff's testimony to be convincing with respect to salt drift and impacts on terrestrial ecology.

166. After examining the testimony from the Staff, the Applicant, and the Intervenors, the Board notes that Dr. Bacchus does not attempt to address why the Staff's analysis is inadequate to support its findings in the FEIS. Accordingly, the Board does not find Dr. Bacchus' testimony to be persuasive with respect to impacts on vegetation and terrestrial ecology from salt drift and deposition. Moreover, based on the explanations above, the Board concludes that the Staff appropriately found the impacts from salt drift and deposition at the LNP site would be minor. Since the evidence presented in the Staff's Direct and Rebuttal Testimony shows that impacts would not be MODERATE or LARGE, as the Intervenors assert, and because there is no evidence that impacts to wetlands, floodplains, special aquatic sites, and other waters from salt drift and deposition would be noticeable or destabilizing, we find that the Staff satisfied NEPA by taking a hard look at the impacts from salt drift and deposition. Accordingly, this Board finds that Part B of Contention 4A lacks merit.

D. Part C of Contention 4A – Consequential Portions

167. Part C of Contention 4A, which we referred to as the "consequential" portion in our contention admissibility decision, is dependent on the findings in Parts A and B of Contention 4A. Specifically, Part C stated that as a result of the omissions and inadequacies alleged in Parts A and B, the FEIS "also failed to adequately identify, and inappropriately characterizes as SMALL, the proposed projects zone of: 1) environmental impacts, 2) impact on Federally listed species, 3) irreversible and irretrievable environmental impacts, and 4) appropriate mitigation measures." While the Staff and the Applicant went through each subpart of Part C in their Initial Position Statements, and the Staff's Direct Testimony specifically addressed each subpart, we focus our decision on the two topics in Part C that seem to be in

controversy. Those are, first, whether the FEIS appropriately considered impacts to endangered species and, second, whether the FEIS properly characterized appropriate mitigation measures.

1. Impacts on Federally Listed Species

168. In Dr. Bacchus' Direct Testimony, she challenged the FEIS's consideration of impacts to Federally listed species. Ex. INT301R at A39. She specifically stated that the Staff's Endangered Species Act (ESA) consultation was inadequate because of the specific flaws in the FEIS that she outlined in parts A and B of Contention 4A. Id. Dr. Bacchus argued that the FEIS improperly described impacts to green sea turtles, manatee, red-cockaded woodpeckers, and smalltooth sawfish. Id.

169. In their Direct Testimony, Staff witnesses detailed their process for complying with the ESA. Mr. Doub and Ms. Aston described the process for terrestrial species (Ex. NRC090 at A237-246) and Dr. Masnik and Dr. Miracle described the process for aquatic species. Id. at A247-257. All four of these witnesses testified that they used both Staff guidance documents and the Endangered Species Consultation Handbook (Ex. NRC066) in their review. Id. at A241, A251. Additionally, the United States Fish and Wildlife Service (USFWS) (Ex. NRC001C at F-196 -198), and the National Marine Fisheries Service (NMFS) (Ex. NRC061) issued responses concluding the ESA Section 7 consultation process and agreeing with the Staff's conclusions. Ex. NRC090 at A246, A257. Mr. Doub and Ms. Aston described impacts to the red-cockaded woodpeckers (Id. at A244) and Dr. Masnik and Dr. Miracle described impacts to green sea turtles, manatee, and the smalltooth sawfish, the species for which Dr. Bacchus challenged the Staff analysis. Id. at A254-56.

170. In their Rebuttal Testimony, Mr. Doub and Ms. Aston responded to Dr. Bacchus' claims that the Staff's ESA consultation was incorrect because of the Staff's inadequate

consideration of hydroperiod effects and responded to Dr. Bacchus's criticisms of the FEIS's discussion of impacts to Federally-listed terrestrial species. Ex. NRC091 at A60-61. Mr. Doub and Ms. Aston described in further detail the interactions between the Staff and the USFWS and the NMFS, showing both that thee resource agencies were well aware of LNP's impacts and they reiterate that these agencies agreed with the Staff's impact findings on listed species. Id. Dr. Masnik and Dr. Miracle make similar arguments concerning the aquatic species. Id. at A67-71. They also refute Dr. Bacchus' specific claims regarding manatees, sea turtles and smalltooth sawfish. Id.

171. We find that the Staff appropriately considered potential impacts to Federally-listed species. None of the parties dispute that the Staff properly consulted with the USFWS and NMFS as required by the ESA and that these agencies concurred with the Staff's findings. We find this compelling evidence that the Staff performed an adequate review and that the FEIS conclusions regarding impacts to these species are well-supported. Further, in their Direct Testimony, the Staff witnesses described in detail their process for considering impacts to federally-listed species, and this information is properly documented in the FEIS. In their Rebuttal Testimony, the Staff witnesses persuasively responded to the criticisms lodged by Dr. Bacchus in her Direct Testimony. Thus, we find that the FEIS took the appropriate hard look at impacts to Federally-listed species, and this subpart of Contention 4A lacks merit.

2. Mitigation Measures

172. The Intervenors have challenged the characterization of available mitigation measures in the FEIS as inappropriate. We disagree. We have already summarized the relevant testimony of the parties relating to mitigation above. Of the resource areas within the scope of Contention 4A, the primary targets for mitigation are terrestrial and wetland resources. We agree with Mr. Doub's testimony that the Staff properly relied on the COCs in its analysis to

prevent dewatering impacts to wetlands from becoming destabilizing to the terrestrial resource. See Tr. at 1532. We also find that Mr. Hubbell's description of SWFWMD's implementation of mitigation and monitoring requirements in the context of other large water use projects indicates that it is reasonably foreseeable that the process can credibly prevent destabilizing impacts to wetlands. Given the COCs' prescriptive nature, the Staff had sufficient information to determine that mitigation and monitoring requirements in the COCs would prevent LARGE terrestrial impacts from occurring. Accordingly, we find that the Staff appropriately characterized mitigation measures.

3. Conclusions Regarding Part C

173. Because we find for the Applicant and Staff for Parts A and B of Contention 4A, and because the FEIS properly describes both impacts to Federally-listed species and mitigation measures, we find that Part C of Contention 4A lacks merit. Specifically, we find that the FEIS adequately identified, and appropriately characterizes, the proposed projects zone of: 1) environmental impacts, 2) impact on Federally listed species, 3) irreversible and irretrievable environmental impacts, and 4) appropriate mitigation measures. Consequently, we find for the Staff and Applicant for Part C of Contention 4A.

V. CONCLUSIONS OF LAW FOR CONTENTION 4A

174. The Licensing Board has considered all of the evidence presented by the parties on Contention 4A. Based upon a review of the entire record in this proceeding and the proposed findings of fact and conclusions of law submitted by the parties, and based upon the findings of fact set forth above, which are supported by reliable, probative and substantial evidence in the record, the Board has decided all matters in controversy concerning this contention and reaches the following conclusions.

175. With respect to dewatering, the FEIS identifies and adequate considers the direct, indirect, and cumulative impacts associated with impacts wetlands, floodplains, special aquatic sites, and other waters, associated with both active and passive dewatering.

176. With respect to salt drift, the FEIS identifies and adequately considers the direct, indirect, and cumulative impacts associated with salt drift and deposition.

177. The FEIS appropriately identifies and characterizes the projects zone of environmental impacts, impacts on Federally listed species, irreversible and irretrievable environmental impacts, and appropriate mitigation measures.

178. Therefore, we conclude that the FEIS complies with NEPA and with NRC's regulations in 10 CFR Part 51, in that the Staff has taken the requisite hard look at the direct, indirect, and cumulative environmental impacts of the proposed action, and has documented its analysis and conclusions in a manner consistent with NEPA's requirements. As such, we conclude that Contention 4A in its entirety must be denied. However, this Partial Initial Decision does not terminate this proceeding because we still retain jurisdiction until the Intervenors' remaining contention concerning disposal of spent reactor fuel is resolved. See Licensing Board Order (Holding Proposed New Contention in Abeyance) at 1 (August 16, 2012) (unpublished).

Respectfully submitted,

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Dated at Indianapolis, Indiana
The 5t Day of December 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

I hereby certify that the NRC Staff's Proposed Findings of Fact and Conclusions of Law Regarding Contention 4A have been filed through the E-Filing system this 5th day of December 2012.

/Signed (electronically) by/
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