LBP-13-04

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

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

In the Matter of	Docket Nos. 52-029-COL, 52-030-COL
PROGRESS ENERGY FLORIDA, INC.	ASLBP No. 09-879-04-COL-BD01
(Levy County Nuclear Power Plant, Units 1 and 2)	March 26, 2013

PARTIAL INITIAL DECISION

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ABBREVIATIONS

APT	Aquifer Performance Testing
AWS	Alternative Water Source
BMP	Best Management Practices
BOR	Basis of Review
CEQ	U.S. Council on Environmental Quality
CFBC	Cross Florida Barge Canal
COC	Conditions of Certification
COL	Combined License
DEIS	Draft Environmental Impact Statement
DWRM2	District-Wide Regional Model 2
EMP	Environmental Monitoring Plan
ER	Environmental Report
ESRP	NUREG-1555, Standard Review Plans for Environmental Reviews for Nuclear Power Plants
FDEP	Florida Department of Environmental Protection
FEIS	Final Environmental Impact Statement
FEPPSA	Florida Electrical Power Plant Siting Act
FTMR	Focus Telescopic Mesh Refinement
gpd	gallons per day
ISOP	Initial Statement of Position
kg/ha/mo	kilogram(s) per hectare per month
LNP	Levy Nuclear Plant
mgd	million gallons per day
MFL	Minimum Flow and Level
NEPA	National Environmental Policy Act
NRC	U.S. Nuclear Regulatory Commission
OFW	Outstanding Florida Waters
PEF	Progress Energy Florida, Inc.
ppt	part(s) per thousand
RSOP	Rebuttal Statement of Position
SWFWMD	Southwest Florida Water Management District
UFA	Upper Floridan Aquifer
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
WAP	Wetland Assessment Procedure
WMP	Wetland Mitigation Plan
WUP	Water Use Permit

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PARTIAL INITIAL DECISION[1]
(Ruling on Contention 4A)

This adjudicatory proceeding arises from a 2008 application by Progress Energy Florida, Inc. (PEF) to the U.S. Nuclear Regulatory Commission (NRC) for the issuance of licenses to construct and operate two nuclear power reactors at a site in Levy County, Florida.[2] On February 6, 2009, the Nuclear Information and Resource Service and the Ecology Party of Florida (collectively, Intervenors) challenged the application.[3] On October 31, and November 1,

[1] This Initial Decision is "partial" because a proposed contention concerning the Waste Confidence Decision remains pending before the Board. See Intervenors' Motion for Leave to File a New Contention Concerning Temporary Storage and Ultimate Disposal of Spent Reactor Fuel at Levy Nuclear Power Plant (July 9, 2012). Essentially identical contentions were filed in many other reactor licensing proceedings, and on August 7, 2012, the Commission ruled that these proposed contentions should be held in abeyance. Calvert Cliffs Nuclear Project, LLC (Calvert Cliffs Nuclear Power Plant Unit 3), et al., CLI-12-16, 76 NRC __, __ (slip op. at 6) (Aug. 7, 2012). As such, this proceeding remains open.

[2] Progress Energy Florida, Inc.; Application for the Levy County Nuclear Power Plant Units 1 and 2; Notice of Order, Hearing, and Opportunity to Petition for Leave to Intervene, 73 Fed. Reg. 74,532 (Dec. 8, 2008) [Notice].

[3] 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) [Petition]. The Green Party of Florida has withdrawn from this proceeding. Notice of Withdrawal [of the Green Party of Florida] (May 17, 2012).

2012, this Board held an evidentiary hearing on one of those challenges, Contention 4A. This contention alleges that NRC's final environmental impact statement (FEIS) for the proposed Levy Nuclear Plant (LNP) fails to comply with 10 C.F.R. Part 51 and the National Environmental Policy Act (NEPA). 42 U.S.C. §§ 4321-4347. The evidentiary hearing was held at the Levy County Courthouse in Bronson, Florida.

As set forth below, based on our review of the entire evidentiary record in this proceeding and our findings of fact and conclusions of law, the Board concludes that, with regard to the specific issues raised by Contention 4A, the NRC has carried its burden of demonstrating that its FEIS complies with NEPA and with 10 C.F.R. Part 51.

I. GENERAL BACKGROUND

On July 28, 2008, PEF applied to the NRC for licenses to construct and operate two proposed nuclear power reactors referred to as Levy Nuclear Plant (LNP) Unit 1 and Unit 2. See 73 Fed. Reg. at 74,532. Such licenses are referred to as "combined licenses" (COL) because they authorize both construction and operation. On December 8, 2008, NRC published a "Notice of Hearing and Opportunity to Petition for Leave to Intervene" in the Federal Register. Id. On February 6, 2009, the Intervenors filed their Petition asserting 11 contentions, including Contention 4. Petition at 32-72. On July 8, 2009, the Board admitted three contentions for adjudication, including Contention 4.[4] LBP-09-10, 70 NRC 51, 106, 147 (2009).

Contention 4 evolved into the current Contention 4A as follows. As originally admitted, Contention 4 alleged that PEF's environmental report (ER) failed to comply with 10 C.F.R. Part 51, NRC's regulations implementing NEPA. Contention 4 alleged, inter alia, that the ER did not adequately address, and inappropriately characterized as small, the environmental impacts that

[4] The other two admitted contentions dealt with low-level radioactive waste issues and were denominated Contention 7 and Contention 8. LBP-09-10, 70 NRC 51, 125, 147. These contentions have been disposed of and are no longer pending. See Order (Granting Motion for Summary Disposition of Contention 7 as Moot) (Sept. 8, 2010) (unpublished); LBP-11-31, 74 NRC 643 (2011) (granting motion for summary disposition of Contention 8A).

"dewatering" associated with the proposed LNP facility would have on "wetlands, floodplains, special aquatic sites, and other waters." Id. PEF appealed our order admitting Contention 4, and the Commission affirmed our decision. CLI-10-2, 71 NRC 27, 48 (2010). Subsequently, NRC issued its draft environmental impact statement (DEIS) covering the proposed LNP.[5] At that point, Intervenors amended Contention 4 to challenge the DEIS on essentially the same grounds as their challenge to the ER (e.g., the environmental impacts of dewatering). The Board admitted this amended contention and dubbed it Contention 4A.[6] Later, when the NRC issued its FEIS,[7] the Board allowed Contention 4A to migrate to the FEIS.[8] Tr. at 856.

Contention 4A, as admitted and adjudicated, reads as follows:

> 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;

[5] Draft Environmental Impact Statement for Combined Licenses (COLs) for Levy Nuclear Plant Units 1 and 2, Draft Report for Comment, NUREG-1941, Vols. 1 and 2 (Aug. 2010).

[6] Memorandum and Order (Admitting Contention 4A) (Feb. 2, 2011) (unpublished) [C4A Order].

[7] Environmental Impact Statement for Combined Licenses (COLs) for Levy Nuclear Plant, Units 1 and 2, NUREG-1941, Vols. 1, 2, and 3 (Apr. 2012) [FEIS]. The FEIS was submitted in three parts by the NRC Staff as exhibits NRC001A, NRC001B, and NRC001C.

[8] This "migration" dispensed with the time-consuming and expensive litigation normally associated with the transition from DEIS to FEIS. The typical scenario involves (1) the applicant filing a motion for summary disposition of the DEIS contention (because the FEIS renders the DEIS moot), the parties briefing the issue, and the Board issuing a decision, and (2) the intervenor filing a motion to admit an identical new contention challenging the FEIS, the parties briefing the issue, and the Board issuing a decision. Unless the DEIS and FEIS are significantly different, these activities simply double the legal and judicial costs.

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.

C4A Order, Att. A at 1.

Contention 4A consists of three main components. The first component (labeled by the Intervenors as Subpart A) deals with environmental impacts associated with "dewatering" (both "active" and "passive"). The second component (labeled by the Intervenors as Subpart B) deals with environmental impacts associated with "salt drift and salt deposition." The third component (labeled by the Intervenors as Subpart C) states that "[a]s a result of the omissions and inadequacies described above," the FEIS fails in several other respects. The deficiencies alleged in the third component are entirely dependent on the existence of the deficiencies alleged in the first and second components. For purposes of our analysis, we denominate the three components of Contention 4A as the Dewatering component, the Salt Drift/Deposition

component, and the Consequential component.[9]

On January 11, 2012, the Board, accompanied by representatives of all parties, conducted a site visit. See Order (Scheduling Site Visit) (Dec. 7, 2011) (unpublished). At the Board's request, PEF provided the Board and the parties with three documents, consisting of maps and orientation materials, to assist in the site visit. On March 7, 2012, the Board admitted these three documents into the evidentiary record as Board Exhibits BRD001 – BRD003.[10]

Meanwhile, although Contention 4A was originally admitted in 2009, the evidentiary hearing could not commence until after the NRC published the FEIS. 10 C.F.R. § 2.332(d). This occurred on April 27, 2012. See FEIS. Pursuant to our initial scheduling order (ISO), LBP-09-22, 70 NRC 640, 654 (2009), once the FEIS was issued, the parties were obligated to file their briefs, submit their prefiled written testimony, and offer their exhibits. Thus, on June 26, 2012, the parties filed their initial statements of position (ISOPs),[11] initial written testimony of their witnesses, and initial exhibits.[12] See ISO, 70 NRC at 654-55; 10 C.F.R. § 2.1207(a)(1). On July 31, 2012, the parties filed their rebuttal statements of position (RSOPs),[13] rebuttal

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[9] We used this terminology when we originally admitted Contention 4. See LBP-09-10, 70 NRC at 84-85.

[10] See Notice (Entering Site Visit Documents into the Evidentiary Record) (Mar. 7, 2012) (unpublished).

[11] Intervenors' Initial Written Statement of Position Regarding Contention 4 (June 26, 2012) [Intervenors' ISOP]; Progress Energy Florida, Inc.'s Initial Statement of Position in the Contested Hearing for Contention 4A (June 26, 2012) [PEF ISOP]; NRC Staff Initial Statement of Position (June 26, 2012) [NRC ISOP].

[12] The Intervenors submitted revised versions of a number of their initial filings, including their ISOP and the testimony of all of their witnesses. See Memorandum and Order (Ruling and Instructions Regarding Evidentiary Filings) (July 18, 2012) (unpublished). These revised documents are denominated with an "R" in their exhibit number (e.g., Dr. Bacchus's Revised Testimony is exhibit INT301R). All references to Intervenors' ISOP or witnesses' testimony in this Partial Initial Decision are references to these revised filings.

[13] See Intervenors' Response Statement of Position Regarding Contention 4 (July 31, 2012) [Intervenors' RSOP]; Progress Energy Florida, Inc.'s Rebuttal Statement of Position in the Contested Hearing for Contention 4A (July 31, 2012) [PEF RSOP]; NRC Staff Rebuttal Statement of Position (July 31, 2012) [NRC RSOP].

written testimony, and rebuttal exhibits. ISO, 70 NRC at 655; 10 C.F.R. § 2.1207(a)(2). Subsequently, the parties filed several procedural motions,[14] and the Board ruled on them.[15] In addition, on September 21, 2012, the Board instructed the parties to brief several legal issues pertaining to NEPA.[16] The parties filed their responses to these questions on October 5, 2012,[17] and October 12, 2012.[18]

It is relevant to note that, in parallel with this adjudicatory proceeding, once the application was docketed, the NRC Staff conducted its NEPA process wherein members of the public were afforded the opportunity to comment (1) on the appropriate scope of the environmental review for the proposed LNP,[19] and, later, (2) on the adequacy of the NRC's DEIS.[20] Individuals working with the Intervenors and PEF submitted comments at both stages

[14] Progress Energy Florida, Inc.'s Motion to Strike Intervenors' Arguments and Testimony that Are Outside the Scope of the Contested Hearing and that Raise a New, Untimely Contention (Aug. 10, 2012); NRC Staff Motion *In Limine* to Exclude Portions of the Parties' Testimony and Statements of Position (Aug. 10, 2012).

[15] Order (Granting in Part and Denying in Part Motion in Limine and Motion to Strike) (Sept. 6, 2012) (unpublished). We struck portions of Intervenors' ISOP and Dr. Bacchus's Testimony that raised new arguments concerning the alleged failure of the FEIS to adequately respond to Dr. Bacchus's comments on the DEIS. We held that such arguments were outside the scope of Contention 4A. Id. at 3.

[16] See Licensing Board Order (Regarding the Briefing of Certain Legal Issues) (Sept. 21, 2012) (unpublished).

[17] Intervenors' Brief in Response to ASLB Order of September 21, 2012 (Oct. 5, 2012); Progress Energy Florida, Inc.'s Initial Brief Regarding Legal Issues in the Contested Hearing for Contention 4A (Oct. 5, 2012); NRC Staff Answer to Order Regarding the Briefing of Certain Legal Issues (Oct. 5, 2012).

[18] Intervenors' Reply Brief in Response to ASLB Order of September 21, 2012 (Oct. 12, 2012); Progress Energy Florida, Inc.'s Rebuttal Brief Regarding Legal Issues in the Contested Hearing for Contention 4A (Oct. 12, 2012); [NRC Staff's] Rebuttal Legal Brief in Response to Intervenors' Brief of October 5, 2012 (Oct. 12, 2012).

[19] 73 Fed. Reg. 63,517 (Oct. 24, 2008) (NRC Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process).

[20] 75 Fed. Reg. 49,539 (Aug. 13, 2010) (Notice of Availability of Draft Environmental Impact Statement for the Combined Licenses for Levy County Nuclear Plant Units 1 and 2).

and the FEIS includes NRC's responses to comments.[21] This is relevant because some of those comments parallel the concerns raised in Contention 4A, see, e.g., FEIS at E-55 (commenting that EIS failed to take hard look at karst conduit system), and because NRC's discussion and responses to these comments are recited in the FEIS.

II. LEGAL STANDARDS UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT

The question presented by Contention 4A is whether the FEIS complies with NEPA and NRC's regulations implementing NEPA, 10 C.F.R. Part 51. The contention alleges that the FEIS is deficient in a number of specific respects. We dispose of those matters later in this decision. But, it is useful at this point to review several key legal principles of NEPA.

Section 101 of NEPA declares a broad national commitment to protecting and promoting environmental quality. 42 U.S.C. § 4331. To ensure that this commitment is infused in the actions of the Federal Government, NEPA establishes certain "action forcing" procedures on each Federal agency. Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 348 (1989). Section 102 of NEPA "directs that, to the fullest extent possible . . . all agencies of the Federal Government shall . . . include in every . . . major Federal action significantly affecting the quality of the human environment, a detailed statement by the responsible official on . . . (i) the environmental impact of the proposed action." 42 U.S.C. § 4332(2)(C)(i). The issuance of a COL is such a "major federal action." See 40 C.F.R. § 51.75(c). The requirement to prepare an environmental impact statement (EIS) "places upon an agency the obligation to consider every significant aspect of the environmental impact of a proposed action."[22] It "ensures that the

[21] See FEIS Appendix D Scoping Comments and Responses at D-4 (Martha Barnwell, PEF commenter) and D-5 (Mary Olson, Intervenor commenter); FEIS Appendix E – DEIS Comments and Responses at E-3 (Sydney Bacchus, Intervenor commenter; John Elnitsky, PEF commenter).

[22] Baltimore Gas & Electric Co. v. Natural Resources Defense Council, Inc., 462 U.S. 87, 97 (1983) (quoting Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, 435 U.S. 519, 553 (1978)).

agency, in reaching its decision, will have available, and will carefully consider, detailed information concerning significant environmental impacts." Robertson, 490 U.S. at 349. NEPA is intended to ensure that such impacts "will not be overlooked or underestimated only to be discovered after resources have been committed or the die otherwise cast." Id. In short, NEPA requires that the agency take a "hard look" at environmental consequences of each agency action.[23]

The duty to prepare an EIS and to identify and consider every significant environmental impact is, however, tempered by the "rule of reason."[24] For example, NEPA only requires that the EIS address those environmental impacts that are "reasonably foreseeable."[25] Within this rule of reason, however, the EIS must address both the direct and indirect effects or impacts[26] of the proposed action. See 10 C.F.R. § 51.14(b) (adopting 40 C.F.R. § 1508.8). "Direct effects . . . are caused by the action and occur at the same time and place." 40 C.F.R. § 1508.8(a). "Indirect effects . . . are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable." 40 C.F.R. § 1508.8(b). The EIS must also address the "cumulative impact" of the proposed action, which is defined as "the impact on the environment which results from the incremental impact of the action when added to other past,

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[23] See Marsh v. Oregon Natural Resources Council, 490 U.S. 360, 374 (1989); Nextera Energy Seabrook, LLC (Seabrook Station, Unit 1), CLI-12-05, 75 NRC __, __ (slip op. at 53) (Mar. 8, 2012).

[24] See Potomac Alliance v. NRC, 682 F.2d 1030, 1035 (D.C. Cir. 1982); Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc. (Pilgrim Nuclear Power Station), CLI-10-22, 72 NRC 202, 208 (2010); see also Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, 435 U.S. 519, 551 (1978) ("To make an impact statement something more than an exercise in frivolous boilerplate the concept of alternatives must be bounded by some notion of feasibility.").

[25] See Potomac Alliance, 682 F.2d at 1035; Pa'Ina Hawaii, LLC, CLI-10-18, 72 NRC 56, 89 (2010); see also Robertson, 490 U.S. at 356, 359 (holding that a CEQ regulation requiring an EIS to consider "reasonably foreseeable impacts" rather than a "worst case analysis" is "entitled to substantial deference" and that NEPA does not require a "worst case analysis" in an EIS).

[26] The adopted regulation states, "Effects and impacts as used in these regulations are synonymous." 40 C.F.R. § 1508.8(b).

present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." 10 C.F.R. § 51.14(b) (adopting 40 C.F.R. § 1508.7). An EIS must cover all such environmental impacts even if they occur "offsite" (e.g., beyond the licensee's property line). See, e.g., Robertson, 490 U.S. at 358.

Although NEPA mandates that an agency prepare an EIS and take a hard look at the environmental impacts of a proposed agency action, "NEPA itself does not mandate particular results, but simply prescribes the necessary process."[27] "If the adverse environmental effects of the proposed action are adequately identified and evaluated, the agency is not constrained by NEPA from deciding that other values outweigh the environmental costs." Id. In short, although NEPA establishes a national policy in favor of protecting the human environment, NEPA does not require the agency to select the most environmentally benign alternative. "NEPA merely prohibits uninformed – rather than unwise – agency action." Id. at 351.

III. EVIDENTIARY RECORD

A. IDENTIFICATION OF WITNESSES

The parties proffered a total of 24 witnesses to provide fact and opinion testimony regarding Contention 4A. Written testimony was submitted for all of these witnesses. Fifteen of these witnesses also testified orally at the evidentiary hearing.[28]

[27] Id. at 350 (citing Strycker's Bay Neighborhood Council, Inc. v. Karlen, 444 U.S. 223, 227-28 (1980) (per curiam); Vermont Yankee, 435 U.S. at 558).

[28] After reading the pre-filed written testimony, the Board concluded that it did not need to receive oral testimony from several of the witnesses. Accordingly, we instructed that these witnesses need not attend the evidentiary hearing. Tr. at 1052-53; Order (Administrative Instructions Regarding Evidentiary Hearing) (Oct. 23, 2012) at 2 (unpublished). In addition, a number of the witnesses who attended the hearing did not need to provide oral testimony.

1. Intervenors' Witnesses

The Intervenors presented four witnesses – Gareth J. Davies, Dr. Timothy J. Hazlett, David Still, and Dr. Sydney T. Bacchus. Intervenors submitted the pre-filed initial testimony of these four witnesses on June 26, 2012. Intervenors then sought leave to file amended versions of this testimony on July 10, 2012,[29] which we granted.[30] Intervenors then submitted the pre-filed rebuttal testimony of these four witnesses on July 31, 2012.

Mr. Davies is a registered professional geologist in Tennessee and Kentucky and holds a Bachelor of Science degree in Geology from Millsaps College and a Master of Science degree in Geology from the University of Southern Mississippi.[31] According to his curriculum vitae (CV), Mr. Davies has over 20 years of experience in hydrogeology and is currently employed as a consultant hydrogeologist for the Cambrian Ground Water Company and as a geologist for the Tennessee Department of Environment and Conservation's Department of Energy Oversight Office. Davies CV. Mr. Davies provided testimony for the Intervenors regarding groundwater flow in and around the proposed LNP site.[32]

Dr. Hazlett holds a Bachelor of Science degree in Geology from Rensselaer Polytechnic Institute, a Master of Science degree in Geological Engineering from the University of Missouri, and a Master of Arts degree and a Ph.D. in Hydrogeology from Johns Hopkins University. INT102 (Hazlett CV). Dr. Hazlett's CV notes that he has over 10 years of experience in

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[29] See Intervenors' Unopposed Motion for Leave to File Corrected SOP and Exhibits (July 10, 2012); see also INT001R, INT101R, INT201R, INT301R.

[30] See Licensing Board Memorandum and Order (Ruling and Instructions Regarding Evidentiary Filings) (July 18, 2012) (unpublished).

[31] [Corrected] Initial Pre-Filed Testimony of Gareth J. Davies in Support of Contention C-4 Regarding Environmental Impacts of Levy Units 1 and 2 on Water Resources and Ecology (July 6, 2012) at 1 (INT001R) [Davies Testimony]; see also INT002 [Davies CV].

[32] See generally Davies Testimony; Pre-Filed Rebut[t]al Testimony of Gareth Davies in Support of Contention C-4 Regarding Environmental Impacts of Levy Units 1 and 2 on Water Resources and Ecology (July 31, 2012) (INT501) [Davies Rebuttal].

groundwater modeling and is currently employed as the President of DHI Water & Environment, Inc. Id. Dr. Hazlett provided testimony for the Intervenors regarding alleged flaws in the FEIS regarding groundwater modeling.[33]

Mr. Still is a registered professional engineer in Florida and holds a Bachelor of Agricultural and Biological Engineering degree and a Master of Engineering degree from the University of Florida. INT202 (Still CV). According to his CV, Mr. Still has over 20 years of experience working in water resource management, having recently retired as Executive Director of the Suwannee River Water Management District, and is currently the owner of a water resource consulting business. Id. Mr. Still provided testimony for the Intervenors regarding groundwater flow and management and alleged flaws in the Southwest Florida Water Management District's (SWFWMD) permitting processes.[34]

Dr. Bacchus holds a Bachelor of Science degree in Biology and Design and a Master of Science degree in Botany and Ecology from Florida State University, and a Ph.D. in Hydroecology from the University of Georgia. INT302 (Bacchus CV). Dr. Bacchus's CV specifies that she has over 30 years experience in the fields of marine biology, ecology, and hydroecology. Id. at 2. Dr. Bacchus provided testimony for the Intervenors on the full range of issues covered by Contention 4A.[35]

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[33] See generally [Corrected] Initial Pre-Filed Testimony of Tim Hazlett in Support of Contention C-4 Regarding Environmental Impacts of Levy Units 1 and 2 on Water Resources and Ecology (June 26, 2012) (INT101R) [Hazlett Testimony]; Pre-Filed Rebuttal Testimony of Dr. Timothy Hazlett in Support of Contention C-4 Regarding Environmental Impacts of Levy Units 1 and 2 on Water Resources and Ecology (July 31, 2012) (INT601) [Hazlett Rebuttal].

[34] See generally [Corrected] Initial Pre-Filed Testimony of David Still in Support of Intervenors' Contention C4 Regarding Environmental Impacts of Levy Units 1 and 2 on Water Resources and Ecology (July 6, 2012) (INT201R) [Still Testimony]; Pre-Filed Rebuttal Testimony of David Still in Support of Contention C-4 Regarding Environmental Impacts of Levy Units 1 and 2 on Water Resources and Ecology (July 31, 2012) (INT701) [Still Rebuttal].

[35] See generally [Corrected] Initial Pre-Filed Testimony of Dr. Sydney Bacchus in Support of Contention C-4 Regarding Environmental Impacts of Levy Units 1 and 2 on Water Resources and Ecology (July 6, 2012) (INT301R) [Bacchus Testimony]; Rebuttal Testimony of Dr. Sydney

2. PEF's Witnesses

PEF presented eight witnesses, with six providing initial and rebuttal testimony, and two providing only rebuttal testimony. Those providing both initial and rebuttal testimony were Dr. Mitchell L. Griffin, James O. Rumbaugh, Jeffrey D. Lehnen, Dr. William J. Dunn, Dr. Kevin M. Robertson, Dr. George C. Howroyd, and Dr. Eldon C. Blancher. Those providing only rebuttal testimony are Dr. Paul C. Rizzo and Peter G. Hubbell.

Dr. Griffin is a registered professional engineer and holds a Bachelor of Science degree in Civil Engineering and a Master of Science degree in Agricultural Engineering from the University of Kentucky along with a Ph.D. in Agricultural Engineering from Purdue University. PEF003 (Griffin CV). Dr. Griffin's CV notes that he has over 30 years of experience practicing engineering, with experience in groundwater modeling. Id. Dr. Griffin provided testimony for PEF regarding the environmental impacts of passive and active dewatering during construction of the proposed LNP.[36]

Mr. Rumbaugh is a registered professional geologist in Florida and Pennsylvania, and he holds a Bachelor of Science degree in Geology from Susquehanna University and a Master of Science degree in Geology from the Pennsylvania State University.[37] Mr. Rumbaugh has 25 years of experience in groundwater modeling, and is currently President of Environmental Simulations, Inc., a hydrogeological consulting firm providing groundwater modeling services.

Bacchus in Support of Contention C-4 Regarding Environmental Impacts of Levy Units 1 and 2 on Water Resources and Hydroecology (July 31, 2012) (INT801) [Bacchus Rebuttal].

[36] See generally Pre-Filed Direct Testimony of Mitchell L. Griffin, Ph.D. Regarding Passive Dewatering and Active Dewatering During Construction (June 26, 2012) (PEF001) [Griffin Testimony]; Pre-Filed Rebuttal Testimony of Mitchell L. Griffin, Ph.D. Addressing Intervenors' Direct Testimony Regarding Passive Dewatering, Active Dewatering During Construction, and Saltwater Intrusion (July 31, 2012) (PEF016) [Griffin Rebuttal].

[37] Pre-Filed Direct Testimony of James O. Rumbaugh, III, P.G. on the Design and Calibration of the Regional Computer Model Used in Predicting the Effects on Local and Regional Water Resources from Active Groundwater Withdrawals During Construction and Operating of the Levy Nuclear Plant, Units 1 & 2 (June 26, 2012) (PEF100) [Rumbaugh Testimony].

Id. at 1, 2. He provided testimony for PEF regarding the elements of Contention 4A that relate to groundwater modeling.[38]

Mr. Lehnen is a registered professional geologist in Florida and holds a Bachelor of Science degree in Geology from the University of Florida. PEF202 (Lehnen CV). According to his CV, he has over 30 years of experience in water resource planning and design, and is currently employed as a Senior Hydrogeologist with CH2M HILL, Inc., an engineering consulting company.[39] Mr. Lehnen provided testimony for PEF regarding computer modeling of the effects of active dewatering at the LNP site.[40]

Dr. Dunn holds a Bachelor of Science degree in Biology from Tufts University, a Master of Science degree in Botany from the University of Florida, and a Ph.D. in Systems Ecology from the University of Florida. PEF302 (Dunn CV). According to his CV, he has 35 years of experience in environmental and water resource management, and is currently employed as the Principal Scientist at Dunn, Salsano & Vergara Consulting, LLC.[41] Dr. Dunn provided testimony

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[38] See generally id.; Pre-Filed Rebuttal Testimony of James O. Rumbaugh, P.G. Addressing Intervenors' Initial Pre-Filed Testimony Regarding the Adequacy of the Regional Groundwater Model Used in Evaluating the Environmental Impacts from Active Groundwater Withdrawals During Construction and Operation of the Levy Nuclear Plant, Units 1 & 2 (July 31, 2012) (PEF104) [Rumbaugh Rebuttal].

[39] See id.; Pre-Filed Direct Testimony of Jeffrey D. Lehnen, P.G. on Computer Modeling of the Effects on Local and Regional Water Resources from Active Groundwater Withdrawals During Construction and Operation of the Levy Nuclear Plant, Units 1 & 2 (June 26, 2012) at 1 (PEF200) [Lehnen Testimony].

[40] See generally Lehnen Testimony; Pre-Filed Rebuttal Testimony of Jeffrey D. Lehnen, P.G. Addressing Intervenors' Initial Pre-Filed Testimony Regarding the Adequacy of the Final Environmental Impact Statement's Discussions of the Hydroecology of the LNP Site and Surrounding Area, Cumulative Impacts, Groundwater Modeling, Saltwater Intrusion, and Water Permitting Associated with Active Groundwater Withdrawals During Construction and Operation of the Levy Nuclear Plant, Units 1 & 2 (July 31, 2012) (PEF218) [Lehnen Rebuttal].

[41] Pre-Filed Direct Testimony of William J. Dunn, Ph.D. Regarding Environmental Impacts from Active Dewatering During Construction and Operation of Levy Nuclear Plant, Units 1 & 2 (June 26, 2012) at 1 (PEF300) [Dunn Testimony].

for PEF regarding Contention 4A, Part A, Sections 1 through 4, and Part C.[42]

Dr. Robertson holds a Bachelor of Science degree in Botany from Louisiana State University and a Master of Science degree and a Ph.D. in Plant Biology from the University of Illinois at Urbana-Champaign. PEF402 (Robertson CV). His CV provides that he has over 20 years of experience in the field of fire ecology, and is currently a Fire Ecology Research Scientist at Tall Timbers Research Station and Land Conservancy. Id. Dr. Robertson provided testimony for PEF regarding the impacts of dewatering at the LNP site on wildfires.[43]

Dr. Howroyd is a registered professional engineer in Georgia and Mississippi and holds a Bachelor of Science degree, a Master of Science degree, and a Ph.D., all in Mechanical Engineering, from the University of Waterloo.[44] He testified that he has over 30 years of experience performing air quality and environmental evaluations and assessments. Id. Dr. Howroyd provided testimony for PEF regarding environmental impacts from salt drift and salt deposition.[45]

Dr. Blancher holds a Bachelor of Arts degree in Biology from the University of New Orleans, a Master of Science degree in Zoology and Physiology from Louisiana State University, and a Ph.D. in Environmental Engineering Sciences from the University of Florida.

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[42] See generally id.; Pre-Filed Rebuttal Testimony of William J. Dunn, Ph.D. Addressing Intervenors' Direct Testimony Regarding Active Dewatering During Construction and Operation of Levy Nuclear Plant, Units 1 & 2 (July 31, 2012) (PEF315) [Dunn Rebuttal].

[43] See generally Pre-Filed Direct Testimony of Kevin M. Robertson, Ph.D. Regarding Impacts on Water Quality and the Aquatic Environment Due to Increased Nutrients Resulting from Destructive Wildfires Allegedly Caused by Dewatering (June 26, 2012) (PEF400) [Robertson Testimony]; Pre-Filed Rebuttal Testimony of Kevin M. Robertson, Ph.D. Regarding Impacts on Water Quality and the Aquatic Environment Due to Increased Nutrients Resulting from Destructive Wildfires Allegedly Caused by Dewatering (July 31, 2012) (PEF404) [Robertson Rebuttal].

[44] Pre-Filed Direct Testimony of Dr. George C. Howroyd Regarding Salt Emissions and Salt Deposition from Cooling Towers (June 26, 2012) at 1 (PEF500) [Howroyd Testimony].

[45] See generally id.; Pre-Filed Rebuttal Testimony of Dr. George C. Howroyd Regarding Salt Emissions and Salt Deposition from Cooling Towers, and Climate Change (July 31, 2012) (PEF506) [Howroyd Rebuttal].

PEF602 (Blancher CV). He testified that he has over 30 years of experience in the assessment of impacts of discharges into wetland and aquatic systems.[46] Dr. Blancher provided testimony for PEF regarding environmental impacts of salt drift and salt deposition.[47]

Dr. Rizzo is a registered professional engineer in 35 States and Puerto Rico, and he holds a Bachelor of Science degree, a Master of Science degree, and a Ph.D., all in Civil Engineering, from Carnegie Mellon University. See PEF702 (Rizzo CV). Dr. Rizzo's CV specifies that he has over 40 years of experience in civil engineering within the nuclear industry, and is currently President and CEO of Paul C. Rizzo Associates, Inc., a civil engineering firm. Id. Dr. Rizzo provided testimony for PEF rebutting testimony from Intervenors' witnesses regarding the FEIS's alleged inadequacy in describing and considering karstic features in and around the LNP site.[48]

Mr. Hubbell holds a Bachelor of Science degree in Hydrology and Water Resource Management from the University of Maryland.[49] According to his CV, Mr. Hubbell has over 30 years of experience in water resource management, having served as the Executive Director of SWFWMD for eight years, and is currently working as a Principal, Senior Hydrologist for Water Resource Associates, Inc. See PEF802 (Hubbell CV). Mr. Hubbell provided testimony for PEF rebutting the initial testimony presented by David Still for Intervenors. See generally Hubbell Rebuttal.

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[46] Pre-Filed Direct Testimony of Eldon C. Blancher II, Ph.D. Regarding Impact of Cooling Tower Salt Emissions (June 26, 2012) at 1 (PEF600) [Blancher Testimony].

[47] See generally id.; Pre-Filed Rebuttal Testimony of Dr. Eldon C. Blancher II, Ph.D. Regarding Impact of Cooling Tower Salt Emissions (July 31, 2012) (PEF608) [Blancher Rebuttal].

[48] See generally Pre-Filed Rebuttal Testimony of Paul C. Rizzo, Ph.D. Addressing Intervenors' Testimony Asserting Inadequate Treatment of Karst Features by the NRC Staff in the Final Environmental Impact Statement for the Levy County Nuclear Plant, Units 1 and 2 (July 31, 2012) (PEF700) [Rizzo Rebuttal].

[49] Pre-Filed Rebuttal Testimony of Peter G. Hubbell Responding to Mr. Still's Criticisms of Florida Water Management Districts' Water Use Permitting and Processes for Protecting Water Resources in Florida (July 31, 2012) at 3 (PEF800) [Hubbell Rebuttal].

3. NRC Staff's Witnesses

The NRC Staff presented twelve witnesses, ten of whom provided both initial and rebuttal testimony.[50] Those providing both initial and rebuttal testimony concerning Contention 4A were Dr. Ann L. Miracle, Dr. Michael T. Masnik, J. Peyton Doub, Lara M. Aston, Dan O. Barnhurst, Lance W. Vail, Dr. Rajiv Prasad, Vince R. Vermeul, Kevin R. Quinlan, and Dr. Larry K. Berg. Mallecia A. Sutton served as the sponsor of the FEIS for the record,[51] and Dr. Gerry Stirewalt provided only rebuttal testimony.

Ms. Sutton holds a Bachelor of Science degree in Biology from Bowie State University. NRC002 (Sutton CV). Her CV provides that she currently serves as an environmental project manager in NRC's Office of New Reactors and is the environmental project manager for the LNP COL Application.[52] Id.

Dr. Miracle holds a Bachelor of Arts degree in Biology from the University of Virginia, a Master of Science degree in Molecular Genetics from the University of Florida, and a Ph.D. in Molecular Immunology from the University of South Florida. NRC003 (Miracle CV). According to her CV, she currently serves as a Scientist in the Environmental Assessment Group, Earth Systems Science Division, Energy and Environment Directorate at the Pacific Northwest National Laboratory. Id. Dr. Miracle provided testimony for the NRC Staff concerning aquatic

[50] See generally 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, Larry K. Berg Concerning Contention 4A (June 26, 2012) (NRC090) [NRC Testimony]; 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. Stirewalt Concerning Contention 4A (July 31, 2012) (NRC091) [NRC Rebuttal].

[51] Prefiled Direct Testimony of Mallecia A. Sutton Sponsoring the [FEIS] into Evidence (June 26, 2012) at 1-2.

[52] The FEIS, issued on April 27, 2012, listed Mr. Douglas Bruner as the NRC's Project Manager. FEIS Appx. A at A-1. The NRC Staff did not proffer Mr. Bruner as a witness.

ecology and the zones of environmental impacts, listed species, irreversible impacts, and mitigation, as well as nutrient concentrations and destructive wildfires.[53]

Dr. Masnik holds a Bachelor of Science degree in Conservation from Cornell University, and a Master of Science degree and a Ph.D. both in Zoology from Virginia Polytechnic Institute and State University. NRC004 (Masnik CV). According to his CV, he has over 35 years of experience assessing impacts of nuclear power on aquatic biota, id., and he currently serves as the Water and Ecology Team Leader in the Division of Site Safety and Environmental Analysis in NRC's Office of New Reactors. NRC Testimony at 2 (Masnik). Dr. Masnik provided testimony for the NRC Staff concerning aquatic ecology and the zones of environmental impacts, listed species, irreversible impacts, and mitigation, as well as nutrient concentrations and destructive wildfires.[54]

Mr. Doub is a Certified Environmental Professional and a Professional Wetland Scientist and holds a Bachelor of Science degree in Plant Sciences from Cornell University and a Master of Science degree in Botany from the University of California at Davis. NRC005 (Doub CV). He has more than 25 years of professional experience in mapping, characterizing, and evaluating possible impacts to terrestrial habitats, NRC Testimony at 7 (Doub), and he currently serves as an Environmental Scientist/Terrestrial Ecologist with the Division of Site Safety and Environmental Analysis in NRC's Office of New Reactors. Doub CV. Mr. Doub provided testimony for the NRC Staff concerning terrestrial ecology and the zones of environmental impacts, listed species, irreversible impacts, and mitigation, as well as nutrient concentrations,

[53] See NRC Testimony at 4, 73-80, 106-15, 117-22, 130-32, 137-42, 146-48, 150-51, 163-64, 172-76, 179-81, 187-94, 196-97, 199 (Miracle); NRC Rebuttal at 63-67 (Miracle).

[54] See NRC Testimony at 72-77, 79, 106-15, 117-22, 130-32, 137-42, 146-48, 150-51, 163-64, 172-76, 179-81, 187-94, 196-97, 199 (Masnik); NRC Rebuttal at 63-67 (Masnik).

destructive wildfires, active and passive dewatering, the Floridan Aquifer, and Outstanding Florida Waters.[55]

Ms. Aston holds a Bachelor of Science degree in Environmental Science from Western Washington University and a Master of Science degree in Environmental Science from the University of Washington. NRC006 (Aston CV). She has over 12 years of experience in ecological assessment, characterization, and restoration of terrestrial and wetland systems, NRC Testimony at 7-8 (Aston), and she currently serves as a research scientist/ecologist for the Coastal Ecosystem Research group at Mattell Marine Research Operations at the Pacific Northwest National Laboratory. Aston CV. Ms. Aston provided testimony for the NRC Staff concerning terrestrial ecology and the zones of environmental impacts, listed species, irreversible impacts, and mitigation, as well as nutrient concentrations and destructive wildfires, active and passive dewatering, the Floridan Aquifer, and Outstanding Florida Waters.[56]

Mr. Barnhurst is a licensed professional geologist and holds an Associate degree in Natural Sciences from Ricks College, and a Bachelor of Science degree in Environmental Geology and a Master of Science in Geology, both from Brigham Young University. NRC007 (Barnhurst CV). He has about 12 years of experience in hydrogeology, and he currently works as a Hydrologist in the Division of Site Safety and Environmental Analysis in NRC's Office of New Reactors. NRC Testimony at 2, 8 (Barnhurst). Mr. Barnhurst provided testimony for the NRC Staff concerning active and passive dewatering, the Floridan Aquifer, and Outstanding Florida Waters.[57]

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[55] See NRC Testimony at 49-50, 59-69, 87-99, 105, 128-30, 135-37, 143-46, 149-50, 160-72, 177-79, 181-87, 194-96, 198-99 (Doub); NRC Rebuttal at 42-63, 71-77 (Doub).

[56] See NRC Testimony at 59-71, 90-99, 105-06, 128-30, 135-37, 143-46, 149-50, 160-72, 177-87, 194-99 (Aston); NRC Rebuttal at 42-63, 72-77 (Aston).

[57] See NRC Testimony at 21-59, 86-87, 99-106, 115-17, 124-27, 131-35, 143, 145, 152, 157-60 (Barnhurst); NRC Rebuttal at 5-41, 71-72, 77-79 (Barnhurst).

Mr. Vail holds a Bachelor of Science degree in Environmental Resources Engineering from Humboldt State University and a Master of Science degree in Civil Engineering from Montana State University. NRC008 (Vail CV). His CV notes that he currently serves as a Senior Research Engineer with the Hydrology Group, Environmental Technology Division at the Pacific Northwest National Laboratory. Id. Mr. Vail provided testimony for the NRC Staff concerning active and passive dewatering, the Floridan Aquifer, and Outstanding Florida Waters.[58]

Dr. Prasad holds a Bachelor of Engineering degree in Civil Engineering from Regional Engineering College, a Master of Technology degree in Civil Engineering from the Indian Institute of Technology, and a Ph.D. in Civil and Environmental Engineering from Utah State University. NRC009 (Prasad CV). According to his CV, he currently works as a Senior Research Scientist in the Surface Water Hydrology division of the Hydrology Group at the Pacific Northwest National Laboratory. Id. Dr. Prasad provided testimony for the NRC Staff concerning active and passive dewatering, the Floridan Aquifer, and Outstanding Florida Waters.[59]

Mr. Vermeul holds a Bachelor of Science degree in Agricultural Engineering and a Master of Science in Civil Engineering both from Oregon State University. NRC010 (Vermeul CV). His CV indicates that he has 20 years of experience in hydrologic and geochemical characterization and that he currently works as a Senior Research Engineer with the Environmental Systems Group, Earth Systems Science Division, Energy and Environment Directorate at the Pacific Northwest National Laboratory. Id. Mr. Vermeul provided testimony

[58] See NRC Testimony at 21-59, 86-87, 99-106, 115-17, 124-27, 131-35, 143, 145, 152, 157-60 (Vail); NRC Rebuttal at 5-41, 71-72, 77-79 (Vail).

[59] See NRC Testimony at 21-59, 86-87, 99-106, 115-17, 124-27, 131-35, 143, 145-46, 152, 158-60 (Prasad); NRC Rebuttal at 5-41, 71-72, 77-79 (Prasad).

for the NRC Staff concerning active and passive dewatering, the Floridan Aquifer, and Outstanding Florida Waters.[60]

Mr. Quinlan holds a Bachelor of Science degree in Meteorology from Millersville University and a Master of Science Degree in Atmospheric Science from the University of Alabama in Huntsville. NRC011 (Quinlan CV). According to his CV, he currently works as a physical scientist (meteorologist) in the Division of Site and Environmental Analysis in NRC's Office of New Reactors. Id. Mr. Quinlan provided testimony for the NRC Staff concerning salt drift and deposition. See NRC Testimony at 80-83 (Quinlan); NRC Rebuttal at 68-69 (Quinlan).

Dr. Berg holds a Bachelor of Science degree in Meteorology from Pennsylvania State University, and a Master of Science and Ph.D. both in Atmospheric Sciences from the University of British Columbia. NRC012 (Berg CV). His CV indicates that he currently serves as a Research Scientist in the Atmospheric Chemistry and Meteorology Technical Group, Atmospheric Sciences and Global Change Division at the Pacific Northwest National Laboratory. Id. Dr. Berg provided testimony for the NRC Staff concerning salt drift and deposition. See NRC Testimony at 80-85, 153-57 (Berg); NRC Rebuttal at 69-71 (Berg).

Finally, Dr. Stirewalt is a Registered Professional Geologist and Certified Engineering Geologist and holds a Bachelor of Arts degree in Geology and Mathematics from Catawba College, and a Ph.D. in Structural Geology from the University of North Carolina at Chapel Hill. NRC Exh. 070 (Stirewalt CV). He has over 40 years of experience in surface and subsurface geological site characterizations, and he serves as a Senior Geologist in the Geosciences and Geotechnical Engineering Branch of the Division of Site Safety and Environmental Analysis in NRC's Office of New Reactors. Id.; NRC Rebuttal at 2 (Stirewalt). Dr. Stirewalt provided rebuttal testimony for the NRC Staff concerning karst features and preferential pathways. NRC Rebuttal at 19–26 (Stirewalt).

[60] See NRC Testimony at 21-53, 86-87, 90, 99-106, 115-17, 124-28, 132-35, 152, 158-60 (Vermeul); NRC Rebuttal at 5-41, 71-72, 77-79 (Vermeul).

B. KEY EXHIBITS

Prior to the hearing, the Intervenors filed 174 initial exhibits and two rebuttal exhibits, in addition to the pre-filed testimony of their witnesses.[61] PEF filed 63 initial exhibits and 41 rebuttal exhibits,[62] and NRC Staff filed 69 initial exhibits and 12 rebuttal exhibits.[63] Among these filings were the following key exhibits. NRC001A, NRC001B, and NRC001C are the three volumes of the NRC Staff's FEIS. PEF005A and PEF005B are the Conditions of Certification (COC) imposed on PEF by the Florida Department of Environmental Protection (FDEP) in granting the certification to construct the LNP and associated transmission lines. PEF004 is a Final Order Approving Certification issued by the Florida Siting Board on August 26, 2009, which includes, as "Exhibit A," the May 15, 2009, Recommended Order on Certification by [Florida] Administrative Law Judge J. Lawrence Johnston approving that certification. PEF210 and PEF212 are technical memoranda regarding the groundwater models used to predict environmental impacts at and around the LNP site. PEF304 is a proposed Aquifer Performance Testing (APT) Plan prepared for PEF by CH2M HILL. PEF305 is a proposed Environmental Monitoring Plan (EMP) prepared for PEF by CH2M HILL.

IV. FINDINGS OF FACT

Contention C4A, recited in full at pages 7-8 above, consists of an introductory clause and three main components. The introductory clause reads as follows:

> 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

[61] Exhibits INT002 through INT009, INT102 through INT105, INT202 through INT218, INT302 through INT446, and INT802 through INT803.

[62] Exhibits PEF002 through PEF024, PEF101 through PEF105, PEF201 through PEF228, PEF301 through PEF316, PEF401 through PEF411, PEF501 through PEF508, PEF601 through PEF611, PEF701 through PEF705, and PEF801 through PEF804.

[63] Exhibits NRC001 through NRC081.

> direct, indirect, and cumulative impacts, onsite and offsite, of constructing and operating the proposed LNP facility

C4A Order, Att. A at 1.

This introductory clause confirms that Contention 4A covers (1) direct impacts, indirect impacts, and cumulative impacts, (2) onsite and offsite impacts, and (3) impacts resulting both from the construction and the operation of the LNP. Contention 4A asserts that the FEIS inadequately addresses and inappropriately characterizes all such impacts as "SMALL."

Contention 4A then gets down to specifics, identifying three main areas where the FEIS is allegedly deficient. The three components are: Dewatering, Salt Drift/Deposition, and Consequential Impacts. We will analyze each in turn.

A. DEWATERING IMPACTS: FINDINGS OF FACT

The first component of Contention 4A – Dewatering Impacts – asserts that the FEIS inadequately addresses, and inappropriately characterizes as SMALL, the LNP's "impacts to wetlands, floodplains, special aquatic sites, and other waters, associated with dewatering." Id. This component of Contention 4A has five subparts:

> (1) Dewatering Impacts resulting from active and passive dewatering (Subpart 1 - Active/Passive Dewatering);
>
> (2) Dewatering Impacts resulting from the connection of the site to the underlying Floridan aquifer system (Subpart 2 – Floridan Aquifer System);
>
> (3) Dewatering Impacts to Outstanding Florida Waters (Subpart 3 – Outstanding Florida Waters);
>
> (4) Dewatering Impacts due to alterations and increases in nutrient concentrations (Subpart 4 - Nutrient Concentrations); and
>
> (5) Dewatering Impacts due to increased nutrients resulting from destructive wildfires (Subpart 5 – Destructive Wildfires).

The Board will address the five subparts of the Dewatering Impacts component of Contention 4A separately. But first we will define some of the relevant terms and will make findings on some of the basic facts concerning the FEIS and the LNP site and its environment.

1. General Findings of Fact

As a matter of introduction and orientation, the Board makes the following findings of fact concerning the location and basic characteristics of the proposed LNP, the relevant characteristics of the proposed nuclear reactors and associated facilities, and the investigation and other work that has been done by PEF in preparing the ER, and the NRC Staff in preparing the DEIS and FEIS. The Board finds:

BASIC FEATURES

1.1 The site proposed for the LNP and its associated facilities is a rural and generally undeveloped parcel of land located in Levy County, Florida, approximately 7.9 miles east of the Gulf of Mexico. FEIS at 1-1, 2-1.

1.2 Each proposed nuclear reactor is to be situated on a land surface that is to be elevated above the existing land surface to meet reactor requirements and to support the associated structures and buildings ("nuclear islands"). Additional features include stormwater holding ponds, electrical transmission lines, cooling water pipelines, and a group of wells drilled into the aquifer to produce fresh water for use in the operation of the LNP. Id. at 2-8, 3-2, 3-7, 3-13, 3-16, 3-19, 4-4.

1.3 PEF plans to construct and operate the LNP's two nuclear reactors on a 3,105 acre parcel of land. PEF designated the 3,105 acre parcel as the "LNP site" and the FEIS likewise defines this parcel as the "LNP site." Id. at 2-5; id. at Figs. 2-2 and 2-3. We will refer to it as the LNP Site.

1.4 Much of the LNP Site has been a pine tree plantation for many decades. Pine plantations encompass about 57% of the LNP Site, cypress swamp covers about 13%, and mixed wetland hardwoods about 10%. Id. at 2-5.

1.5 The LNP project includes a proposed corridor that would extend south from the LNP Site to the Cross Florida Barge Canal (CFBC). Id. at 2-5 and id. at Fig. 2-3. The corridor

would include underground cooling water intake pipelines, a cooling water discharge pipeline, electrical transmission lines, and a heavy haul road. Id. 2-5, 3-7, 3-11, 3-13.

1.6 The CFBC is an incomplete cross-Florida waterway located approximately two miles south of the LNP Site and four miles south of the proposed location of the two nuclear reactors. Id. at 2-7. PEF proposes to construct a cooling water intake structure, a barge slip, and a barge unloading facility at the point where the corridor meets the CFBC. Id. at 2-5 and id. at Fig. 2-3.

1.7 The LNP project includes the installation of five groundwater production wells. See PEF005A at 41; FEIS at 3-21 and at Fig. 3-1. One of the wells is only to be used during the construction phase, and is intended to produce 90,000 gallons per day (gpd). PEF005A at 41.

1.8 The other four groundwater production wells are to be used during the operation phase of the LNP and are intended to produce a collective total of 1.58 million gallons per day (mgd) on an annual average basis. FEIS at 3-30. We will refer to these four wells as the "production wells." The production wells will be constructed to a maximum depth of 500 ft. Id. at 3-21.

1.9 Cooling water for the LNP will not be drawn from the production wells. The production wells will instead be used to supply water for "general plant operations including makeup water for the service-water system, potable-water supply, raw water to the demineralizer, fire protection, and media filter backwash." Id. at 3-30.

1.10 Cooling water for the LNP will be drawn from the CFBC. Id. at 2-7.

1.11 The proposed production wells will not be located on the LNP Site. Instead they are to be located on a 2,114 acre parcel of land owned by PEF that is contiguous with, and immediately south of, the LNP Site. Id. at 3-21; BRD001 at 2; Griffin Testimony at 4. Thus, the production wells and wellfield are located off of the LNP Site.

1.12 Because a number of structures associated with the proposed LNP (e.g., the production wellfield, the corridor structures, the cooling water intake structure on the CFBC) will

not be located on the LNP Site, it is reasonably foreseeable that the LNP will have offsite environmental impacts.

1.13 For purposes of clarity, the Board will refer to the 3,105 acre parcel of land where the nuclear power reactors are proposed to be located as the "LNP Site" or the "North Property." We will refer to PEF's adjacent southern parcel (2,114 acres) as the "South Property." Unless otherwise specified, we will use the term "Proposed Site" to include both the North Property and South Property.

BASIC GEOLOGY

1.14 The Proposed Site is located in a portion of west-central Florida where groundwater generally occurs in a surficial aquifer composed of unconsolidated sediments (Surficial Aquifer) and an underlying carbonate rock aquifer known as the Floridan Aquifer system (Floridan Aquifer). FEIS at 2-22.

1.15 The Surficial Aquifer is composed primarily of sands, and provides substantial recharge to the Floridan Aquifer. Id. at 2-22. In the vicinity of the Proposed Site, the Surficial Aquifer is generally encountered at depths of less than 5 ft and has an average thickness of approximately 50 ft. Id. at 2-25.

1.16 The Floridan Aquifer consists of both an upper and lower Floridan aquifer. Id. at 2-22. The Upper Floridan Aquifer (UFA) is of primary relevance here.

1.17 The UFA is estimated to be 500 to 750 ft thick at the Proposed Site. Id. at 2-22 and 2-25. The UFA is the primary source of potable water in the area and, as such, is the part of the Floridan Aquifer that would most likely be impacted by the production wells. Id. at 2-25.

1.18 No confining layer exists between the Surficial Aquifer and the UFA in the area of the Proposed Site and thus the two aquifers are hydraulically connected. Id. at 2-22.

1.19 Limestone is a form of rock that consists of at least 50% calcite or aragonite (CaCO3 or calcium carbonate). See NRC077 at 3.

1.20 Dolomite or dolomitic limestone consists of calcium magnesium carbonate (CaMg(CO3)2). Tr. at 1132 (Stirewalt), 1240 (Lehnen). Dolomite is formed by the substitution of magnesium for calcium in the carbonate mineral structure. NRC077 at 3. If more than 50% of the rock is composed of calcium magnesium carbonate, then it is considered dolomite rather than limestone. See id.

1.21 The percentage of calcium versus magnesium in the carbonate rock can vary considerably and may not be uniform. In general, the higher the percentage of pure limestone, the greater its proclivity to form karst.[64] Some evidence exists that it takes about 60% limestone to form karst and about 90% may be necessary to fully develop karst. Id. However, even pure limestone may not produce karst. Some karst features may also form on dolomite, but their permeability is typically lower than that of limestone. The occurrence of karst in dolomites is usually minor. Id. Dolomite is harder and less susceptible to dissolution than ordinary limestone. Lehnen Testimony at 8.

1.22 The UFA at the Proposed Site consists of the "Avon Park Formation." FEIS at 2-22; Tr. at 1306 (Davies); Lehnen Testimony at 8. The Avon Park Formation consists of dolomitic limestone. Tr. at 1307 (Davies). The Avon Park Formation grades into harder dolomite at greater depths. Lehnen Testimony at 8.

1.23 Regional data from the United States Geological Survey (USGS) indicates that that another formation, known as the "Ocala Formation," lies south of the Proposed Site. See PEF205; Tr. at 1230-31 (Rizzo).

1.24 The Ocala Formation is a rock formation that consists primarily of limestone. Tr. at 1240 (Lehnen). The limestone Ocala Formation has a greater proclivity to form karst. NRC077 at 3.

[64] The term "karst" is defined below.

1.25 The South Property starts to transition from the harder (dolomitic) Avon Park Formation to the more karstic (limestone) Ocala Formation. Tr. at 1235-37 (Rizzo). The uppermost layer in the vicinity of the production wells on the South Property could include a ten foot thick lens of Ocala Formation. Tr. at 1230-31 (Rizzo).

1.26 The UFA in the vicinity of the Proposed Site likely contains some cavities, fractures, and solution channels allowing the flow of groundwater within the limestone and dolomite of the Avon Park Formation. Lehnen Testimony at 10.

1.27 The term "karst" refers to "a terrain in which near-surface carbonate rocks have been partially dissolved by rainwater and groundwater, producing large solution openings that can readily transmit groundwater and where sinkholes can provide easy connections between the surface and groundwater." FEIS at 2-25. Karst is a terrain in which the topography is chiefly formed by the dissolution of soluble rock (particularly limestone). Karstic terrain is highly permeable as a result of the network of interconnected fissures, fractures, and conduits. These features facilitate groundwater flow and transport, resulting in highly permeable aquifers. Lehnen Testimony at 8-9.

1.28 The nature and extent of the karstic terrain at the Proposed Site and its vicinity, and the degree to which it is "developed" into significant conduits or preferential pathways is in dispute in this case.

1.29 "Permeability" is a measure of a geologic formation's ability to transmit water through an aquifer. Id. at 9.

1.30 High permeability results in high transmissivity and in aquifers where larger quantities of water can be extracted with less drawdown of the level of the groundwater. Id.

BASIC REGULATORY STATUS

1.31 In addition to the NRC, the proposed LNP is regulated by several governmental entities.

1.32 The LNP will impact at least 668 acres of wetlands and therefore its construction and operation will require a permit from U.S. Army Corps of Engineers (USACE) under Section 404 of the Federal Water Pollution Control Act.[65]

1.33 With regard to State governmental agencies, on August 26, 2009, the Florida Department of Environmental Protection (FDEP) issued a water use permit (WUP) to PEF for the construction and operation of LNP Units 1 and 2, other associated facilities (such as the production wells), and the transmission lines and corridor. FEIS at 1-1. The WUP for the LNP is referred to as the "Conditions of Certification" (COC). The COC was most recently modified on January 25, 2011 and may be found in exhibits PEF005A and PEF005B herein. FDEP issued the COC to PEF pursuant to the Florida Electrical Power Plant Siting Act (FEPPSA), Fla. Stat. §§ 403.501-518. See PEF005A at 1.

1.34 With regard to local governmental agencies, the SWFWMD also regulates PEF and the proposed LNP. SWFWMD evaluates applications for WUPs within its jurisdiction and was involved in the issuance of the COC to PEF. See PEF ISOP at 22; Fla. Stat. § 403.507(2)(a)(2).

BASIC GROUNDWATER MODELING

1.35 DWRM2: The SWFWMD uses a regional groundwater flow model known as the District-Wide Regulation Model, Version 2 (DWRM2). FEIS at 2-25. DWRM2 encompasses the entire area of the SWFWMD, plus a 10 mile buffer around the periphery, a total area of approximately 10,000 square miles.[66]

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[65] FEIS at 1-1. The NRC is the lead Federal agency in the development of the FEIS and the USACE is a cooperating agency on the FEIS. Id. at 1-4.

[66] See Rumbaugh Testimony at 11-12 (Regional Model "consists of 59,840 cells arranged in five layers . . . each grid cell . . . measures 5000 ft on each side") ((1/5th of 59,840) x (5000' x 5000') = approximately 10,000 square miles); see also *Who We Are & What We Do*, Southwest Florida Water Management District, http://www.swfwmd.state.fl.us/about/mission (last visited Jan. 28, 2013).

1.36 Model 1: As part of its application to FDEP for the COC, PEF constructed a sub-model of the DWRM2 encompassing a smaller area – an area of 20 miles by 20 miles. FEIS at 2-25; Tr. at 1383 (Vermeul). We refer to this sub-model of DWRM2 as Model 1.

1.37 Model 2: As part of its application to the NRC for the COL, NRC required PEF to revise and recalibrate the local scale Model 1. FEIS at 2-26. We refer to this recalibrated local scale model as Model 2. Model 2 encompasses the same area as Model 1. Tr. at 1387 (Vermeul).

RELEVANT NRC GUIDANCE

1.38 The NRC Staff has a guidance document that concerns its environmental review process for nuclear power plants. This guidance is known as "NUREG-1555, Standard Review Plans for Environmental Reviews for Nuclear Power Plants" (2000) ("ESRP") and it is exhibit NRC013 herein. See FEIS at 1-2.

1.39 The NRC Staff relied on the ESRP in drafting the FEIS. See id.; NRC Testimony at 13 (Testimony of "All" NRC Staff witnesses).

2. Dewatering Impacts: Basic Terminology and Definitions

The Dewatering component of Contention 4A starts with an allegation that the FEIS has not adequately discussed impacts to "wetlands, floodplains, special aquatic sites, and other waters." C4A Order, Att. A at 1.

2.1 Wetlands: For purposes of this decision, we define the term "wetlands" as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." See 33 C.F.R. § 328.3(b). Wetlands generally include swamps, marshes, bogs, and similar areas. Id.

2.2 Floodplain: For purposes of this decision, we define "floodplain" as an area of normally dry or semi-dry land providing temporary natural storage areas for floodwater. FEIS at 4-63.

2.3 Special aquatic sites: For purposes of this decision, we define the term "special aquatic sites" in accordance with guidelines issued by the United States Environmental Protection Agency. See 45 Fed. Reg. 85,336, 85,344 (Dec. 24, 1980); Griffin Testimony at 6. The EPA guidelines identify six categories of special aquatic sites: (1) sanctuaries and refuges; (2) wetlands; (3) mudflats; (4) vegetated shallows; (5) coral reefs; and (6) riffles and pool complexes. Id. Of these six categories, the only "special aquatic sites" shown to be present on the Proposed Site are wetlands. Griffin Testimony at 6.

2.4 Hydroperiod: For purposes of this decision, we accept the Intervenors' definition of the term "hydroperiod" as the "natural fluctuations of the water table – the surficial aquifer." Bacchus Testimony at 12-13. The "three important aspects of a wetland hydroperiod are (1) the depth or stage of fluctuating ground and surface water; (2) the duration of the water level at a given depth or stage; and (3) the periodicity or seasonality of the water level fluctuations." Id. at 13.

2.5 Active Dewatering: Although Contention 4A uses the term "active dewatering," the Intervenors do not define it, nor is it a term used in the FEIS. See NRC Testimony at 37 (Prasad, Barnhurst, Vail, Vermeul). For purposes of this decision, the term "active dewatering" will refer to the mechanical pumping of water from an aquifer. See Bacchus Testimony at 14. Active dewatering includes pumping from the four production wells during the operation of the LNP. It also includes pumping from the 90,000 gpd well during construction and pumping to dewater excavations associated with constructing the nuclear islands and the pipeline corridor ditch.

2.6 Passive Dewatering: Although Contention 4A uses the term "passive dewatering" the Intervenors do not define it, nor is the term used in the FEIS. See NRC

Testimony at 37 (Prasad, Barnhurst, Vail, Vermeul). For purposes of this decision, the term "passive dewatering" will refer to evaporative losses of surface or groundwater resulting from alterations in land cover, site drainage design, and changes to subsurface flow properties. Id. at 38; Bacchus Testimony at 30. This includes evaporative dewatering from stormwater ponds, Bacchus Testimony at 30, and seepage from excavations. NRC Testimony at 38 (Prasad, Barnhurst, Vail, Vermeul).

ADDITIONAL TERMS

2.7 SMALL/MODERATE/LARGE: For purposes of this decision, we will use the definitions of SMALL, MODERATE, and LARGE environmental impacts the NRC Staff employed in the FEIS. See FEIS at 1-3 to 1-4; NRC ISOP at 18; Bacchus Testimony at 8. These terms are defined as follows:

2.7.1 The term "SMALL" means "environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource." FEIS at 1-3.

2.7.2 The term "MODERATE" means "environmental effects are sufficient to alter noticeably, but not destabilize, important attributes of the resource." Id.

2.7.3 The term "LARGE" means "environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource. Id. at 1-4.

3. Dewatering Impacts: Subpart 1 - Active/Passive Dewatering

The first component of Contention 4A alleges that the FEIS fails to adequately address the environmental impacts "associated with dewatering" and, as discussed above, contains five specific subparts.

The first subpart of the first component concerns "impacts resulting from passive and active dewatering" and is central to the Intervenors' entire challenge.[67] In support of this subpart, Intervenors assert that the FEIS fails to "adequately assess the potential ecological and other environmental impacts that would result from dewatering caused by construction and operation" of the proposed LNP. Bacchus Testimony at 9. The Intervenors state that dewatering will have "potentially catastrophic environmental impacts . . . on the extremely fragile aquatic and terrestrial ecosystem" of the Proposed Site and that "water withdrawals . . . threaten to severely and irreversibly harm the ecosystem." Intervenors' ISOP at 1. The Intervenors assert that "most" of these adverse impacts "will occur because PEF proposes removing significant amounts of water from the ecosystem already stressed by alterations in the natural hydroperiods." Bacchus Testimony at 10. Dr. Bacchus adds:

> This removal will take place in many different ways, including: mechanical dewatering from pumping from the proposed LNP supply wells, and dewatering for excavations of the nuclear islands; passive dewatering from capture and impoundment of water in the stormwater ponds; evaporative loss from the stormwater ponds, ditches, swales and other features to reroute water; alterations of historic sheet-flow via 'stormwater management'; disruption in the existing preferential flow pathways caused by the huge nuclear islands; and withdrawing freshwater from the Withlacoochee Canal (erroneously referred to in the FEIS as the [CFBC]) via the Cooling Water Intake System."

Id.

We note that the issue is not whether the dewatering associated with the proposed LNP will have adverse environmental impacts. The FEIS plainly acknowledges that adverse impacts will occur. See, e.g., FEIS at 4-25; 4-27; 4-70 to 4-72; 5-26 to 5-30; 5-46 to 5-47. The issue is

[67] In a sense, this first subpart (active/passive) of the first component (dewatering) encompasses the entirety of the first component. According to the Intervenors there are two types of dewatering - active and passive. Therefore, active and passive dewatering cover the entire universe of dewatering impacts. The other four subparts (e.g., impacts to the Floridan Aquifer, impacts to OFWs) are specific examples of the dewatering problem. Thus, our analysis of this first subpart will also support our analysis of the other four subparts.

whether the FEIS identification, discussion, and characterization of these impacts is adequate and satisfies the requirements of NEPA and 10 C.F.R. Part 51.

We now turn to the first subpart of the first component of Contention 4A: the adequacy of the FEIS with regard to dewatering impacts resulting from active and passive dewatering.

a. Dewatering: Site Characterization: Adequacy of FEIS Regarding Site Geology and Hydrology

i. Evidence Regarding Site Characterization[68]

One of the Intervenors "overarching themes" is that the "FEIS grossly oversimplifies the hydroecological conditions of the LPN [sic] site" and "grossly oversimplifies the geology and hydrology of the region." Bacchus Testimony at 5. The Intervenors contend that the FEIS is inadequate because it is "based on the gross oversimplification of existing environmental conditions, including the complex karstic geology of the site which connects the groundwater and surface water on the LNP site to a huge region." Intervenors' ISOP at 2.

Mr. Gareth Davies, a consultant hydrogeologist testifying for the Intervenors, stated that "the FEIS does not adequately recognize that most of the [groundwater] flow in this area goes through preferential pathways, not through a porous medium" and that "[b]ecause these flow paths are currently unknown . . . it is [not] possible to rely upon the predictions in the FEIS." Davies Testimony at 2. Mr. Davies explained that "carbonate rocks underlie the LNP site," id., and that "[c]arbonate rocks are particularly prone to chemical weathering (dissolution)." Id. at 3. He described the "positive feedback loop" whereby such dissolution is initiated at fractures near the land surface, causing enlargement of the fracture, more water dissolution, more enlargement, and the formation of preferential pathways for groundwater flow. Id. During the hearing, Mr. Davies stated that all carbonate rocks have conduits and therefore he assumes

[68] The "evidence" subsections, such as this one, focus primarily on evidence offered by the Intervenors in support of their assertion that the FEIS is deficient and inadequate. Our findings of fact, as recited in the next subsection, however, are based on our assessment of the entire evidentiary record presented by all of the parties.

that such conduits exist under the Proposed Site. Tr. at 1308 (Davies). In his written testimony, Mr. Davies stated that the LNP Site is located in a region of karstic geomorphology susceptible to such preferential pathways. Davies Testimony at 4. He added: "To predict the impacts more reliably I recommend mapping of some of the major preferential flow paths and use of a model that is more physically realistic." Id. at 2.

Mr. Davies acknowledged that the FEIS discusses and recognizes that the terrain in the area is karst, but stated that the FEIS "does not emphasize enough the karst landscape/aquifer at the LNP, nor does it mention the possible problems of assuming the incorrect model." Id. at 9. He criticized the FEIS statements that the karst at the LNP site is not "well-developed" stating that the distinction between well-developed karst and non-well-developed karst is not clear and is "entirely subjective, especially because conduits – a key feature of karst development – may be relatively small but will still have a large impact on groundwater movement." Id. at 10. Mr. Davies added that there is a 1995 "Standard Guide published by the American Standards for Testing and Materials [ASTM]" that describes how karst aquifers can be properly investigated and asserts that the FEIS did not follow the ASTM guide. Id. at 13.

Mr. Davies noted that the FEIS references an investigation of the LNP Site that included "118 geotechnical borings to characterize subsurface conditions at the proposed LNP Units 1 and 2," id. at 14 (citing FEIS at 2-25), and stated that this number of borings provides "very little knowledge about how much groundwater is really flowing." Id. Mr. Davies cited, with approval, a study that calculates that "it would take 1,000 3-cm drill holes per acre (404 per hectare)[69] to have a 90% probability of intersecting a 1-meter solid elliptical object in the subsurface." Id. He then stated, "Obviously, 118 borings on a 3,105 acre site (FEIS p.2-41) is less than the optimum number needed for an accurate analysis of conduits, even if they are large." Id. at 15. Mr. Davies stated, "it is clear that only if empirical tests and minimal assumptions about aquifer

[69] Something seems amiss with Mr. Davies' calculation. A hectare consists of 2.471 acres. 1000 holes per acre equates to 2471 holes per hectare (not 404). See Tr. at 1446.

characteristics are used, can any predictions approaching reliability be made. As yet at the LNP none of this has been done." Id. at 15.

When asked "what should have been done to investigate this aquifer if you are assuming that it is karst?" Tr. at 1316 (J. Charbeneau), Mr. Davies acknowledged that drilling more boreholes might not be productive, id. (Davies) ("The probability of intersecting conduits with randomly drilled wells is fairly low.") and stated that "investigating karst requires a different method." Id. He proposed the use of "tracer testing," as follows: Mr. Davies stated that the existence of conduits "can be implied by the existence of springs and sinking streams." Id. at 1317. He testified that the existence of such springs on the Proposed Site is shown by the "springs that Dr. Bacchus found on the north side of the Barge Canal." Id. at 1321. Mr. Davies stated that "injected tracing experiments" would be the appropriate method for identifying and understanding the conduit components in the area. Id. at 1317. He acknowledged, however, that there were difficulties with tracer tests: "it is actually quite difficult to - - if you inject tracers into conduits it's actually quite difficult to recover those in wells even if the wells are apparently quite close to conduits." Id. at 1318. And, as Judge Charbeneau pointed out, you still "need to find the conduits first." Id. (J. Charbeneau). Upon questioning, Mr. Davies stated that he was unaware of any site within the Avon Park formation that has had tracer tests performed. Id. at 1319.

Dr. Tim Hazlett, testifying for the Intervenors primarily on groundwater modeling issues (discussed infra at Section IV.A.3.b), also asserted that the site characterization data is not sufficient. Hazlett Testimony at 4. He testified that "there is . . . no dispute among the experts that significantly more site characterization would be needed to enable the creation of a more realistic and reliable model [including] more boreholes . . . flow tracing and mapping of the existing wetlands and karst features." Hazlett Rebuttal at 2. The modeling, he said, "is fundamentally inadequate" and the "primary reason for this inadequacy is that the model fails to take into account that the aquifers are karstic and therefore not uniform." Id. at 3. Dr. Hazlett

testified that "improved understanding of the behavior of the simulated system would come from additional data streams such as: more wells, at varying depths, being monitored and tested over a longer period of time, monitoring of water levels in wetlands over at least one year (ideally longer), and measurement of streamflows and spring discharges during both wet and dry season conditions." Hazlett Testimony at 4. He added that the "use of dye tracers to determine the locations of major preferential flow pathways would greatly assist to understand how pumping will affect the local groundwater." Id.

During his oral testimony, Dr. Hazlett dismissed the significance of PEF's grout injection testing that failed to identify the existence of any conduits. He stated that "you could have very small spaces that are parallel to the bedding that could easily be clogged with grout injection, yet could be conduits for vast quantities of water to move on to the site." Tr. at 1327-28 (Hazlett). "From a probabilistic point of view . . . it's not easy finding the smoking gun." Id. at 1328. He concluded that "just because you don't see it doesn't mean it is not there." Id. at 1329.

Dr. Sydney Bacchus, testifying for the Intervenors as a hydroecologist, strongly supported the proposition that the FEIS has failed to adequately characterize the Proposed Site. Bacchus Testimony at 5. She stated that she has visited and studied the vicinity of the Proposed Site numerous times and has visited the Proposed Site itself. Id. at 6. Dr. Bacchus referred to an illustrated cross-section of the Floridan Aquifer System (Exhibit INT351) from an atlas that, she said, "shows how interconnected karst features such as sinkholes and other cavities serve as relatively large underground pathways for preferential flow of water." Id. at 10.

Dr. Bacchus then discussed "photolinears" or "lineaments," which she indicated are "linear trends identified on aerial photographs that may represent zones of increased fracture density [or] fracture traces." Id. at 11. Dr. Bacchus then presented exhibits INT335 through INT343 that she stated "show similar fractures in close proximity to the proposed supply wells on the proposed LNP site and extending throughout the surrounding vicinity." Id. at 12. She

testified that these exhibits are aerial photos of the Proposed Site region that were taken in approximately 2004, Tr. at 1293. These photos have blue lines drawn on them, Tr. at 1294, and, according to Dr. Bacchus, the blue lines represent lineaments or fracture traces. Bacchus Testimony at 11. Dr. Bacchus testified that the blue lines on these exhibits are not based on her professional review or assessment of the 2004 aerial photos, Tr. at 1297-1301, but instead are based on information she obtained from a 1951 map that was "reverified" in a 1973 publication. Tr. at 1300 and 1280. Based on the 1951 map, Dr. Bacchus had these blue lines placed onto exhibits INT335 through INT343. Id. at 1294-96. She testified that the lineaments in question, while discernable in 1951, are difficult to see now. Tr. at 1280.

At the Board's request, the Intervenors produced copies of INT335 through INT343 without the added lines.[70] These were admitted as Intervenor exhibits INT335X through INT343X. The Board reviewed INT335X through INT343X and we were unable to discern the lineaments depicted by the lines.

Finally, the Intervenors focus on (but do not define) a geologic feature known as "sinkholes." See INT357 (Brook/Allison article on subsidence sinkholes in Dougherty County, Georgia). NRC Exhibit NRC076, which is the Final Safety Analysis Report (FSAR) that PEF submitted as part of its application, describes one type of sinkhole, a "solution sinkhole" as follows:

> Solution sinkholes occur in areas where limestone is exposed at the land surface or is mantled by only a thin layer of cover (Figure 2.5.1-240). Solution is most active at the limestone surface and along joints or fractures or other openings in the rock that permit water to move easily into the subsurface. Large voids commonly do not form because subsidence of the soil layer occurs as the surface of the limestone dissolves, resulting in a gradual downward movement of the land surface and in development of a depression that collects increasing amounts of surface runoff as its perimeter expands. This type of sinkhole generally develops as a bowl-shaped depression with the slope of its sides

[70] See Order (Administrative Instructions Regarding Evidentiary Hearing) at 3 (Oct. 23, 2012) (unpublished); see also exhibits INT335X through INT343X.

> determined by the rate of subsidence relative to the rate of erosion of the walls of the depression from surface runoff. Surface runoff may carry sand and clay particles into the depression, resulting in an impermeable seal in the bottom of the sinkhole. Due to these impermeable seals, marshes and lakes form covering these sinkholes. This process produces an undulating topography characterized by shallow depressions and is common over large parts of Florida. The LNP Site lies completely within the area dominated by solution sinkholes (Figure 2.5.1-237). (Reference 2.5.1-317). This type of sinkhole is recognized and is likely to develop on the LNP Site over a long timeframe as slow dissolution of the carbonate (dolostone) surface occurs.

NRC076 at 2.5-73.

Figure 2.5.1-237 of the FSAR displays a USGS map of Florida showing that the Levy Site is located in an area where "Sinkholes are few, generally shallow and broad, and develop gradually." Id. Figure 2.5.1-244 of the FSAR is a map prepared by PEF that displays certain geological features within a five mile radius of the PEF Site, including two fractures (based on the same 1951 map used by Dr. Bacchus and discussed above, see testimony of Dr. Stirewalt at Tr. at 1149) and ten sinkholes. Id. In the FEIS, NRC acknowledges that "karst is a terrain . . . where sinkholes can provide easy connections between the surface and groundwater." FEIS at 2-25.

The Intervenors are concerned about sinkholes because, as Dr. Bacchus testified, they are examples of preferential flow paths for the movement of groundwater. Bacchus Testimony at 10 ("[S]inkholes and other cavities serve as relatively large underground pathways for preferential flow of water."). She stated that "underlying karst features such as relict sinkholes, fractures, faults, swallets and other karst conduits that can serve as preferential flow paths connecting wetlands in the vicinity of LNP, have not been considered and accurately identified." Bacchus Testimony at 24. She testified that she "observed . . . the depressional pond-cypress wetlands indicative of relict sinkholes on the proposed site during the site inspection on January 11, 2012" and that she has observed and inspected similar features in the immediate vicinity of the Proposed Site. Id. at 26. According to Dr. Bacchus, a "relict sinkhole" is a sinkhole that has

been “infilled” and “plugged” and that is “indicated by a depressional wetland that Pond Cypress occupy [and is] aligned along fractures.” Tr. at 1285-86 (Bacchus). Groundwater pumping, such as that contemplated by the LNP project, can, she said, unplug these relict sinkholes and start moving the water through these preferential flow paths. Id. at 1286. Dr. Bacchus stated:

> The FEIS does not address the potential that future groundwater withdrawals at LNP will increase the likelihood of sinkholes. This is a significant omission. Relict or historic sinkholes occur throughout the vicinity of the proposed LNP. When new sinkholes open up, they expose the underlying water to evaporation and contamination. Induced sinkholes can affect the quality of human drinking water in local wells, and also the quality of drinking water for wildlife. The FEIS does not address these effects. It is my professional opinion that similar subsidence/collapse events and subsequent “passive dewatering’ of the aquifer system and re-opening of relict sinkholes will occur if the stormwater ponds for the proposed LNP are constructed and collect water.

Bacchus Testimony at 32-33.

ii. Findings of Fact Regarding Site Characterization

With regard to Intervenors’ allegations that the FEIS “oversimplifies the geology and hydrology of the region” of the Proposed Site, Bacchus Testimony at 5, and therefore that the FEIS is inadequate, Intervenors’ ISOP at 2, the Board makes the following findings of fact:

3.1 An adequate assessment and understanding of the geologic and hydrologic characteristics of the Proposed Site and its vicinity is needed in order for the NRC to take a hard look at the environmental impacts associated with dewatering, whether active or passive, that are reasonably foreseeable for the construction and operation phases of the proposed LNP.

3.2 FEIS Discussion of Geology and Hydrology: The FEIS discusses and analyzes, in several places, characteristics of the geology and hydrology of the Proposed Site and its vicinity, including but not limited to:

a. The land use in the affected environment, including the LNP Site, the vicinity around the LNP Site, the transmission line corridors to and from the LNP Site and the 50-mile region surrounding the LNP Site. See FEIS at 2-5 to 2-13.

b. The water and "hydrologic processes and waterbodies in and around the LNP Site, the existing water use, and the quality of water in the environment of the proposed LNP Units 1 and 2," id. at 2-13, including the "site-specific and regional hydrological features that could be affected," id. at 2-16, and both surface water hydrology, id. at 2-16 to 2-22, and groundwater hydrology. Id. at 2-22 to 2-30.

c. Groundwater use, quality and monitoring within the vicinity of the Proposed Site. Id. at 2-31, 2-38, 2-41.

d. The "terrestrial and wetland ecology" of the LNP Site, its corridors and proposed offsite facilities, including the proposed wellfield. Id. at 2-41 to 2-91

e. The "aquatic ecology" of the environment and biota in the vicinity of the LNP Site, and in the corridors and proposed offsite facilities, including the production wellfield. Id. at 2-91 to 2-125.

f. Water-related impacts associated with construction of the LNP, including hydrological alterations, water use impacts, ground and surface water-quality impacts, terrestrial and wetlands impacts, and aquatic impacts. Id. at 4-17 to 4-80.

g. Water-related impacts associated with operation of the LNP, including hydrological alterations, water use impacts, ground and surface water-quality impacts, water monitoring, terrestrial and wetlands impacts, and aquatic impacts. Id. at 5-3 to 5-47.

3.3 NRC's analysis and understanding of the geologic and hydrologic characteristics of the Proposed Site, reflected in the FEIS, as it pertains to the potential impacts of active and passive dewatering, are based on numerous sources, both site-specific data and information and regional and historic information. NRC Testimony at 29-30 (Prasad, Barnhurst, Vail, Vermeul).

3.4 Site-Specific Data and Information: The site-specific information that NRC used to support the FEIS analysis and understanding of the geologic and hydrologic characteristics of the Proposed Site and its vicinity includes the following:

a. One hundred and eighteen (118) geotechnical borings to characterize subsurface conditions within a 0.6 mile radius of the proposed locations of the nuclear islands, i.e., the North Property. FEIS at 2-25.

b. Slug tests and site pumping tests performed on 23 wells drilled in both the North and South Property. See id. at 2-26.

c. Three constant rate groundwater pumping tests conducted at the North Property, one within the Surficial Aquifer and two within the UFA. Id. at 2-26.

d. Quarterly monitoring during 2007 of water levels and quality derived from four wells (two in the Surficial Aquifer and two in the UFA) located on the LNP Site. Id. at 2-28 and 2-38.

e. Two continuous water-level monitoring stations installed in the Surficial Aquifer, one within the footprint of each of the proposed nuclear islands. Id. at 2-28.

f. Water-level data from other USGS wells within the 20 x 20 mile domain surrounding the Proposed Site and used in Model 1 and Model 2. Id. at 2-29.

g. FDEP data on surface water use in the vicinity of the Proposed Site. Id. at 2-30.

h. SWFWMD and FDEP well permits and other data regarding groundwater use in the vicinity of the Proposed Site. Id. at 2-31.

i. Five visits to the LNP Site and its vicinity by NRC, or NRC contractor personnel. NRC Testimony at 23 (Prasad, Barnhurst, Vermeul, Vail).

j. Review of PEF's Environmental Report and PEF's responses to 26 hydrology related requests for additional information by NRC. Id. at 24 (Prasad, Barnhurst, Vermeul, Vail).

3.5 Regional Information: The regional and general information that supports the FEIS analysis and understanding of the geologic and hydrologic characteristics of the Proposed Site includes the following:

a. Geohydrologic regional descriptions of the vicinity of the Proposed Site provided in the USGS Ground Water Atlas of the United States (2000) for the Floridan Aquifer system. FEIS at 2-22.

b. Regional information on water quality monitoring from the Florida Geologic Survey. Id. at 2-177, 2-204.

c. Information on droughts, surface water quality standards, public water systems, impaired waters, the COC, and Electric Power Plant Certification Staff Analysis Report from the FDEP. Id. at 2-199 to 2-201.

d. District water management plans, water use, minimum flows and levels as well as the DWRM2. Id. at 2-216, 5-149.

3.6 The FEIS recognizes and discusses that the geology and hydrology at the Proposed Site and its general vicinity are complex. Id. at 2-29. It acknowledges that there is no confining unit between the Surficial Aquifer and the UFA and that they are hydraulically connected. Id. at 2-22.

3.7 The FEIS recognizes and discusses that there is karst terrain and there are some sinkholes in the vicinity of the Proposed Site. See id. at 2-25, 2-180, 5-26, 5-124. For example, the FEIS acknowledges "the LNP Site is in a region where the limestone is bare or thinly covered, and sinkholes are few, generally shallow, broad and develop gradually. This interpretation is also consistent with the USGS Groundwater Atlas, which shows transmissivity values in the vicinity of the LNP site that are below the threshold that would be indicative of well-developed karst systems." Id. at 2-179-180.

3.8 The FEIS also discusses karst and sinkholes as follows:

> Although karst terrain (i.e., areas where underlying carbonate rock near the surface has been subjected to dissolution by downward infiltrating rainfall) is a problem in many areas of Florida, conditions near the LNP site (e.g., regional transmissivity values; few sinkholes) do not suggest well-developed karst (see Section 2.3.1.2 of the EIS). Nevertheless, the cypress dome wetlands on site may represent karst development and likely provide for preferential recharge between the surface and groundwater [citation omitted]. [The PEF ER] estimates that general facility uses would require normal daily withdrawal of about 1.58 Mgd of freshwater from the underlying Floridan aquifer. Because the surficial aquifer that supports local wetlands is hydrologically connected to the Floridan aquifer system in this area, groundwater withdrawal from the Floridan aquifer system could affect wetlands on and around the LNP site.

Id. at 5-26.

3.9 Other than the several cypress dome wetlands that the FEIS acknowledges might represent some limited karst development and preferential recharge, there is no support for the Intervenors' assertions that there are other sinkholes or significant preferential pathways for groundwater on or under the Proposed Site. The absence of such features is supported by the testimony of NRC witnesses familiar with the Proposed Site. See Tr. at 1153 (Vermeul – no features consistent with sinkholes suitable for a tracer test); NRC Testimony at 9, 11 (Barnhurst – no onsite sinkholes or large scale preferential flow features); Tr. at 1158-59 (Barnhurst); Tr. at 1193 (Barnhurst); Tr. at 1193-94 (Vermeul); Tr. at 1194 (Stirewalt).

3.10 The absence of sinkholes or other significant preferential pathways for groundwater on or under the Proposed Site is also supported by the testimony of PEF witnesses familiar with the Proposed Site. This includes the testimony of Dr. Rizzo that the geologic formation under the North Property is characterized by the absence of dissolution activity and preferential flow within interconnected fractures or conduits, as well as by a high degree of dolomitization that would inhibit dissolution activity that might create new preferential pathways. Rizzo Testimony at 7. Dr. Rizzo's testimony is convincing because it is based on (a) a geotechnical engineering investigation of the North Property that included a review of sinkhole databases maintained by the State of Florida and private entities, Tr. at 1210-11, 1215 (Rizzo);

(b) literature reviews of previous studies inquiring into the presence of faults, fractures and lineaments within the North Property and the area surrounding it, Tr. at 1217 (Rizzo); (c) field reconnaissance in a five-mile radius from the LNP reactor islands (encompassing the entire North Property and part of the South Property) that was conducted to locate, map and characterize fracture patterns that pose a risk of dissolution activity that could lead to sinkholes, Tr. at 1208-10 (Rizzo); (d) the grout take test program discussed below, Tr. at 1210 (Rizzo); and (e) surface reconnaissance conducted to locate sinkholes and lineaments. Tr. at 1211 (Rizzo).

3.11 Transmissivity values in the range of 250,000 to 1,000,000 feet-squared per day[71] generally represent limestone formations where well-developed karst and significant preferential pathways are likely to exist. NRC Rebuttal at 24, Tr. at 1155 (Barnhurst), NRC018 at 14.

3.12 Transmissivity values estimated from aquifer pumping tests in the vicinity of proposed LNP Unit 1 and 2 range from 62,000 to 69,000 feet-squared per day. FEIS at 2-26. Transmissivity values within the Proposed Site portion of Levy County range from 50,000 to 100,000 feet-squared per day. NRC Rebuttal at 24. Calibrated transmissivity values from Model 2, which extends well beyond the Proposed Site (NRC Rebuttal at 16), have values in the range of 7,900 to 250,000 feet-squared per day. FEIS at 2-26. These are all barely at or below the range at which well-developed karst and significant preferential pathways are likely to exist. See Tr. at 1154-55 (Barnhurst).

3.13 At the Proposed Site, the Surficial Aquifer lies directly over the Floridan Aquifer of the Avon Park Formation. FEIS at 2-22. The Avon Park Formation is a dolomitic limestone. Tr. at 1227 (Rizzo), 1240 (Lehnen). Transmissivity values of the Avon Park Formation range from 50,000 to 100,000 feet-squared per day. Tr. at 1176 (Vermeul).

[71] The term “feet-squared per day” is a unit of transmissivity. Transmissivity refers to the ability of groundwater to flow through a particular type of rock formation. The higher the transmissivity, the easier it is for water to move through that formation.

3.14 Except for a thin (10 foot) lens that may begin on the southern part of the South Property, Ocala Formation limestones are not present at the LNP facility and vicinity. FEIS at 2-22.

3.15 The transmissivity values of the Proposed Site and its vicinity are not consistent with, and do not support, the Intervenors' assertion that the Proposed Site is underlain with significant preferential pathways for the groundwater. FEIS at 2-25, 2-180, 5-26. Instead, the transmissivity values are more consistent with the dolomitic Avon Park formation.

3.16 There is more site-specific data supporting NRC's characterization of the geology and hydrology of the North Property than there is for the South Property, which is where the production wellfield would be located. The 118 geotechnical borings are all located within 0.6 mile radius of the two nuclear islands on the North Property. FEIS at 2-25. See Rizzo Rebuttal at 10-12, Tr. at 1132-34 (Stirewalt), 1209 (Rizzo), 1264 (Lehnen).

3.17 Even though there has been less extensive characterization of the South Property, the PEF and Staff witnesses persuasively maintained that it is reasonable to extrapolate to the South Property the general site characterization conclusions concerning the North Property. This is because (a) the South Property is immediately adjacent to the North Property and (b) the regional geologic and hydrologic characterizations were validated in the investigation of the North Property and this regional information indicates that both properties are underlain by the same hydrogeological formation with similar properties. The Intervenors provided no evidence specific to the Proposed Site to contradict this testimony. Further, Dr. Rizzo testified that PEF inspected the CFBC and quarries in the area to map possible lineaments or other features back to the Proposed Site, but there was nothing to show that these features would exist on the South Property near the production wellfield. Tr. at 1219 (Rizzo). Additionally, Dr. Griffin testified that, while doing wetlands delineations, PEF personnel spent considerable time on both the North and South Properties but detected no visible features such as sinkholes or swallets that are indicative of well-developed karst. Tr. at 1341 (Griffin).

Similarly, Dr. Stirewalt, Mr. Vermeul, and Mr. Barnhurst, testifying for the NRC Staff, stated 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. Tr. at 1193-95 (Stirewalt, Vermeul, Barnhurst).

3.18 "Grout take tests" are tests where fluid (grout) is injected into a borehole and then the size and length of cavities or underground pathways in contact with the borehole are estimated by measuring the direction, distance, and quantity of grout that is capable of being pumped into the borehole. Tr. at 1250 (Rizzo), 1348-49 (Rizzo).

3.19 Grout take tests conducted by PEF as a part of the 118 geotechnical borings indicate that significant preferential pathways for the groundwater are not present in the vicinity of the tests. Tr. at 1250 (Rizzo). While these borings, and thus these grout take tests, were centered on the North Property, they provide some support for the proposition that such significant preferential pathways do not exist on the Proposed Site.

3.20 The existence of water seepage on the north bank of the CFBC, see Bacchus Testimony at 21,[72] Tr. at 1321 (Davies), which is immediately south of the South Property, FEIS at 2-3, Fig. 2-2, does not indicate the existence of significant preferential pathways on the South Property. Dr. Rizzo's testimony convincingly explained that there are no large flows from the wall of the CFBC, that these constitute seeps (not springs) resulting from the CFBC cut below the water table, and that these seeps do not indicate significant preferential flow pathways from the South Property. Tr. at 1351 (Rizzo).

3.21 We reject the Intervenors' suggestion that thousands of additional borings need to be drilled in order to adequately characterize the potential preferential pathways and conduits at the Proposed Site (Davies Testimony at 14-15). Predicting where conduits occur in the subsurface requires substantial empirical data on such things as hydraulic head variation and

[72] Dr. Bacchus referred to the Cross Florida Barge Canal throughout her testimony as the Withlacoochee Canal. Bacchus Testimony at 5.

groundwater velocity. Id. at 16. But the probability of detecting preferential pathways and conduits via such a program of additional drill holes at the Proposed Site and its vicinity is low, and is not reasonably likely to produce contrary data. See Tr. at 1316 (Davies).

3.22 It is undoubtedly correct that "improved understanding of the behavior of the simulated system would come from additional data streams." Hazlett Testimony at 4. While such additional data and additional study might promote an improved understanding of the geologic and hydrologic characteristics of the Proposed Site, this does not mean that additional data and study are required in this instance to make the FEIS adequate or reasonable.

3.23 We also reject the Intervenors' claim that injected tracer testing is required to characterize the geology and hydrology of the Proposed Site. Tracer testing will not measure groundwater drawdown. Tr. at 1319 (Davies). Even as to preferential pathways, tracer testing can be quite difficult to perform. Tr. 1317-19 (Davies). The Intervenors could cite no case or site within the Avon Park formation where tracer tests have been conducted. See Tr. at 1319 (Davies).

3.24 We further reject the proposition, advocated by the Intervenors (Tr. at 1317 (Davies); Hazlett Testimony at 3) that an adequate and reasonable FEIS requires that NRC or PEF conduct tracer testing at the Proposed Site and its vicinity.

3.25 ASTM: We reject the Intervenors' assertion that the FEIS is deficient because it failed to follow guidance issued by the American Society for Testing and Materials (ASTM). Davies Testimony at 13. No such guidance document currently exists on the ASTM webpage and the evidence shows that ASTM withdrew the guidance cited by Mr. Davies. Lehnen Rebuttal at 7.

3.26 Photolinears: We reject the Intervenors' assertion that evidence of photolinears or lineaments shows the existence of conduits or preferential pathways for groundwater flow in and around the Proposed Site. We have examined exhibits INT335X to INT343X and, as Dr. Bacchus acknowledged, no lineaments can currently be discerned on them. Tr. at 1280, 1297-

1301 (Bacchus). Further, when we compare the scale (1 inch = 4 kilometers) of INT335 - INT343 to the scale (1 inch = 34 miles) of the 1951 map, INT369, and compare the large number of lines depicted by Dr. Bacchus on INT335 - INT343 to the relatively few lines drawn by Dr. Vernon on the 1951 map, INT335 does not appear to be a fair and accurate transposition of Dr. Vernon's 1951 lines to the 2004 photos of the Proposed Site and its vicinity. See Tr. at 1304-05 (Bacchus).

3.27 We reject the Intervenors' assertions that the existence of the Big King and Little King springs is evidence of conduit flow within the "catchment area" of the Proposed Site. Tr. at 1287-88 (Davies). Mr. Lehnen testified convincingly that the small amount of flow from these two springs (5 mgd) and the potentiometric head in that part of the UFA combine to indicate that these two springs simply are not extensively connected to a large conduit system. Tr. at 1269-70 (Lehnen) ("If you had a large conduit system that was well inter-connected feeding those springs and you had a head of 10 ft on the Floridan Aquifer and a large conduit, you would be discharging much larger quantities of water than 5 million gallons per day.").

3.28 Significant active/modern sinkholes: All parties agree that the UFA at the Proposed Site consists primarily of the Avon Park Formation, a dolomitic limestone with smaller dissolution potential. Solution sinkholes develop over a long timeframe in this type of limestone due to slow dissolution. NRC076 at 2.5-73. Accordingly, we reject the Intervenors' assertion that groundwater withdrawals at LNP will cause new sinkholes to "open up" and expose underlying water to evaporation and contamination.

3.29 Unplugging of Relict Sinkholes: We reject the Intervenors' assertion that groundwater pumping will dislodge plugs of relic sinkholes within the vicinity of the Proposed Site. Tr. at 1352 (Bacchus). The impermeable seals (plugs) resulting from depression infilling with sand and clay of solution sinkholes allows the formation of marshes (wetlands). NRC076 at 2.5-76. During testimony, Intervenors did not persuasively account for how these seals could be dislodged by groundwater pumping. Tr. at 1352-56 (Davies, Hazlett). The only testimony

provided concerned how pressurizing a conduit could dislodge a plug in the opposite direction to what might be caused by groundwater pumping. Tr. at 1353 (Davies).

b. Dewatering: Groundwater Modeling and Modeling Assumptions

i. Evidence Regarding Groundwater Modeling and Modeling Assumptions

Groundwater modeling was part of the FEIS analysis of the foreseeable environmental impacts that might result from the active dewatering activities associated with the operation of the LNP project.[73] The FEIS discusses this groundwater modeling, its evolution, use, and limitations, at some length. See, e.g., FEIS at 2-25 to 2-32; 5-5 to 5-9; 5-14 to 5-27; 5-45 to 5-47. The Intervenors' challenge to the adequacy of the groundwater modeling echoes many of their complaints (discussed above) concerning the adequacy of the characterization of the Proposed Site and its environs. In both cases, they assert that the FEIS analysis was grossly oversimplified and thus inaccurate and unreliable.

With regard to modeling, Mr. Davies, testifying for the Intervenors, objected to the assumption, inherent in Model 1 and Model 2,[74] that "most of the water flow is through a homogeneous porous medium" stating that this assumption is "invalid in karstic areas." Davies Testimony at 11-12. He asserted that the "homogeneous porous medium" assumption causes the groundwater models to generate "an underestimate of groundwater flow velocity compared to the actual situation." Id. at 15-16. Further, he testified that the 20 x 20 mile regime covered by Model 1 and Model 2 is insufficient because groundwater velocity and transport are "orders

[73] The groundwater modeling discussed in the FEIS consists of the DWRM2, Model 1, and Model 2. See Findings of Fact 1.42 to 1.44, supra. All three of these models focused on the impacts of the four groundwater production wells (active dewatering) that would be used during the operation of the LNP. These models did not focus on the impacts of dewatering during construction. (Note however that PEF employed "hydrologic and hydraulic modeling using the EPA Storm Water Management Model," FEIS at 4-20, as part of its analysis the loss of floodplain storage that might result from the construction of the LNP.) Nor did DWRM2, Model 1, or Model 2 attempt to model the impacts of passive dewatering during operation.

[74] Model 1 and Model 2 are defined at Findings 1.36 and 1.37 above.

of magnitude higher in conduits than in an assumed porous medium" and that "[v]elocities of hundreds of meters or kilometers per day are normal in conduits," id. at 17-18, and therefore the dewatering impacts could stretch beyond the 20 x 20 mile area. Id.

The Intervenors' primary witness with regard to groundwater modeling, Dr. Hazlett, agreed that Model 1 and Model 2 are unrealistic and cannot be relied upon because "significantly more site characterization would be needed." Hazlett Rebuttal at 2. These models, he said, are "fundamentally inadequate to predict groundwater behavior" because they "fail[] to take into account that the aquifers are karstic and therefore not uniform." Id. at 3. In short, he contended that the models are too simplified to generate reliable predictions. Dr. Hazlett testified that a more complex "integrated surface water and groundwater model . . . is necessary here to simulate the impacts on wetlands from the groundwater withdrawals and other changes" caused by the proposed LNP. Id. at 6. He added that such an integrated model "should also include preferential flow paths, such as fracture traces, bedding plane parallel fracture or dissolution features, or other karst conduits. The end result . . . would be a simulated cone of depression that would generally not appear radial in map view, but rather would extend outward in a 'star' pattern, seeking water both horizontally and vertically along the paths of least resistance." Id. at 7.

Dr. Hazlett then identified four "serious shortcomings" in Model 2, as follows: [1]"it cannot predict how changes will occur over time, [2] it omitted salinity interactions with the nearby barge canal from the model, [3] it is not well-suited to predict how pumping of the [Floridan Aquifer System] will affect levels or salinity in the [Surficial Aquifer], and [4] it assumes that the aquifers themselves are uniform, which they are not." Hazlett Testimony at 2. As a result of these shortcomings, Model 2 is "not a suitable tool to predict how the local wetlands . . . will be affected by the proposed pumping at LNP." Id. He noted that the FEIS reflects that there are "large" ranges in the field measured aquifer parameters that "do not match well with the values used in [Model 2]" and that these differences are a "strong indication that the model is unable to

simulate actual field conditions." Id. at 3. He acknowledged that a "model is only an approximation of reality," but added:

> [T]he more that model parameter calibration values (i.e., hydraulic conductivities) differ from measured (field) values, the less reliable predictions derived from the model become. In this case, the divergence between the calibration and the measured parameters shows that the model cannot be relied upon to predict the effects of the proposed groundwater extraction to a reasonable degree of scientific certainty.

Id.

As discussed in the prior section, Dr. Hazlett asserted that there was insufficient data about the Proposed Site to allow Model 2 to be accurately calibrated. Id. at 4. Even though Model 2 is itself a recalibrated version of Model 1, "this recalibration is insufficient for an accurate modeling of the area because it does not address the seasonal or long term temporal variability in the naturals system." Id. at 6. Dr. Hazlett stated that the FEIS modeling approach cannot "quantitatively assess impacts to wetland hydroperiods due to groundwater pumping" because "the model does not have the capacity to address various interactions with surface water (i.e., wetlands)." Id. at 7. He noted that the FEIS uses an average precipitation value of 53 inches per year at the Proposed Site whereas a "time-varying (transient) model would allow sensitivity to variation in precipitation to be investigated." Id. at 8. In addition, he stated that the "effects of climate change as discussed in the FEIS on page 2-181 should have been included in the model." Id. at 9. He concluded that the FEIS should have used a transient model rather than a steady state model. Id. at 10 ("[A] transient model could, in part, allow the FSEIS to predict the change in hydro-period that could occur, particularly during periods of drought. This is essential here for the impact on wetlands to be accurately determined.").

ii. Findings of Fact Regarding Groundwater Modeling and Modeling Assumptions

With regard to Intervenors' position that the FEIS fails to adequately assess the environmental impacts of dewatering because it relies on defective groundwater modeling and inappropriate modeling assumptions, we find as follows:

3.30 The ESRP, NRC013, provides guidance to the NRC Staff regarding the use of groundwater modeling in the NEPA process. Although the ESRP is mere guidance that is not binding on this Board, it is somewhat instructive. It states:

a. "A detailed and thorough description of the hydrologic environment is essential for the evaluation of potential impacts to the environment that may result from plant construction or operation." NRC013 at 2.3.1-6.

b. The ESRP directs the Staff to ensure that "data are sufficient to provide quantitative information on the hydrological resources potentially affecting or affected by plant construction and operation." Id. at 2.3.1-7.

c. The ESRP instructs that the FEIS should include "a summary of present and known future groundwater withdrawals on the site and for distances great enough to cover potentially affected groundwater aquifers." Id. at 2.3.2-7.

d. The ESRP instructs that the NRC Staff should obtain information for "identification and location of groundwater . . . users and areas that could be affected by project related hydrologic alterations." Id. at 4.2.1-3.

e. The ESRP instructs that the FEIS should "[e]nsure that the water users and water-use areas potentially impacted by alterations in water quantity and availability as a result of plant operation have been identified and that any impacts of reduced water quantity and availability have been identified and assessed." Id. at 5.2.2-7.

3.31 In preparing the FEIS, the NRC Staff used groundwater modeling of the LNP's State-authorized active groundwater withdrawals as a tool for evaluating the reasonably foreseeable environmental impacts of LNP operation. FEIS at 2-29, NRC Testimony at 44-45

(Vermeul, Barnhurst, Vail, Prasad). The NRC Staff reviewed both the groundwater modeling performed by PEF's consultant, CH2M HILL, in support of PEF's application for the COC from the FDEP, i.e., Model 1, as well as the recalibrated version of Model 1 required by the NRC Staff that incorporated additional site-specific data, i.e., Model 2. Id.

3.32 Both Model 1 and Model 2 derive from the DWRM2 which is used by the SWFWMD to evaluate the potential impacts of groundwater withdrawals within the SWFWMD's jurisdiction. FEIS at 2-29.

3.33 Mr. Rumbaugh, one of PEF's witnesses, designed and calibrated DWRM2 for the SWFWMD. Rumbaugh Testimony at 3, 11. DWRM2 is a numerical, regional groundwater model adapted from a USGS groundwater model code known as MODFLOW-2000. Id. at 11.

3.34 DWRM2 covers the entire SWFWMD and is designed to predict both incremental and cumulative impacts arising from new or existing water use permits. Id. at 11, 16. DWRM2 covers approximately 10,000 square miles. See id. at 11-12, Finding of Fact 1.39 supra.

3.35 A peer review of DWRM2 conducted in 2008-09 concluded that it was "well suited to evaluate ground-water withdrawal impacts to the UFA." INT105 at 7.

3.36 The MODFLOW-2000 code is widely used by hydrogeologists and water permitting authorities to simulate existing groundwater occurrence and flow, as well as to predict the effects of groundwater withdrawal on local and regional groundwater resources. Rumbaugh Testimony at 10-11.

3.37 Because DWRM2 and its individual cells (5000 ft x 5000 ft) are too large for the SWFWMD's evaluation of individual WUP applications, the SWFWMD commissioned Mr. Rumbaugh to develop software for extracting subregional models from DWRM2. Id. at 14. This software code, known as Focus Telescopic Mesh Refinement (FTMR) software, refines the grid in the vicinity of the wells proposed in a WUP application by making those cells closest to the proposed wellfield smaller than those on the periphery of the subregional model domain. The surficial boundary conditions (e.g., wetlands and rivers) from DWRM2 are then revised using a

geographic information system so that they are more accurate at the subregional model domain level. Id. An FTMR subregional model domain is usually 20 miles x 20 miles (400 square miles). Tr. at 1404 (Rumbaugh).

3.38 As part of PEF's application to the FDEP and SWFWMD for approval to operate the four proposed groundwater extraction wells at the Proposed Site, CH2M HILL, developed Model 1, a subregional groundwater model based on DWRM2. See PEF212 at 2 (CH2M HILL Revised Conceptual Wellfield Layout and Evaluation of Simulated Drawdown Impacts, Levy Nuclear Plant, October 27, 2008) (Technical Memo 74). Model 1 was created using the FTMR process, id., and it covers a domain of 20 miles x 20 miles. Lehnen Testimony at 16. See FEIS at 2-29.

3.39 In creating Model 1 from DWRM2, CH2M HILL hydrogeologists and groundwater modelers, supervised by Jeffrey Lehnen of CH2M HILL, validated DWRM2 by calibrating it against literature related to the hydrogeological characteristics of the area, as well as the results of the LNP Site characterization activity. Lehnen Testimony at 4-6. CH2M HILL personnel verified that UFA water levels within Model 1 were consistent with UFA water levels observed during LNP Site characterization activity when normal fluctuations in water levels were taken into account, and were consistent with regional descriptions of water level elevation provided by the USGS. Tr. at 1425-26 (Lehnen); FEIS at 2-27.

3.40 In creating Model 1, CH2M HILL personnel also verified DWRM2's assumption of increasing transmissivity as one moves south from the North Property across the CFBC. This verification involved both aquifer performance data (including transmissivity) from the North Property taken during LNP Site characterization activities, Tr. at 1419-20 (Lehnen), and the SWFWMD's understanding of transmissivity trends in the area. Tr. at 1465 (Lehnen).

3.41 DWRM2's assumptions regarding the increasing transmissivity as one moves South from the North Property to the South Property and across the CFBC are consistent with

the transmissivity trends shown in USGS publications, see NRC018 at 14 (Fig. 56); NRC020 at B77 (Fig. 27), as well as in other regional studies. See, e.g., NRC019 at 86 (Fig. 6.35).

3.42 In creating Model 1, CH2M HILL modified DWRM2 to better reflect the aquifer response to groundwater withdrawals. First, CH2M HILL deactivated model layers for those hydrostratigraphical layers that the 118 core borings indicated were not present at the LNP Site. PEF210 at 3. Second, CH2M HILL drew on wetlands delineation from the LNP Site characterization activity when it assigned boundary conditions for Model 1, converting cells representing wetlands from their default assignment as river cells to variable head cells. PEF212 at 3, Tr. at 1417 (Lehnen). Third, CH2M HILL added Big King and Little King Springs, which are located approximately 2 miles northwest of the LNP Site, see FEIS at 2-32 (Fig. 2-12) and approximately 6 miles from the nearest groundwater production well. See Tr. at 1146 (Vermeul). Discharges from these springs were calibrated to data compiled by the Florida Geological Survey, see PEF209, and spring drain elevations were obtained from topographical studies. Tr. at 1415-16 (Lehnen). Fourth, Model 1 extended the length of the groundwater simulation to 60 years to conform better to the expected operating life of the LNP. PEF212 at 4.

3.43 Model 1's simulation of incremental environmental impacts at withdrawal rates for an annual average pumping day of 1.58 mgd yielded no more than a 0.5 ft drawdown (relative to 2001 water levels) in the Surficial Aquifer and the UFA over both the 1 year and 60 year modeled pumping periods over substantially all of the wellfield. PEF212 at 7, 16-17. At most, the cumulative drawdown in the immediate vicinity of one of the productions wells registered a 0.6 drawdown in the UFA after 60 years. Id. at 18-19.

3.44 No wetlands within Model 1's 400 square mile model domain exhibited a cumulative or incremental impact from the LNP production wells of greater than 0.5 ft drawdown within both the 1 year and 60 year modeled pumping periods. Id. at 7, 22-23.

3.45 Model 1 predicted that groundwater withdrawals at 1.58 mgd annual average pumping rates resulted in reductions of modeled flow into Lake Rousseau and the Lower

Withlacoochee River of 0.9% and reductions in the discharges from Big King and Little King Springs of approximately 0.01 mgd or 0.3% of their total simulated flux. PEF212 at 5, 20.

3.46 Based on assumed groundwater withdrawals of 5.8 mgd during a maximum one week period (the maximum allowed under the COC), Model 1 predicted approximately 0.7 to 0.8 ft drawdown in the immediate vicinity of each production well, with the magnitude of the drawdown diminishing rapidly with distance from each well. Id. at 6-7, 21. Under this scenario, areas greater than one mile from the center of the Well Field would not be expected to experience more than a 0.1 ft drawdown. Id.

3.47 CH2M Hill did not use Model 1 to perform modeling of the impacts to springs (e.g., Big King and Little King Springs) and surface waters during the 5.8 mgd postulated maximum pumping week. Lehnen Testimony at 24.

3.48 The SWFWMD provided technical guidance and peer review to PEF and CH2M HILL in the development of Model 1 from DWRM2. FEIS at 5-7. The SWFWMD used Model 1 as a basis for the issuance of the COC and issued a "completeness determination" recommending that FDEP approve the LNP's proposed groundwater withdrawals. Id.

3.49 The Florida Siting Board's Final Order approving the COC for the LNP project adopted the reviewing administrative law judge's finding that the modeling results "demonstrate that the proposed groundwater withdrawals associated with the LNP operation will comply with the SWFWMD water use criteria . . . [and] would not lower surficial aquifer levels to the point of causing unacceptable adverse impacts to wetlands and other surface waters." PEF004 at 18, Exhibit A at 35. The administrative law judge added:

> Groundwater pumping for the LNP is not expected to adversely impact Lake Rousseau, the Withlacoochee River, or other streams or springs in the Project area. Groundwater withdrawals for the LNP are likewise not expected to induce saline water intrusion, cause the spread of pollutants in the aquifer, adversely impact and offsite land uses, cause adverse impacts to wetland systems, or adversely impact any other nearby uses of the water system.

PEF004, Exhibit A at 35-36.

3.50 After reviewing PEF's Environmental Report, including Model 1 as derived from DWRM2, the NRC Staff concluded that the PEF and CH2M HILL "general modeling approach and model development [is] technically sound." NRC Testimony at 36 (Vermeul, Barnhurst, Vail, Prasad). The NRC Staff did not re-run Model 1. Id.

3.51 After reviewing Model 1 the NRC Staff requested that PEF and CH2M HILL recalibrate it, stating as follows:

> [Model 1] was a submodel of the SWFWMD's DWRM2 regional groundwater flow model. Because this DWRM2 was calibrated to the USGS regional interpretation of the Upper Floridan aquifer potentiometric surface, which incorporated only limited information in the vicinity of the LNP site, a poor fit between simulated and observed heads in the vicinity of the LNP site was obtained. . . . To improve the goodness of fit over this portion of the model domain, which encompasses the proposed LNP wellfield and thus is important to groundwater-use impacts, the model was recalibrated by PEF using both site-specific and regional head data. . . . Calibration targets included in the recalibration process included (1) site water-level data, (2) water-level data from other USGS monitored wells within the model domain, and (3) additional measurement locations synthesized from the USGS potentiometric surface where no well coverage was available.

FEIS at 2-29.

3.52 PEF210, which includes the "CH2M HILL Revised Conceptual Wellfield Layout and Evaluation of Simulated Drawdown Impacts, Levy Nuclear Plant" (Nov. 24, 2009) (Technical Memo 123), describes and documents the recalibration of Model 1 and the development of Model 2. PEF210 at 2. Model recalibration was performed under steady-state conditions directly in Model 1, rather than in a new subregional model extracted from the Regional Model. Lehnen Testimony at 24-25, Rumbaugh Testimony at 17.

3.53 CH2M HILL's recalibration incorporated additional site water level data and water level data from USGS-monitored wells within the model domain, including a USGS-measured UFA water level extracted from the 2007 USGS potentiometric surface based on a well known as the T&J Ranch Well located approximately 4 miles to the northeast of the outer boundary of the LNP production wellfield. PEF216; BRD003.

3.54 The USGS data indicated that the water level measured in the UFA at the T&J Ranch Well was 69 ft, nearly 20 ft higher than the next highest observed UFA water level in the vicinity. Tr. at 1370 (Vermeul).

3.55 The T&J Ranch Well measurement of 69 ft in the UFA was intentionally excluded from Model 1 by CH2M HILL because it considered that data point anomalous and not representative of the regional UFA system. Rumbaugh Testimony at 18, Tr. at 1408-11 (Rumbaugh).

3.56 The inclusion of the T&J Ranch Well 69 ft data point as a recalibration target created a steep groundwater gradient, i.e., a change in the direction and quantity of groundwater flow, along the eastern boundary of Model 2. Lehnen Testimony at 25, PEF210 at 27. To accommodate this steep groundwater gradient, CH2M HILL made a number of adjustments within Model 2. CH2M HILL assigned high constant head boundary conditions to cells near the high point of the groundwater gradient and set local water levels just below the surface to maximize the amount of water introduced in the area by recharge. Lehnen Testimony at 25. CH2M HILL viewed this additional recharge to be unsupported by actual surface features. Tr. at 1423 (Lehnen).

3.57 In order to accommodate the T&J Ranch Well data point, CH2M HILL also reduced the values of a series of parameters throughout Model 2, including UFA transmissivity, surficial aquifer hydraulic conductivity, and leakance (the ability of water to move vertically from one aquifer to another) between the Surficial Aquifer and the UFA, in order to hold water at the high points of the groundwater gradient (created by the inclusion of the T&J Ranch Well) by inhibiting movement of water to lower points in the model of the system. Lehnen Testimony at 25.

3.58 The recalibration of Model 1 to incorporate the additional site water level data and USGS data, including the T&J Ranch Well 69 ft data point, caused Model 2 to predict that the operation of the production wellfield during the operation of the LNP would result in larger

drawdowns than were predicted by Model 1. This prediction resulted from incorporating the T&J Ranch Well data point into the Model 2, which forced the model to assume that the UFA had a lower transmissivity and a lower groundwater flow rate. This, in turn, caused the model to predict a larger drawdown in response to any groundwater withdrawals. Lehnen Testimony at 11, PEF210 at 7.

3.59 Model 2 predicted an incremental 0.5 ft drawdown (relative to 2001 water levels) in the Surficial Aquifer and UFA of a roughly 1 mile radius from the center of the production wellfield during the 1 year pumping period. PEF210 at 8, 37-38, 46. The 0.5 ft drawdown radius increased to roughly 3 miles after the 60 year modeled pumping period. Id. at 9, 42-43, 47. With respect to cumulative impacts, Model 2 yielded a 0.5 ft drawdown in the Surficial Aquifer and the UFA over roughly 1.5 miles around each of the four production wells during the 1 year pumping period, id. at 38-39, and roughly 5.5 miles during the 60 year modeled pumping period. Id. at 44-45.

3.60 Model 2 predicted an incremental 2.0 ft drawdown (relative to 2001 water levels) in the Surficial Aquifer and UFA of a roughly 0.5 mile radius from the two wells in the center of the production wellfield during the 1 year pumping period. PEF210 at 8, 37-38, 46. It predicted a drawdown exceeding 2.5 ft in a very much smaller area in the immediate vicinity of each of the four production wells. Id. These radii were the same, or smaller, after the 60 year modeled pumping period. Id. at 9, 42-43, 47. With respect to cumulative impacts, Model 2 predicted 2.0 ft and greater than 2.5 ft drawdowns in the Surficial Aquifer, and the UFA of very similar size and dimension as the incremental drawdowns. Id. at 38-39, 44-45.

3.61 The FEIS discusses DWRM2, Model 1, and Model 2 in several places. See FEIS at 2-29 to 2-31, 5-7 to 5-8, 5-16, 5-26 to 5-30.

3.62 The NRC Staff did not choose between Model 1 and the more conservative Model 2 in assessing the foreseeable environmental impacts of the proposed LNP. See NRC Testimony at 45 (Vermeul, Barnhurst, Vail, Prasad). Instead, the NRC Staff used both. Id.

3.63 The NRC Staff stated that it used Model 2 as follows:

> The NRC staff used results from [Model 2] in its assessment of groundwater-use impacts at the LNP site. . . . The staff did use results from [Model 2] to 1) assess whether the applicant's proposed groundwater usage was plausible given the current understanding of site geohydrologic conditions and 2) evaluate the magnitude of the proposed groundwater usage in relation to the local-scale hydrologic water balance. The staff also performed simplified calculations based on surface recharge estimates extracted from the DWRM2 model to compare the proposed usage with local-area recharge.

FEIS at 2-29.

3.64 The NRC acknowledged that the groundwater model predictions were subject to uncertainty and were not the sole basis of Staff's assessment of the environmental impact of the proposed groundwater pumping:

> The model results were not the sole basis of the staff's assessment. Given the complex site hydrologic conditions, including natural annual variability in groundwater level, model parameter uncertainties, and the relatively small water-level changes that have been shown in the literature to result in wetlands impacts, the staff determined that the groundwater model alone was not sufficient for supporting a definitive assessment of the impacts on wetlands. This determination is consistent with the State of Florida's groundwater-use permitting process that uses the model as a scoping-level assessment tool but relies on a State-mandated environmental monitoring program and mitigation plan to ensure no adverse impacts on wetlands.

Id.

3.65 The FEIS concludes that the operation of the LNP, including the production wellfield, would have SMALL environmental impacts on groundwater quality, as follows:

> Groundwater withdrawals from the Upper Floridan Aquifer have the potential to lower potentiometric surfaces and induce saltwater intrusion. However, due to the relatively small amount of groundwater usage for proposed LNP operations compared to the overall groundwater system water balance, and the relatively small drawdowns (less than 2.5 ft) at the wells and progressively less farther away from the wells, predicted for the LNP wellfield [citation to PEF210], lateral saltwater intrusion from the CFBC is unlikely. Simulation results indicate that groundwater will continue to discharge to the CFBC (although at a somewhat reduced rate) rather than the canal acting as a recharge boundary for the groundwater system. The potential for vertical migration of saline waters from deeper Floridan aquifer intervals also exists at the site, although a low-

> permeability carbonate rock sequence (middle confining unit) that separates the Upper and Lower Floridan aquifers should act to limit vertical migration. A wellfield water-quality monitoring program would be instituted to detect any detrimental impacts, and wellfield operations would be managed to mitigate any significant decreases in water quality. Under these geohydrologic and operational conditions, the staff concludes that operational groundwater-quality impacts would be SMALL, and mitigation beyond the FDEP Conditions of Certification would not be warranted.

Id. at 5-16.

3.66 The FEIS concludes that operation of the LNP, including the production wellfield, would have SMALL to MODERATE environmental impacts on terrestrial ecological resources, including wetlands and species listed as endangered or threatened, as follows:

> Based on the review team's independent evaluation of the LNP project, including the ER, the Site Certification Application, PEF's responses to the review team's RAIs, interactions with State and Federal agencies, the public scoping process, and the identified mitigation measures and BMPs, the review team concludes that operational impacts on terrestrial ecological resources (including wetlands and listed species) would be SMALL to MODERATE. A range is provided to account for the uncertainty that exists regarding the potential effects of groundwater withdrawal on wetlands and associated biota. The review team believes that any possible effects of groundwater withdrawals on wetlands would be temporary and localized as long as the FDEP and USACE conditions are met. Additional mitigation beyond that proposed by PEF is not warranted; however, as stated in the State of Florida Conditions of Certification (FDEP 2011a), PEF must monitor groundwater and, if adverse operational hydrological effects on wetlands are discovered, PEF must either mitigate the effects or use an alternative water source.

Id. at 5-47.

3.67 We reject the Intervenors' assertions that the groundwater models used by the NRC Staff in the FEIS are unsound because they assume that the groundwater flow is through a "homogeneous porous medium" which, they say, is an assumption that is "invalid in karstic areas," Davies Testimony at 11-12. Our rejection is based on the following grounds and findings:

a. Karstic terrains tend to be highly permeable with a relatively high transmissivity. Well-developed karstic terrains likely to contain the significant preferential pathways and conduits alleged by the Intervenors would be characterized by transmissivities of at least 250,000 to 1,000,000 feet-squared per day. This is supported by USGS publications, Tr. at 1154-55 (Barnhurst) (citing NRC020), as well as the testimony of the NRC Staff, Tr. 1154-55 (Barnhurst), the PEF witnesses, Tr. at 1418-19 (Lehnen); Tr. at 1402 (Rumbaugh), and the Intervenors' witness. Tr. at 1439-40 (Hazlett).

b. The transmissivities at the Proposed Site and its vicinity are not consistent with a highly-developed karstic terrain or with significant preferential pathways or conduits for groundwater flow.

c. Authoritative regional geologic interpretations, as well as interpretations of the LNP Site characterization work, indicate that the vicinity of the Proposed Site is particularly resistant to the sort of dissolution activities that would give rise to the preferential conduits hypothesized by the Intervenors. USGS regional transmissivity projections for the area indicate that the UFA in the area transitions from the highly dolomitized Avon Park formation to the more pure limestone Ocala formation as one moves South from the North Property through the wellfield and across the CFBC. See PEF205, Tr. at 1226-31 (Rizzo), NRC018 at 14, NRC019 at 86. USGS regional interpretations project transmissivities of only 50,000 to 100,000 feet-squared per day for the LNP Site and the immediately surrounding area, Tr. at 1169-70 (Vermeul) (discussing NRC018 at 14). This is well below the transmissivity threshold for well-developed karst formations like the Ocala formation. See Tr. at 1154-55 (Barnhurst).

d. The Intervenors have offered no persuasive evidence supporting their claims that the Proposed Site has a prevalence of dissolution activity or significant preferential pathways or conduits. Mr. Davies's testimony consisted of the application of

generalizations based on his and others' research in other areas of Florida, see, e.g., Davies Testimony at 8-10, 17, or other parts of the United States, id. at 10-11, that are characterized by much greater karst development and dissolution activity than has been shown to prevail at the Proposed Site. Mr. Davies did not claim to have review site-specific data for the Proposed Site or to have personally worked in the area of the Proposed Site. See Davies Rebuttal at 7.

e. Porous Medium Assumption: The groundwater models that are part of the FEIS analysis, including DWRM2, Model 1, and Model 2, use simplifying assumptions and do not attempt to identify or model all joints, fractures, or conduits that might be encountered within their respective model domains (e.g., 20 x 20 miles for Model 1 and Model 2). This is normal and appropriate. As even the Intervenors acknowledge, porous media models are used for making water resource decisions even at locations that exhibit well-developed karst formations, and indeed Mr. Davies testified that the porous medium assumption (like that used for the FEIS) has been used in all of the teams with which he has been associated. Tr. at 1428-29.

3.68 Groundwater models in general assume that fractures, solution channels, and similar features can be represented as porous media at the scale of the model grid cell. Rumbaugh Rebuttal at 11.

3.69 The use of a uniformly porous medium assumption like the one used in DWRM2, Model 1, and Model 2 is common and appropriate in environments like the Proposed Site. NRC Rebuttal at 7 (Vermeul, Vail, Prasad, Barnhurst). The SWFWMD uses this approach and it is standard industry practice as described in the published literature. Id. (citing NRC071 and NRC072).

3.70 Attempts to model discrete fractures, conduits, or dissolution features over an area as large as the domain of Model 1 and Model 2 would be technically difficult, and even if

successful, such a modeled result would still be subject to significant uncertainty. Id. at 7-8; see also Tr. at 1317-19 (Davies).

3.71 The FEIS acknowledges groundwater model predictions are subject to uncertainty and these models may not be used as the sole basis of the Staff's assessment of the reasonably foreseeable impacts of the LNP. See FEIS at 2-29, 5-16, 5-47.

3.72 The use of the uniformly porous medium assumption in these models is reasonable and does not bar their use by the NRC Staff to estimate the behavior of the groundwater and surface water as it will be affected by the active dewatering resulting from the operation of the LNP.

3.73 We reject the Intervenors' assertion that the FEIS is inadequate because it relies on local groundwater models that considered only a 20 x 20 square mile geographic area of interest, whereas, according to Mr. Davies, "velocities of hundreds of meters or kilometers per day are normal in conduits." Davies Testimony at 17-18. The Intervenors offered no evidence that any such conduits exist or are even likely to exist in or around the Proposed Site, much less that the groundwater is moving at the velocities hypothesized by Mr. Davies. The 20 x 20 square mile domain used in the two local-scale models, Model 1 and Model 2, are reasonable and appropriate for the purposes of the FEIS for the proposed LNP.

3.74 Integrated Model: We reject the proposition, advocated by the Intervenors, Hazlett Rebuttal at 6, that an integrated surface and groundwater model is necessary for the FEIS to assess the dewatering impacts on the wetlands caused by the groundwater withdrawals and other changes caused by the LNP. Dewatering impacts were evaluated based on the magnitude of the estimated drawdown predicted by Model 2. FEIS at 5-8. There is no conjunctive use of surface water and groundwater, and attempted use of an integrated model would not only be more difficult and more data intensive, but would have little or no likelihood of significantly changing the drawdown predictions.

3.75 Transient Model: We reject Intervenors' argument that the FEIS is inadequate because it did not use a transient groundwater model. See Hazlett Testimony at 8-10. We find that the DWRM2, on which Model 1 and Model 2 are based, is the product of transient calibration, see Lehnen Rebuttal at 9, and as such the FEIS's reliance on those models was reasonable.

c. Dewatering: Seasonal Fluctuations and Hydroperiods

i. Evidence Regarding Seasonal Fluctuations and Hydroperiods

The "hydroperiods" issue is part of the Intervenors' "overarching theme" that the "FEIS grossly oversimplifies the hydroecological conditions" in the vicinity of the Proposed Site. Bacchus Testimony at 5. The thrust of this argument is that the FEIS relies on the simplistic "average" values for various parameters such as rainfall and groundwater levels, whereas it should recognize that there are "natural fluctuations of the water table" and that the environmental impacts of dewatering will be different depending on the particular stage of the water table. Id. at 12-13.

As stated at Finding 2.4 above, Dr. Bacchus defined the term "hydroperiod" as the "natural fluctuations of the water table – the surficial aquifer." Bacchus Testimony at 12. According to her, the "three important aspects of a wetland hydroperiod are (1) the depth or stage of fluctuating ground and surface water; (2) the duration of the water level at a given depth or stage; and (3) the periodicity or seasonality of the water level fluctuations." Id. Dr. Bacchus testified that although perturbations in the level of the water table may have little impact on wetland vegetation during its normal dormant period (winter), those same perturbations can result in irreversible adverse impacts to wetlands if they occur during the active growing season for the vegetation. Id. at 12-13. The same holds true for life cycle of frogs and other amphibians. Id. at 16. She further testified that frogs require "surface water of specific depth, during a specific time of year, for a specific duration, to allow eggs to hatch" and

asserted that the "the authors [of the FEIS] fail to explain or perhaps even comprehend, that if any of the hydroperiod components (duration, extent, timing) is altered, those fluctuations can be fatal." Id.

Dr. Bacchus stated that the FEIS's failure to address seasonal fluctuations and hydroperiods may be its "most serious failing." Id. at 9.

> The fact that the FEIS does not even discuss that irreversible adverse impacts to the natural hydroperiods on the proposed LNP site and surrounding vicinity would occur from dewatering and other alterations that would be caused by construction and operation of the proposed LNP may be its most serious failing. Irreversible adverse impacts to the natural hydroperiods will result in adverse impacts to both plants and animals in wetland, upland, aquatic and coastal habitats on the proposed LNP site and surrounding vicinity.

Id.

Dr. Bacchus testified that the Proposed Site ecosystem is "already stressed from alterations in natural hydroperiods." Id. at 10. She stated that the "area of the proposed LNP and surrounding vicinity is a highly complex and sensitive ecological area where plants and animals . . . depend upon natural seasonal fluctuations and periods of drought" and that these animals and plants are "not adapted to the results of man-induced alterations of the natural hydroperiod." Id. at 14. She asserted that the FEIS focuses on "long term averages" when discussing water availability and that "hydroperiods, and their importance, are nowhere meaningfully discussed in the FEIS." Id. at 15. She stated that it is "ironic that . . . the PEF Wetland Mitigation Plan [INT364]" is the only place where the hydroperiods issue is "clearly spelled out." Id. at 17. Focusing on the risk that dewatering will cause salinization, Dr. Bacchus stated that "impacts to the natural hydroperiods cannot be quantified accurately" if more data is not collected and that the FEIS analysis "should have been more finely tuned." Id. at 20. Dr. Bacchus reiterated that "underlying karst features . . . and other karst conduits . . . have not been considered and accurately identified" and, as a result the "FEIS does not properly address passive and active dewatering and aquifer flow issues that affect natural hydroperiods." Id. at

24. "This is a critical failing because without accurately assessing the changes to natural hydroperiods, there is no way for affected agencies, such as the [USFWS] and [EPA], in evaluating the impacts of the proposed LNP to know that the plants and animals at Levy will be affected." Id.

Turning to cumulative environmental impacts, Dr. Bacchus stated that the FEIS is subject to a "fatal flaw" because it fails to consider the cumulative impacts to natural hydroperiods combined with the impacts of climate change. Id. at 63. The FEIS is objectionable because it assumes "average precipitation, weather conditions and water withdrawals" and it presumes that the 8-foot variability in groundwater levels observed on the Proposed Site are the "normal seasonal variability". Id. at 62-63. She suggested that the FEIS should use a normal seasonal variability based on "conditions that preceded hydroperiod alterations in the LNP vicinity from existing" activities in the vicinity such as mines, excavations, groundwater extractions, surface water impoundments and the "original ground elevation." Id. at 63-64. She stated that "the '8 foot fluctuations' reported in the FEIS (p 5-5) support my conclusion that LARGE hydroperiod alterations have already occurred at the proposed LNP site and surrounding vicinity." Id. at 64-65. She concluded that "[e]ven if the seasonal variability under baseline conditions was 8 ft, an additional 0.5 ft alteration of that seasonal variability could prove fatal to the ecosystems and associated organisms in the 3-mile drawdown predicted in the vicinity of the proposed LNP during the normal dry season and during periods of drought." Id. at 65.

Dr. Hazlett, testifying for the Intervenors with regard to the inadequacies of the groundwater modeling, agreed with the proposition that the FEIS needs more precision with regard to seasonal fluctuations. He asserted that the recalibration that was used to develop Model 2 is "insufficient for an accurate modeling of the area because it does not address the seasonal or long term temporal variability in the natural system. At a minimum, a transient calibration with time-varying rainfall should have been performed." Hazlett Testimony at 6.

ii. Findings of Fact Regarding Seasonal Fluctuations and Hydroperiods

With regard to Intervenors' allegations that the FEIS relies on the simple "average" values for various parameters such as rainfall and groundwater levels, and does not adequately consider seasonal fluctuations and hydroperiods, the Board makes the following finding of fact:

3.76 The FEIS discusses the environmental impacts of the proposed LNP on wetlands during the period of construction, FEIS at 4-31 to 4-35, during the period of operations, id. at 5-26 to 5-31, and for cumulative impacts, id. at 7-20 to 7-29.

3.77 Much of the site, especially the planned reactor location, has been in intensive forest plantation for over a century. The natural vegetation and configuration of the land surface have been significantly altered by these operations. FEIS at 2-5. Reference to "natural" hydroperiods thus is largely inapplicable.

3.78 Hydroperiod issues are addressed in the COC (PEF005A at 25, 31, 79-81), the Basis of Review (BOR) (PEF006 at Chapter 3, Page 4), the EMP (PEF305 at 11, 16, 23, 51, 55), and SWFWMD's *Literature Review on the Effects of Groundwater Drawdowns on Isolated Wetlands* (NRC041), all of which are used in the FEIS to assess wetland impacts.

3.79 Baseline environmental monitoring data, including wetland hydroperiods and stage duration curves, are used to establish minimum flows and levels (MFL) requirements to characterize the potential for a proposed groundwater drawdown to cause unacceptable harm to wetlands. PEF305 at 16. The approach for estimating this MFL threshold uses hydrologic statistics of the water level records combined with measures of ecological health. Dunn Rebuttal at 3-4. Because the MFL is based on baseline monitoring data and records of water levels and ecological health over a period of time, it inherently includes seasonal effects. PEF305 at 17-18.

3.80 The threshold MFL used by SWFWMD is a drawdown of 0.5 ft. Dunn Testimony at 16. SWFWMD has previously used a "de facto standard" of 1-foot drawdown for one month under conditions of 90 days without recharge. NRC041 at 30. The SWFWMD literature review

specified that adverse wetland impacts could be identified with drawdown ranging from 0.6 to 1 foot. Id.

3.81 The SWFWMD review standards for water use permitting include limits on wet season water levels, wetland hydroperiod deviations, and wetland habitat function, which assure that groundwater withdrawals cannot cause unacceptable adverse impacts on wetlands. FEIS at 5-30. This is discussed in Section IV.A.3.g below.

3.82 Due to complex site hydrologic conditions, the NRC Staff determined that the groundwater modeling alone is not sufficient for supporting a definitive assessment of the impacts on wetlands. Id. at 2-29. Model 2 was used to assess, based on current understanding of site geohydrologic conditions, whether proposed groundwater use was plausible and to evaluate the magnitude of the proposed groundwater use on the local-scale hydrologic balance. Id. The FEIS acknowledges that "operational impacts from groundwater withdrawal to wetlands on and around the LNP site could affect the hydrological and hence ecological properties of wetlands within a localized area." Id. at 5-30. However, if adverse environmental impacts on wetlands are predicted or detected, PEF would be required either to mitigate the adverse impacts or implement an approved alternative water supply project. Id.

3.83 Model 1 predicts a drawdown of 0.4 to 0.5 ft near the LNP production wellfield. FEIS at 5-27. Thus, Model 1 predicts no wetlands will be impacted.

3.84 Model 2 predicts a drawdown exceeding 0.5 ft extending 3 miles from the LNP production wellfield. Id. Thus, Model 2 predicts wetland impacts would exceed the SWFWMD threshold. FEIS Table 5-2 presents a breakdown of wetlands in locations with drawdown exceeding 0.5 ft.

3.85 The DWRM2, which is the basis for Model 1 and Model 2, is the product of a transient calibration based on over 1,000 measuring points over an eight-year time period. Lehnen Rebuttal at 9.

3.86 Groundwater modeling simulations using DWRM2, Model 1, or Model 2, will give the same drawdown predictions whether the user assumes a transient time-varying rainfall or assumes a steady-state long-term average rainfall. Rumbaugh Rebuttal at 8. Because of "super position," the drawdown (difference in predicted water levels caused by the LNP production wellfield) does not depend on whether a steady-state or transient model is used. Tr. at 1411-12.

3.87 Intervenors offer no explanation to support their assertions that ecosystems in the vicinity of the Proposed Site are already hydrologically stressed due to decreasing water levels. Long-term groundwater monitoring records from the USGS Goethe Road well (PEF220), located 1 mile from the site, do not show any trend in groundwater levels. Lehnen Rebuttal at 4-5.

3.88 Long-term drought impacts are addressed in the FEIS given that SWFWMD developed its wetland drawdown protection criteria based on ecosystem studies with 6 to more than 30 years of hydrology data. Dunn Rebuttal at 9-10; PEF305 at 17.

3.89 We reject the Intervenors' assertion that possible impacts on hydroperiods due to the presence of conduits and preferential flow paths have not been addressed within the FEIS, because Intervenors have not provided persuasive evidence demonstrating existence of such pathways in the vicinity of the Proposed Site.

3.90 Reductions in flow to the Withlacoochee River and Lake Rousseau are small compared to long-term average. FEIS at 5-8. No evidence is provided by Intervenors on how such reductions in flow would impact hydroperiods. Dunn Rebuttal at 9.

3.91 SWFWMD's review criteria for evaluating potential impacts include "[w]etland hydroperiods shall not deviate from their normal range and duration to the extent that wetland plant species composition and community zonation are adversely affected." FEIS at 5-30. If adverse environmental impacts on wetlands are predicted or detected, then mitigation measures are required. Id.; see Section IV.A.3.g.

3.92 The COC requires two testing and monitoring plans: Aquifer Performance Testing (APT) (see PEF005A at 45) and an Environmental Monitoring Plan (EMP) (see PEF005A at 42). If adverse impacts are detected through the APT Plan or the EMP, then either mitigation measures are implemented or PEF must identify an alternative water supply (AWS). PEF005A at 43. These monitoring and mitigation plans are discussed more fully below in Section IV.A.3.g.

d. Dewatering: Passive Dewatering Impact Analysis

i. Evidence Regarding Passive Dewatering Impact Analysis

A principal concern expressed by the Intervenors is the impact of water withdrawal from the Levy site by active and passive dewatering during construction and operation of the proposed LNP. Dr. Bacchus stated that the withdrawal would have a more substantial and irreversible adverse effect on wetlands, wildlife habitat, the aquatic environment, and endangered and threatened species than the FEIS presents. Bacchus Testimony at 4. She asserted that passive dewatering will occur "from capture and impoundment of water in the stormwater ponds; evaporative loss from the stormwater ponds, ditches, swales and other features to reroute water; alteration of historic sheet-flow via 'stormwater management'; disruption in the existing preferential flow pathways caused by the huge nuclear islands." Id. at 10.

Dr. Bacchus asserted that the FEIS fails to address the impact of excavating the nuclear islands and then filling them with concrete. Id. at 28. She noted that these islands extend down approximately 100 ft below ground level, and argued that excavating to a depth of 100 ft for construction of these islands would have a LARGE adverse effect on groundwater flow with respect to altered hydroperiods and environmental impacts. Id. Dr. Bacchus argued that the excavation itself would result in adverse impacts to hundreds of acres of wetlands directly, indirectly, and cumulatively by altering the natural flow of surficial and Upper Floridan Aquifers,

which will affect the hydroperiods of the surrounding vicinity. Id. at 28-29. She contended that the nuclear islands themselves would each be composed of impermeable concrete approximately an acre in area and 100 ft in depth and would significantly and permanently alter the natural flow of groundwater through the proposed LNP site, and thus the natural hydroperiods. Id. at 29. In his testimony, Mr. Still also stated that he is concerned that construction of the nuclear islands and pumping of groundwater could disturb existing flow paths, and cause passive dewatering. Still Testimony at 3.

Dr. Bacchus also expressed her opinion that the FEIS fails to account for evaporative dewatering from stormwater ponds. She stated that numerically, evaporative loss is estimated at 46 to 50 inches per year compared to the average rainfall of 53 inches per year, which is only slightly more than the rate of evaporation. In her opinion, the recharge from rainfall is inadequate during periods of drought or during the dry season to compensate for evaporation from the stormwater management ponds. Bacchus Testimony at 29-30. Dr. Bacchus took issue with the FEIS statement that loss associated with evaporation from these ponds would be smaller than a natural system such as an equivalent-sized saturated wetland due to the additional loss due to transpiration in the wetland. She maintained that this FEIS statement confuses the effects of transpiration with evaporation, and hence underestimates the effect of evaporation during dry periods. Id. at 30.

ii. Findings of Fact Regarding Passive Dewatering Impact Analysis

With regard to Intervenors' allegations that the FEIS fails to adequately assess the impact of passive dewatering, and therefore that the FEIS is inadequate, the Board makes the following findings of fact:

3.93 The landscape and stormwater drainage systems are described in section 3.2.2.1 of the FEIS. Passive dewatering impacts associated with site drainage design are discussed in section 5.3.1 of the FEIS. Stormwater runoff from the facilities will be collected in

three stormwater-retention ponds or roadway swales for treatment. These unlined retention/detention facilities would allow for aquifer recharge of stormwater by way of infiltration. FEIS at 5-26.

3.94 There are no landscape profile modifications associated with the LNP that could lead to passive dewatering. Griffin Testimony at 11-12.

3.95 The LNP must meet the requirements of SWFWMD's Basis of Review (BOR) plan (PEF006). Meeting these requirements will ensure that the stormwater system at the LNP will not result in large environmental impacts. Id. at 15-16.

3.96 The requirements of the SWFWMD BOR result in runoff flow rates at the LNP site and South Property boundary that will not exceed existing runoff rates. Id. at 16-17.

3.97 Intervenors' assertion that rainfall in dry months never exceeds evaporation lacks merit. Griffin Rebuttal at 4; NRC Rebuttal at 39 (Prasad, Barnhurst, Vail, Vermeul).

3.98 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. Griffin Rebuttal at 5.

3.99 The effect of the LNP foundation on groundwater flow is small, and groundwater elevations are not affected. Griffin Testimony at 28-29.

3.100 Because the FEIS specifically discusses impacts on passive dewatering due to changes in land cover, site drainage design, and subsurface flow near the LNP excavation, we find the FEIS discussion of these impacts to be adequate.

e. Dewatering: Climate Change and Saltwater Intrusion

i. Evidence Regarding Climate Change and Saltwater Intrusion

The Intervenors allege the NRC lacks the most basic information about the direct environmental impacts of water withdrawals for construction and operation of the LNP reactors and has no basis for making an adequate evaluation of indirect and cumulative impacts,

including but not limited to the impacts of climate change and salt intrusion. Bacchus Testimony at 58.

In his testimony on behalf of the Intervenors, Mr. Davies stated that the FEIS acknowledges sea level rise might already be contributing to wetland losses (FEIS at 7-22) without analyzing or predicting how future sea level rise will impact the Floridan Aquifer. Davies Testimony at 21. He testified that the interaction of saline and fresh water means that sea level fluctuation should also be considered when evaluating the impacts of dewatering in a karst environment, because in conduits removal of fresh water will mean more saline water entering. Id. He added that the withdrawal of groundwater for consumption upgradient of any coastal area can encourage saline intrusion inland. Id. He asserted that, given the currently stressed nature of the aquifer, all significant current and proposed groundwater extractions should be included in the modeling of the regional groundwater resources. Id. at 20-21. Dr. Hazlett testified that "[i]f sea level rises, as a climate change scenario might consider, the immediate effects are that saltwater pushes inland, both above and below ground, and the groundwater gradient would flatten." Hazlett Testimony at 9.

Similarly, Mr. Still testified for the Intervenors that he is concerned that this amount of water extraction by the LNP combined with other proposed projects could deplete the Floridan Aquifer, leading to existing wells drying up or becoming saline and that the FEIS has not accounted for all new proposed groundwater extraction in the cumulative impact analysis. Still Testimony at 3. He also noted that the FEIS used historical rainfall averages, but there are indications that drought conditions are becoming more common. Id. He expressed concern that the permitting agency and the NRC Staff have relied upon long-term rainfall records and are not looking at current conditions. Id. Mr. Still noted that page 2-21 of the FEIS indicates a reliance on approximately 53 inches of rainfall that needs to be reexamined in relation to existing conditions, not old records. Id. at 4. He stated that this statistic is no longer valid when the trend is toward less rainfall and higher temperatures, possibly due to climate change (FEIS

at 2-181). Id. He stated that a better indication would be a statistic that reflects the latest climate trends, i.e., a 5, 10, 15 year moving average to compensate for the changes. Id.

Mr. Griffin testified that he considers attempting to quantify climate change impacts on rainfall as too speculative to be included in the analysis in the FEIS because there is inadequate agreement to support any one hypothesis. Griffin Testimony at 25. He noted that researchers tend to opine that the long-term average precipitation would continue to change only slightly in Florida with climate change; perhaps a slightly lower average annual rainfall will result from higher temperatures, but precipitation could become more variable with an increase in storm intensity. Id.

ii. Findings of Fact Regarding Climate Change and Saltwater Intrusion

3.101 The FEIS notes that global climate change may induce drier springs and wetter falls. FEIS at 2-181, 5-22 to 5-24.

3.102 The FEIS also notes that changes in climate during the life of the LNP could result in either an increase or decrease in the amount of runoff and that the divergence in model projections for the southeastern United States precludes a definitive estimate. Id. at 2-181.

3.103 The FEIS does discuss the impact of global climate change on seasonal precipitation and temperature. See FEIS at 7-12, 7-22, 7-23. Consistent with Mr. Griffin's testimony, the FEIS notes, "[g]lobal climate change could result in changes in seasonal precipitation and increased temperatures. These forecasted changes have the potential to reduce surface runoff and increase evapotranspiration. Changes in climate during the life of proposed Units 1 and 2, described above, could result in either an increase or decrease in the amount of runoff; however, the divergence in model projections for the southeastern United States precludes a definitive estimate." Id. at 7-12.

3.104 The FEIS does discuss the possibility that global climate change can result in a rise in sea level that may induce saltwater intrusion in the surficial and Floridan Aquifers, id. at

7-20. The FEIS acknowledges that sea level rise may exceed 3 ft by the end of the century due to global climate change. Id. at 7-18. The FEIS also acknowledges that the increase in sea level could result in the saltwater front moving farther inland in the CFBC. Id.

3.105 When looking at long-term cumulative effects it is customary to look at average conditions given the high amount of variability in environmental inputs. Griffin Testimony at 22.

3.106 As previously noted, the karst environment in the vicinity of a LNP property consists of relic sinkholes and is not likely to have large interconnected conduits needed for intrusion of seawater as discussed by Mr. Davies.

3.107 Because the FEIS specifically discusses impacts of climate change and salt water intrusion in the area impacted by the LNP in a manner that is consistent with the level of uncertainty associated with climate change predictions, we find that the FEIS's discussion of these impacts to be adequate.

f. Dewatering: Cumulative Impacts Analysis

i. Evidence Regarding Cumulative Impacts Analysis

The Intervenors allege the FEIS ignores or downplays cumulative impacts that, together with the impacts of construction and operation of LNP, significantly threaten the health of the local environment. These cumulative impacts include mining or quarrying (including mining to be conducted for the purpose of building LNP), increased conditions of drought in the area, and water consumption by other users. Intervenors' ISOP at 2. The cumulative impacts analysis "looks at the possibility that . . . impacts may combine in such a fashion that will enhance the significance of their individual effects." Id. at 5 (citing Hydro Resources, Inc. (P.O. Box 15910, Rio Rancho, NM 87174), CLI-01-4, 53 NRC 31, 57-58 (2001)).

Mr. Davies stated that quarrying in the vicinity of the LNP may have significant effects on the flow system in the area. Davies Testimony at 20. He asserted that quarrying operations

often involve reducing the water level in the excavation, as is proposed at the LNP which can affect the flow in the area around the LNP. Id.

Dr. Bacchus stated that the FEIS ignores or downplays significant contributors to the cumulative impacts of the LNP, such as the effect of water withdrawals from the CFBC (which Dr. Bacchus refers to as the Withlacoochee Canal), on salinity levels in Withlacoochee Bay. Bacchus Testimony at 5. She stated that the FEIS also fails to analyze the cumulative effects of the proposed Tarmac mine, Knight Sand mine, and Adena Ranch on the environmental impacts of the proposed LNP. Id. at 33. In addition, she asserted that the FEIS fails to examine the cumulative effects of dewatering and other hydroperiod alterations when combined with deposition and drift of salt from the LNP cooling towers and wildfires that, while essential in maintaining important ecosystems in the vicinity of the proposed LNP, will become more destructive because of the dewatering and other hydroperiod alterations associated with the proposed LNP. Id. at 5.

ii. Findings of Fact Regarding Cumulative Impacts Analysis

3.108 Cumulative effects with incremental impacts from LNP dewatering and salt drift/deposition are described in Section 7.3 of the FEIS. FEIS at 7-20.

3.109 For the cumulative impacts analysis, the geographic area of interest for terrestrial ecology encompasses the 20-mile radius around the LNP site, plus the certified corridors for the proposed transmission lines and other offsite linear features.[75] Id. at 7-21.

3.110 The NRC Staff used a 20-mile radius because it includes water users and watersheds (such as the lower watersheds of the Withlacoochee and Waccasassa River basins) that would be expected to be affected by building and operating the LNP in this region of the Florida Gulf Coast. Id. at 7-10. As a result, the cumulative impacts analysis includes those surface waters and past, present, and reasonably foreseeable future actions/projects that

[75] For the land use impact, the FEIS uses a radius of 15 miles. FEIS at 7-7.

contribute to cumulative impacts on the surface water resources affected by LNP building and operations. NRC Testimony at 31-32 (Prasad, Barnhurst, Vail, Vermeul).

3.111 The geographical region considered by the FEIS for the aquatic ecology review for direct, indirect, and cumulative impacts included onsite permanent and seasonal shallow ponds and offsite waterbodies that would or could be affected by offsite facilities. FEIS at 2-91. Offsite waterbodies include, but are not limited to, the CFBC, Lake Rousseau, the Inglis lock and by-pass channel, the Old Withlacoochee River (OWR), the lower Withlacoochee River (LWR), the Crystal River Energy Complex (CREC) intake and discharge areas, Crystal Bay and the Gulf of Mexico offshore of Levy and Citrus Counties, (id. at 2-91) and streams and other waterbodies in or contiguous to the transmission corridors. Id. at 2-106. The NRC Staff also considered named and unnamed freshwater springs that reasonably could be potentially affected by the building and operation of LNP. NRC Testimony at 75-76 (Miracle, Masnik).

3.112 The NRC Staff evaluated the direct, indirect, and cumulative impacts of the construction activities that would be authorized with the issuance of a COL. Id. The environmental effects of preconstruction activities (e.g., clearing and grading, excavation, and erection of support buildings) are generally included as part of this FEIS in the evaluation of cumulative impacts. NRC Testimony at 18 (All).

3.113 Contrary to the assertion in Contention 4A that the Staff characterized these terrestrial impacts as SMALL, the Staff concluded that such impacts would be MODERATE for all building activities, SMALL for NRC-authorized construction, SMALL to MODERATE for operations, and MODERATE for cumulative impacts. FEIS at 4-71 to 4-72, 5-47, 7-29.

3.114 The assessment of cumulative impacts to terrestrial ecological resources, including wetlands, is presented in Section 7.3 of the FEIS. The assessment considers possible effects from the LNP project combined with other past, present, or reasonably foreseeable future impacts from the other activities listed in Table 7-1 of the FEIS at 7-3. NRC Testimony at 98 (Doub, Aston).

3.115 Based on this analysis, the NRC review team concluded that cumulative impacts from construction, preconstruction, and operations of the proposed LNP units and from other past, present, and reasonably foreseeable future actions on wildlife, important species and their habitats would noticeably alter, but not likely destabilize, terrestrial ecological resources in the surrounding landscape. FEIS at 7-28 to 7-29.

3.116 Dewatering impacts on wetlands are also considered in the evaluation of cumulative impacts on terrestrial ecological resources in Section 7.3.1. of the FEIS at 7-20 to 7-29. NRC Testimony at 87 (Doub).

3.117 FEIS Section 7.3.1 describes the cumulative impacts to terrestrial resources resulting from activities associated with the proposed LNP project in combination with other past, present, and reasonably foreseeable future activities within the geographic area of interest for these resources. FEIS at 7-21.

3.118 Additionally, in its cumulative impacts review, the NRC Staff considers impacts of offsite mines to involve passive dewatering because the mines could induce seepage of surrounding groundwater into open pits and its subsequent evaporation. FEIS at 7-4, Table 7-1, 7-20; NRC Testimony at 38 (Prasad, Barnhurst, Vail, Vermeul).

3.119 The cumulative impacts review included consideration of the proposed Tarmac King Road Mine. FEIS at 7-4, Table 7-1.

3.120 The assessment of the impacts of construction activities, as that phrase is defined in 10 C.F.R. § 50.10(a)(1), and the assessment of the combined impacts of construction and preconstruction are used in the description and assessment of cumulative impacts in Chapter 7 of the FEIS. FEIS at 7-1; NRC Testimony at 18-19 (All).

3.121 Because the FEIS specifically discusses cumulative impacts to the area surrounding the proposed LNP that is likely to be impacted by pre-construction, construction and operation of the facility, we find that the FEIS's discussion of cumulative impacts is adequate.

g. Dewatering: Reliance on COC and State Regulatory Processes

The central thrust of this element of Contention 4A is the allegation that the NRC Staff has "sidestepped [its] obligation to fairly and accurately determine the direct, indirect and cumulative effects of the LNP project" because the FEIS "invokes the [COC] conditions as substantiation that environmental harm will not occur or proof that impacts will be SMALL."[76] This argument is not a separate section of Contention 4A but instead underlies its other parts. See Memorandum and Order (Admitting Contention 4A) at 18-19 (Feb. 2, 2011) (unpublished).

The Intervenors' assertion that the FEIS reflects an "unlawful reliance on the State Regulatory Process," Intervenors' ISOP at 13, seems to have two prongs. First, the Intervenors assert that, when it evaluated the characteristics of the Proposed Site and attempted to model and assess the drawdown and other impacts that the LNP would cause, the NRC unlawfully relied on information and work done by the State of Florida and SWFWMD and failed to independently assess those impacts. Intervenors' ISOP at 13 ("NRC may not assign to a state agency its own independent responsibility under NEPA for evaluating environmental impacts"). Our findings as to the adequacy of the FEIS site characterization, section IV. A.3.a above, and the FEIS groundwater modeling and modeling assumptions, section IV.A.3.b above, address the issues raised in this prong.

The second prong of the Intervenors' "unlawful reliance" argument challenges NRC's use of COC monitoring and mitigation measures to conclude that the environmental impacts of the proposed LNP will be SMALL. The Intervenors assert:

> The NRC attempts to compensate for the FEIS' inadequate analysis of water use impacts by making a determination that the impacts will be mitigated by a

[76] Ecology Party of Florida, Green Party of Florida, Nuclear Information and Resource Service Motion for Leave to Amend Contention 4 (Nov. 15, 2010); An Amended Contention 4 (Nov. 15, 2010) at 3 (Motion Addendum).

> groundwater monitoring plan and "dewatering" plan to be reviewed by the State of Florida and approved in "Conditions of Certification" after the COL is issued.

Intervenors' ISOP at 13.

In this second prong, the Intervenors assert that, by relying on monitoring and mitigation plans that have not yet been drafted or finalized by PEF and not yet modified, finalized, and approved by the State, the true content and efficacy of the plans is currently unknown and thus NRC is "punting environmental issues into the future without addressing them in the FEIS." Id. This, they say "violates NEPA's cardinal principle that environmental impacts of agency action must be considered before the action is taken, not afterwards." Id. (emphasis in original) (citation omitted). The Intervenors assert that it is "not appropriate that Staff rely on another agency's hypothetical plans" because "[o]ne cannot take a 'hard look' at something that does not exist!" Motion Addendum at 6.

This section of the decision focuses on this second prong of the unlawful reliance argument.

Before proceeding, it is worth noting that, when we admitted the unlawful reliance issue as part of Contention 4A, we characterized it as a matter of degree:

> [I]t is clear that, in the [FEIS], the NRC is entitled to refer to "data analyses, or reports prepared by . . . competent and responsible state authorities" so long as the NRC Staff conducts an independent evaluation and takes responsibility for that information before relying on it in an EIS. Neither NEPA nor Part 51 require the NRC Staff to duplicate a current and sound environmental analysis issued by an authorized governmental agency. Nevertheless, the NRC is required to make its own independent assessment of the environmental impacts of a proposed project. The issue, which appears to be fairly raised in C-4A is whether the NRC Staff relied too heavily on the COC (and the associated, yet to be developed, Environmental Monitoring Program) and/or failed to independently assess the environmental impacts of the LNP in its DEIS.[77]

Id. at 18-19 (emphasis in original) (citations omitted).

[77] When Contention 4A was originally admitted, it challenged the adequacy of the DEIS. See Memorandum and Order (Admitting Contention 4A) at 18-19 (Feb. 2, 2011) (unpublished). When NRC published the FEIS, the contention automatically migrated and became an identical challenge to the FEIS. See Tr. at 856.

Thus, the issue to be decided here is not whether the FEIS relied on the COC mitigative measures to conclude that the environmental impacts of the LNP will be SMALL or SMALL to MODERATE, but whether the FEIS relied too heavily or inappropriately on the COC.

i. Evidence Regarding Reliance on COC and State Regulatory Processes

Intervenors' "unlawful reliance" argument relies substantially on the testimony of Dr. Bacchus. Bacchus Testimony at 69-73; Bacchus Rebuttal at 2-9. She focused on NRC's reliance on "mitigative measures" and disagrees with the proposition that that COC-imposed measures are sufficient to ensure that the environmental impacts of the proposed LNP will be SMALL. Bacchus Testimony at 68-69. Dr. Bacchus emphasized that the FEIS characterization of the impacts as "SMALL" depends on a number of "future" mitigation or monitoring measures "none of which has been developed or approved." Id. at 68. As examples, Dr. Bacchus cited to numerous COC required plans, including a dewatering plan, an erosion, sedimentation and control plan, a storm water pollution prevention plan, an environmental monitoring plan, a wetland mitigation plan, and an avian protection plan, which, she asserted, do not exist yet and/or are yet to be approved by the State of Florida. Id. at 69-70. She stated that "the potential environmental impacts of dewatering . . . salt drift and deposition, and erosion are significant" and that the "measures relied on to mitigate those impacts are important." Id. at 69. In light of this, she asserted that "the mere promise of future mitigation measures without any demonstration of what those measures will be or analysis of their effectiveness, does not support any conclusion that the environmental impacts will be SMALL." Id. As a specific example, she challenged the FEIS's confidence that groundwater monitoring required by the COC "will allow a response capable of averting adverse impacts on wetlands," FEIS at 9-250, because, she stated, at the moment, there is no approved groundwater monitoring plan and thus the effectiveness of the non-existent plan is "dubious." Bacchus Testimony at 70.

Dr. Bacchus's rebuttal testimony focused almost entirely on PEF's proposed monitoring and mitigation plans. She reiterated that the FEIS indicated that "PEF would be required to establish an Aquifer Performance Testing Plan ("APT Plan"); an Environmental Monitoring Plan ("EMP"), and if necessary, an Alternative Water Supply Plan ("AWS Plan"), but none of those plans was included in the FEIS" when it was issued on April 27, 2012. Bacchus Rebuttal at 2. She noted that "after the FEIS was released, PEF produced an APT Plan and an EMP" as attachments to the initial testimony of Dr. William F. Dunn, a witness for PEF.[78] Id. Dr. Bacchus also notes that Dr. Dunn's testimony discusses (but did not submit) the AWS Plan. Id.

Dr. Bacchus testified that PEF's proposed May 29, 2012 EMP has "significant inadequacies." Id. As "only a few examples," she stated:

> Specifically, the EMP fails to provide the precise locations that would be monitored; implies that monitoring would be confined to the proposed LNP site, excluding the surrounding vicinity; excludes monitoring of groundwater discharges and water quality from nearby springs and throughout the Gulf Hammock, such as the springs discharging along the Withlacoochee canal and King Springs; includes only on-site wetlands habitats; fails to acknowledge the existence of supply well #5 in the LNP north parcel near the adjacent red-cockaded woodpecker nesting trees; and relies on assumptions and presumptions that have no scientific basis.

Id. at 2-3.

Dr. Bacchus asserted "first" that the proposed "EMP failed to consider adequately the influence of preferential flow paths" and instead is based on the premise the groundwater wells will produce an "essentially symmetrical radial drawdown." Id. at 3.

Second, Dr. Bacchus stated that the EMP presumes that potential adverse impacts to wetlands are likely to be detected first within the near vicinity of the production wells and therefore proposes to locate the monitoring points near to the production wells. Id. at 4. This

[78] The EMP is contained in a CH2M HILL "Tech Memo Approval Form" dated May 29, 2012, entitled "Levy Nuclear Plant Well Field Environmental Monitoring Plan" and is PEF exhibit PEF305. The APT Plan is contained in a CH2M HILL "Tech Memo Approval Form" dated May 29, 2012, entitled "Levy Nuclear Plant Well Field Aquifer Performance Testing Plan," and is PEF exhibit PEF304.

presumption is invalid, she said, because of the conduits that (she posits) exist in the vicinity of the Proposed Site. Id.

Dr. Bacchus testified that, as a result of the foregoing "flawed assumptions," the EMP would "fail to detect the LARGE adverse impacts on natural hydroperiods in the area" and would "fail to detect the LARGE adverse environmental impacts, including degraded water quality, on Big and Little King Springs, and the numerous small springs discharging groundwater to the Withlacoochee canal." Id. at 4-5. She added that the "EMP is extremely significant" to the FEIS because "PEF and the NRC propose to rely so heavily on it" in concluding that the impacts would not be LARGE "because [NRC assumes] those impacts would be detected and cured before those impacts could result in irreversible harm to the environment." Id. at 5.

Dr. Bacchus stated that there are other flaws in the proposed EMP that will render it incapable of adequately evaluating environmental impacts of the proposed LNP. She asserted that "neither the models, nor the EMP and other newly submitted plans consider . . . surfacewater alterations from construction and operation." Id. at 6. Also, she said that the EMP fails to mention any "monitoring to assess the impacts from salt drift and deposition on the vegetation and water on the proposed LNP and surrounding vicinity" and that this is a "grave omission." Id. Next, she objected to the fact that the EMP specifies that "CH2M HILL will establish 'management thresholds' for mitigation measures" stating that "it is inappropriate for this critical environmental determination to be made (a) in the future, (b) without any input from regulators or the public and (c) by a private entity." Id. at 6-7. Dr. Bacchus objected to the timing of the proposed initiation of the environmental monitoring in the EMP, stating that starting the monitoring "a minimum of 2 years before operational production wells are installed" will not establish a "scientifically valid 'baseline'" because it "would not take into account alterations of the natural hydroperiods that have occurred already or would occur during construction." Id. at 7. As to the duration of the EMP, Dr. Bacchus objected to the EMP provision authorizing PEF "to request a release from the requirements of the EMP after five years of monitoring" stating

that the adverse impacts to the pond cypress wetlands may not be detected until well after five years. Id.

Turning from monitoring to mitigation, Dr. Bacchus firmly rejected the proposition that adverse environmental impacts (even if detected) can be reversed or mitigated. "By the time the effects of hydroperiod alterations from water withdrawals and other proposed LNP actions are visible, the damage to wetlands, other wildlife habitat and water quality is irreversible." Id. at 8. She stated that irreversible adverse impacts are "virtually certain to occur before adverse impacts are detected" and that "there is no evidence that adverse impacts [in this environment] can be reversed." Id.

Mr. Still, testifying for the Intervenors, raised many of the same concerns and inadequacies about the proposed EMP. He added that the "most critical failing" of the EMP is that PEF can request that it be terminated after five years. Still Rebuttal at 7. He stated that "in today's difficult economic times" even a well intentioned FDEP "will be hard-pressed to require continuation" of the EMP. Id. He stated that "unacceptable changes . . . typically take five to ten years to manifest" and that the five-year release is a "fatal loophole in the COC." Id. at 7-8. Mr. Still agreed with Dr. Bacchus that the EMP is based on an inappropriate baseline because the "baseline will be determined after the [90,000 gpd] construction well has been operating." Id. at 8. Like Dr. Bacchus, Mr. Still asserted that the EMP will not be able to detect "far field adverse impacts" because it is based on the faulty premise that impacts are most likely to occur in the near vicinity of the production wells. Id. at 9. This premise is invalid, he said, "[b]ecause of conduits, fractures and other preferential pathways." Id.

Mr. Still asserted that the proposed EMP is inadequate because it is "only concerned with detecting groundwater-pumping effects [from the 4 production wells] and not effects from other dewatering caused by construction and operation of the EMP." Id. He noted that Contention 4A is concerned with cumulative impacts and does not focus solely on dewatering caused by groundwater-pumping. Id. at 10. Mr. Still stated that "it is possible that the EMP will

miss impacts that occur along the lines of conduits." Id. Next, he noted that USACE is also reviewing the proposed LNP and that the NRC should have required the input of the USACE before issuing the FEIS. Id. at 11. Finally, he stated that he has seen "many examples of failed mitigation," especially with attempted wetland creation. Id. at 11.

Turning to the APT Plan, Mr. Still testified that "[b]ecause tracer tests are not proposed for the APT, it will not reliably find karst conduits" and thus it is not "accurate." Id. at 12. He asserted that it is necessary that NRC review the APT Plan before relying on it. Id. Mr. Still added that it is not reasonable for PEF or the NRC to rely on the "adaptive management strategy." Id. at 12-13.

ii. Findings of Fact Regarding Reliance on COC and State Regulatory Processes

Our findings of fact regarding NRC's reliance on the monitoring and mitigation measures specified in the COC cover three main topics. First, we make findings regarding the monitoring and mitigation measures that are mandated in the COC. Second, we make findings on the nature and extent to which the FEIS relies on the conditions in the COC. Third, we make findings regarding the strength and reliability of the COC monitoring and mitigation requirements.

FINDINGS REGARDING COC MONITORING AND MITIGATION MEASURES

3.122 The COC is a large document that PEF submitted in two pieces, PEF005A and PEF005B. The full title of the COC is "State of Florida Department of Environmental Protection Conditions of Certification, Progress Energy Florida Levy Nuclear Power Plant, PA08-51C, Modified January 25, 2011." PEF005A cover page. FDEP issued the COC to PEF pursuant to section 403.501 to 518 of the Florida Electrical Power Plant Siting Act. PEF005A at 1.

3.123 The COC constitutes the FDEP approval, subject to the specified conditions, of the construction and operation of the LNP. The COC states:

> PEF shall be responsible for the compliance with the conditions herein. Under the control of these Conditions of Certification PEF may construct, operate, and

> maintain two 1,150 MW (nominal) Westinghouse AP1000 nuclear reactors, makeup and blowdown pipelines and intake structures, a heavy haul road, two mechanical draft cooling towers, four 4,000 kilowatt (kW) emergency standby generators, four 35 kW ancillary emergency generators and two fire pumps, and other miscellaneous ancillary equipment.

Id. The COC also authorizes PEF to construct, operate, and maintain numerous transmission lines as a part of the LNP. Id. at 1-2.

3.124 The COC includes 97 pages of text, covering (A) "General Conditions" (including Construction Practices, Procedures for Post-Certification Submittals, Coastal Zone Consistency, Water Quality Certification, Water Discharges, Solid and Hazardous Waste, and Storage Tank Systems) (PEF005A at 1-30); (B) "Common Conditions" (including a Wetlands Mitigation Plan and certain transportation related requirements) (PEF005A at 31-33); (C) "Plant Specific Conditions" (Including Radiological Conditions, Flood Control, SWFWMD Special Conditions, Florida Fish and Wildlife Conservation Commission requirements, Levy County Requirements, and Withlacoochee Regional Planning Council requirements) (PEF005A at 34-75); and (D) Transmission Line Requirements (paralleling the conditions imposed under (C)) (PEF005A at 76-95).

3.125 In addition to its text, the COC incorporates four appendices that are permits that impose additional conditions and requirements on PEF and the LNP. The four appendices are a Prevention of Significant Deterioration Air Construction Permit (approximately 50 pages), a Florida Environmental Resources Permit (approximately 50 pages), a "Board of Trustees of the Internal Improvement Trust Fund of the State of Florida Easement No 31959 (approximately 15 pages), and a Levy County Special Exception SE 2-08 (4 pages). The COC also calls for the incorporation of an additional air quality permit and a water quality permit (Title V Air Operation Permit and National Pollutant Discharge Elimination System Water Permit, respectively) when they are issued by the relevant agencies.

3.126 The COC was issued as part of a process in the State of Florida under which the State certified the LNP site and authorized the LNP's proposed use of groundwater pursuant to

the Florida Electrical Power Plant Siting Act (FEPPSA). Title XXIX, Chapter 403, Florida Statutes §§ 403.501 – 403.539 (PEF303). Pursuant to the FEPPSA, applicants seeking to construct large electrical power plants in Florida are required to submit a Site Certification Application. Florida Statutes § 403.5064.

3.127 PEF submitted a Site Certification Application for the LNP on June 2, 2008. See PEF004, Exh. A at 3. On August 12, 2008, the Florida Public Service Commission issued a determination of need for the LNP. Id. The FDEP reviewed the Site Certification Application and on September 26, 2008 and January 12, 2009, it issued its Staff Analysis Reports proposing a compiled set of conditions of certification for the LNP. Id. at 4.

3.128 In February and March 2009, Florida Administrative Law Judge J. Lawrence Johnston held eight days of certification hearings on PEF's Site Certification Application. Id., Exh. A at 1. Twenty-two entities filed notices of intent to be parties to the certification hearing. Id. at 4-5. Fifteen additional entities petitioned to intervene. Id. at 5. The adjudication included lawyers from PEF, FDEP, Levy County, the City of Tampa, and the Southern Alliance for Clean Energy. Id. at 1-2. SACE recommended that the LNP not be certified. PEF004 at 10.

3.129 On May 15, 2009, Judge Johnston issued a 113-page "Recommended Order" recommending that PEF's Site Certification Application for the LNP be granted and approved, subject to certain conditions of certification specified by the FDEP.[79] The Recommended Order is Exhibit A to PEF004. A review of the Recommended Order reveals that the State of Florida conducted an exhaustive and diligent review of the potential environmental impacts of the proposed LNP and associated facilities and transmission line corridors. The Recommended Order reflects that the FDEP review was professional and multi-disciplinary, that the FDEP process allowed for substantial public participation, and that it was coordinated with relevant Federal, State, and local governmental entities (including the SWFWMD). The Recommended

[79] Recommended Order on Certification, State of Florida, Division of Administrative Hearings, In Re: Progress Energy Florida, Levy Nuclear Project Units 1 and 2, Case No. 08-2727EPP.

Order included findings of fact on issues such as the environmental impacts of water use, id. at 23; the cooling water intake structure, id. at 28; groundwater withdrawals, id. at 35-38; salt drift and deposition, id. at 39; stormwater management, id. at 43; and wetlands and terrestrial impacts. Id. at 49.

3.130 On August 26, 2009, the Governor of Florida, the Honorable Charlie Crist, and his Cabinet, sitting as the State of Florida Siting Board, issued a Final Order Approving Certification (Siting Board Order) which adopted Judge Johnston's Recommended Order in its entirety and approved the issuance of the certification.[80] The Siting Board Order is PEF exhibit PEF004 herein.

3.131 Pursuant to the Siting Board Order, FDEP issued the COC.

3.132 As part of the FEPPSA process, the SWFWMD recommended approval of the LNP's proposed groundwater withdrawal. See PEF ISOP at 6; PEF005A at 41-55. Under Florida law, in order to obtain an authorization to consume water, an applicant must meet a three-part test, establishing that the proposed use of water: (1) is reasonable and beneficial; (2) is consistent with the public interest; and (3) will not interfere with existing legal users. Florida Statute Title XXVIII, Chapter § 373.223 (see PEF311). To implement the State statute, the SWFWMD has adopted administrative rules from Florida Administrative Code Chapter 40D-2, "Consumptive Use of Water," which set out a series of requirements applicable to the issuance of Water Use Permits (WUP) or, in the case of the LNP, the COC (which serves as a WUP). F.A.C. Chapter 40D-2. One of these requirements is that the proposed water use "will comply with the provisions of 4.2 of the WUP Basis of Review [BOR] incorporated by reference in Rule 40D-2.091, F.A.C., regarding adverse impacts to wetlands, lakes, streams, estuaries, fish and wildlife of other natural resources." F.A.C. § 40D-2.301(1)(c). Section 4.2 of the "SWFWMD

[80] Final Order Approving Certification, State of Florida Siting Board, Recommended Order on Certification, State of Florida, Division of Administrative Hearings, In Re: Progress Energy Florida, Levy Nuclear Project Units 1 and 2, OGC Case No. 08-1621; DOAH Case No. 08-2727EPP.

Water Use Permit Information Manual, Part B, Basis of Review" (PEF313) specifies that "[t]he withdrawal of water must not cause unacceptable adverse impacts to environmental features" and identifies as relevant environmental features "surface water bodies such as lakes, ponds, impoundments, sinks, springs, streams, canals, estuaries, or other watercourses" and "wetland habitats." PEF313 at B4-1.

3.133 The COC specifies that the groundwater withdrawals from the four production wells proposed to be used during operation of the LNP will be 1,580,000 gpd. See PEF305A at 41, 44. It also reflects that PEF will use a temporary well during the construction phase of the LNP that might draw up to 90,000 gpd. Id. These limits are calculated on an annual average basis. See id. at 55.

3.134 Turning to the monitoring and mitigation conditions contained in the COC, it includes numerous such requirements, including 14 pages of conditions imposed by the SWFWMD. PEF005A at 41-55. These "SWFWMD Special Conditions" cover such topics as Environmental Impact Monitoring and Mitigation, Alternative Water Supply Implementation, Aquifer Testing and Groundwater Impact Analysis, Water Quality Sampling, and Reporting requirements. Id. In listing each of these SWFWMD conditions, the COC cites the relevant portion of the Florida Statutes, Florida Rules, Florida Code, and the SWFWMD Basis of Review.

3.135 For example, COC condition C, Subpart II. A. 9. g. reads as follows:

> Wetlands and other surface waters may not be adversely impacted as a result of the water use authorized by these conditions of certification. If unacceptable adverse impacts occur, the [SWFWMD] will request that [FDEP] modify the conditions of certification to curtail or abate the unacceptable adverse impacts, unless the impacts can be mitigated by Licensee. (Sections 373.016, 373.219, 373.223(1), F.S.; Rules 40D-2.301(1), 40D-2.381(1), F.A.C.; BOR 2.8, 4.2, 4.13, 6.2).

PEF005A at 53.

3.136 EMP Required: COC condition C.II.A.2.a.i requires PEF to develop and submit an EMP no less than 3 years prior to the use of any production well use in excess of 100,000 gpd. PEF005A at 42. The EMP must be approved by the SWFWMD. The COC specifies the

timing as to when the EMP must be submitted and when it must be implemented. Id. The EMP must be based on the SWFWMD Wetlands Assessment Procedure. As part of the EMP, COC condition C.II.A.2.v requires PEF to submit to the SWFWMD and the FDEP a comprehensive annual environmental data summary by January 1 of each year for the preceding water year (October 1 – September 30). PEF005A at 41-43. The annual monitoring report "shall assess relationships between water level fluctuations, well pumpage, atmospheric conditions, and drainage factors related to the environmental condition of the wetlands and surface waters" in the vicinity of the Proposed Site and must include statistical trend analysis of the data. Id. at 43. The annual reports are available for public inspection online through the SWFWMD's webpage. Tr. at 1524-25 (Hubbell). After five years of monitoring (following groundwater use rising to more than 1.25 mgd annual average), PEF may request to be released from such monitoring, however monitoring will not cease unless and until the SWFWMD approves this request and takes action to have the FDEP modify the COC to terminate the monitoring requirement. PEF005A at 42. In the absence of such a request, and approval, monitoring and reporting under the EMP will continue indefinitely for the life of the LNP. Tr. at 1504 (Griffin).

3.137 AWS Plan Required: COC condition C.II.A.3. requires PEF to "investigate the development of one or more alternative water supply projects to supply the water supply demands to offset all or a portion" of the 1.58 mgd allocated by the COC. PEF005A at 43. If "adverse impacts are detected or predicted" by the EMP, then PEF must either mitigate those impacts or implement an AWS project. Id. at 43-44. In the meantime, PEF is obligated to develop an AWS Plan and submit it to the SWFWMD for approval. Id. at 44.

3.138 APT Plan Required: COC condition C.II.A.4 requires PEF to develop and submit an APT Plan "for the purpose of confirming Upper Floridan transmissivity and leakance values used in Licensee's groundwater flow model [Model 1]." Id. at 45. The COC specifies the timing as to when the APT Plan must be submitted and when it must commence. Id. The APT Plan must be approved by the SWFWMD. Id. If the APT program reveals transmissivity or leakance

values that are 20% higher or lower than the values predicted by Model 1, then PEF must revise Model 1 to account for this discrepancy. Id. The COC prescribes in some detail, the appropriate modeling parameters and reporting obligations. Id.

3.139 Compliance Reports Required: COC condition C.II.A.5 requires PEF to submit compliance reports. PEF005A at 46. The reports "must contain sufficient information to demonstrate reasonable assurance that the withdrawals and use of water authorized by these conditions of certification continue to meet the substantive requirements set forth in Chapter 40D-2, F.A.C., and the [SWFWMD's] Water Use Permit Information Manual Part B, Basis of Review." Id.

3.140 WMP Required: COC condition B.I.A requires PEF to develop and submit a wetlands mitigation plan (WMP) "that fully offset[s] the functional loss, as required by 62-345, F.A.C., all impacts to jurisdictional wetlands remaining after minimization and avoidance to those jurisdictional wetlands has been demonstrated." Id. at 31. The COC specifies the timing as to when the WMP must be submitted. Id. PEF has submitted the WMP dated April 23, 2010. See Bacchus Testimony at 71.

3.141 Proposed APT Plan: Pursuant to COC condition C.II.A.4., PEF and its contractor, CH2M HILL prepared a proposed APT Plan. Dunn Testimony at 27. On April 5, 2012, PEF submitted a draft version of the proposed APT Plan to NRC, USACE, and the SWFWMD. Id. PEF revised the plan in response to comments from USACE. Id. On June 4, 2012, PEF submitted a revised version of the proposed APT Plan (dated May 29, 2012) to NRC, USACE, and the SWFWMD. Id. PEF submitted the May 29, 2012 APT Plan as exhibit PEF304 herein. PEF's proposed APT Plan must be approved by the SWFWMD and the USACE before it can be finalized and implemented. See PEF304 at 10.

3.142 Proposed APT Plan: The purpose of the APT Plan is to improve the uncertainty of Model 1's representation of the groundwater flow system by confirming the transmissivity and leakance of the UFA. Dunn Testimony at 27. The APT Plan specifies the types of tests (e.g.,

step-drawdown tests and 72 hour multi-well constant rate tests), PEF304 at 5, and the proposed locations of the monitoring wells and other monitoring spots. See id. at 7, Fig. 2. It includes three background monitoring wells proposed to be located off of the Proposed Site. See id. at 14, Fig. 3.

3.143 Proposed EMP: Pursuant to COC condition C.II.A.2.a, PEF and its contractor, CH2M HILL, prepared a proposed Environmental Monitoring Plan (EMP). Dunn Testimony at 30. On April 5, 2012, PEF submitted a draft version of the EMP to NRC, USACE and the SWFWMD. Id. PEF revised the plan in response to comments from USACE. Id. On June 4, 2012, PEF submitted a revised version of the proposed EMP (dated May 29, 2012) to NRC, USACE, and the SWFWMD. Id. PEF submitted the May 29, 2012 proposed EMP as exhibit PEF305 herein.[81] PEF's proposed EMP must be approved by the SWFWMD and the USACE before it can be finalized and implemented. See PEF304 at 10.

3.144 Proposed EMP: The purpose of the proposed EMP is "to provide a framework for monitoring the hydrology and ecology in the vicinity of the LNP site that could potentially be affected by the operation of the LNP well field." PEF305 at 6. The proposed EMP will monitor the following parameters: "water levels within the Surficial Aquifer System (SAS), wetland hydrology, wetland vegetative community composition and condition, soil profile, and regional climatic conditions." Id. at 11. The proposed EMP states:

> Monitoring data collected will be used to answer the following questions:
>
> - What are the baseline ranges of wetland hydroperiods for the systems potentially affected by well field pumpage?
> - Are wetland water levels and hyrdoperiods changing relative to baseline, and if so, are these changes the result of regional factors (such as precipitation patterns, cumulative groundwater pumping in the area, or disruption in surface water hydrology), or PEF well field pumping?
> - Is well field pumping affecting wetland water levels or hydroperiods?

[81] The formal title of the May 29, 2012 EMP is "Levy Nuclear Plant Well Field Environmental Monitoring Plan." PEF305 at 2.

- Are shifts in vegetation type occurring and are these changes due to observed decreases in hydroperiod stage and duration?
- Has there been any evidence of subsidence in wetlands attributable to groundwater pumping?
- Is well field pumpage adversely affecting wetlands?

Id.

3.145 Proposed EMP Monitoring Locations: The proposed EMP states that "[m]onitoring locations (assessment areas) will focus on wetlands within the near vicinity of the production wells where potential drawdown impacts, if any, are likely to be detected first." Id. It provides that a minimum of twelve monitoring transects will be established, seven near-field (within 2000 ft of the production wells), two far-field (between 2000 and 5000 ft of the production wells), and a minimum of three background (beyond 5000 ft). Id. at 12. All monitoring transects will be established within the LNP property boundary except for the background transects. Id. The proposed EMP specifies the proposed locations of these twelve transects. PEF305 at 13-14, Figs. 2 and 3. The final locations of the transects are subject to USACE and SWFWMD approval. Id. at 19. A "transect" is a "monitoring line" that is established and surveyed at a particular location, such as a wetland, and that typically runs from the deep area in the wetland to an upland edge of the wetland. Tr. at 1470-71 (Dunn). Sampling points, whether photographic documentation, soil sampling, vegetation monitoring, or hydrologic well monitoring, are established along the transect or line. Id. at 1470 (Dunn). Thus, each of the twelve transects proposed in the EMP will entail multiple monitoring points. The proposed monitoring parameters and frequency, for each transect, are specified in the EMP. PEF305 at 24, Table 1.

3.146 EMP Protocol: The proposed EMP specifies that monitoring of the wetlands will be conducted "using the SWFWMD and Tampa Bay Water (TBW) Wetland Assessment Procedure (WAP) (2005)." Id. at 11. That WAP is a 33-page attachment to the proposed EMP

and it titled “Wetland Assessment Procedure (WAP) Instruction Manual for Isolated Wetlands, March 2005, Prepared by: SWFWMD and Tampa Bay Water, a Regional Water Supply Authority.” Id. at 32-65.

3.147 Proposed EMP – Hydrologic Monitoring: The EMP proposes two major types of monitoring – Hydrologic and Ecological. EMP section 3.3 deals with “Hydrologic Monitoring.” Id. at 15-18. This section specifies that one Surficial Aquifer System monitoring well, one wetland piezometer, and one staff gauge will be installed at each of the twelve monitoring transects. Id. at 15. EMP section 3.3 specifies that hydrologic data will be collected during the preconstruction (baseline) period and that this baseline data will be “used to establish management threshold values, which are linked to a sequence of intervention measures designed to prevent adverse effects on wetlands.” Id. at 16-17. The EMP states that “three management thresholds [water levels] will be developed for each monitored wetland,” proposes how the “management threshold values” will be established, and states that “these management thresholds are levels at which there is concern for the wetland hydrology, but before harm is expected to occur.” Id. at 17 (emphasis added).

3.148 Pursuant to the EMP, it is PEF’s plan that if the initial management threshold is reached then a management strategy is triggered. Id. at 25; Dunn Testimony at 33. If that does not work, and the secondary management threshold is reached, then a more aggressive management strategy is triggered. PEF305 at 25; Dunn Testimony at 33. If the tertiary management threshold is reached “then groundwater pumping in the vicinity of the affected piezometer(s) will be suspended and the transition to an alternative water source will begin.” PEF305 at 26. The EMP lists the “general sequence of water level management strategies” that will be followed and implemented. Id. The SWFWMD must approve the EMP and its hydrologic monitoring program. Likewise, the SWFWMD and USACE will be notified within seven days if any of the management threshold values are reached or exceeded and will monitor the implementation of the management strategies. Id. at 29.

3.149 Proposed EMP- Ecological Monitoring: In addition to Hydrologic Monitoring, section 3.4 of the proposed EMP requires PEF to conduct "Ecological Monitoring . . . designed to identify and evaluate the ecological condition of the wetlands that might be affected by the construction and operation of the LNP well field." Id. at 18. The wetland ecological monitoring will be based on the WAP, i.e., Appendix A to the EMP. The EMP states that, "in addition to the WAP methodology for vegetative monitoring, quantitative elements will be conducted as part of this EMP. Modifications to the WAP method include increased frequency of vegetative monitoring (semi-annual), higher resolution in the collection of cover range values for vegetation strata (nearest 10 percent or better) and calculation of a Wetland Affinity Index (WAI) to estimate shifts in wetland vegetation zonation." Id. at 18. Section 3.4 of the EMP goes into considerable detail specifying the Ecological Monitoring program. Id. at 18-23.

3.150 Mitigation Required: COC Condition C.II.A.3 specifies, "If adverse impacts are detected or predicted through the [EMP] or through aquifer performance testing or groundwater modeling" then PEF "shall either mitigate such adverse impacts in accordance with a plan submitted by the Licensee and approved by the [SWFWMD] or by selecting and implementing an Alternate Water Supply [AWS] project." PEF005A at 44. In short, if adverse impacts are detected or predicted, then PEF must mitigate those impacts, by either (1) submitting and implementing a mitigation plan approved by the SWFWMD, or (2) implementing an AWS project.

3.151 Other Monitoring and Mitigation Required: In addition to the foregoing conditions, the COC establishes and mandates numerous other monitoring and mitigation conditions for the protection of the environment, including but not limited to an Avian Protection Plan, id. at 58, Manatee monitoring requirements, id., a Cross Florida Barge Canal and Withlacoochee River Survey and Monitoring program, id. at 60, and a Levy Nuclear and Crystal River Energy Complex Combined Discharge Survey and Monitoring program. Id. at 63.

FINDINGS REGARDING NATURE AND EXTENT OF FEIS RELIANCE ON COC MONITORING AND MITIGATION MEASURES

3.152 The FEIS relies on various conditions and requirements specified in the COC.

3.153 The FEIS is based upon, and relies upon, the COC provisions limiting the amount of groundwater that the LNP operational production wells may withdraw to 1.58 million gpd. See FEIS at 2-55, 3-30, 3-39, 4-22 to 4-24, 5-7 to 5-8, 5-19, 5-26, 5-28 to 5-29.

3.154 With regard to monitoring and mitigation measures, the FEIS relies on the COC requirements in several places. See id. at 2-29, 4-24, 4-71, 5-5, 5-16, 5-30, 5-44 to 5-47, and 9-250.

3.155 Section 2 of the FEIS identifies and discusses the proposed LNP's "Affected Environment." Id. at 2-1. In this section, the FEIS reviews the development of Model 1 and Model 2 which helped the Staff assess the reasonably foreseeable impact of the LNP on wetlands. Id. at 2-29. In this discussion, the FEIS frankly acknowledges that the groundwater models alone are "not sufficient for supporting a definitive assessment of the impacts on wetlands" and notes that the groundwater modeling is simply a "scoping level assessment tool" and that the FDEP and NRC also "relies on a State-mandated environmental monitoring program and mitigation plan to ensure no adverse impact on wetlands." Id. The FEIS states:

> The NRC staff used results from the recalibrated groundwater model in its assessment of groundwater-use impacts at the LNP site. The model results were not the sole basis of the staff's assessment. Given the complex site hydrologic conditions, including natural annual variability in groundwater level, model parameter uncertainties, and the relatively small water-level changes that have been shown in the literature to result in wetlands impacts, the staff determined that the groundwater model alone was not sufficient for supporting a definitive assessment of the impacts on wetlands. This determination is consistent with the State of Florida's groundwater-use permitting process that uses the model as a scoping-level assessment tool but relies on a State-mandated environmental monitoring program and mitigation plan to ensure no adverse impacts on wetlands.

Id. at 2-29. (emphasis added).

3.156 Section 4 of the FEIS addresses "Construction Impacts at the Proposed Site." Id. at 4-1. In discussing the potential hydrological alterations that might result from the construction of the LNP, the FEIS notes that the COC "require[s] PEF to develop an environmental monitoring plan, which includes a hydraulic testing program during drilling and installation of the proposed water-supply wells" and notes that the COC "require[s] that operational impacts of the LNP wellfield limit drawdowns in the surficial aquifer to levels that ensure no adverse impacts on wetlands." Id. at 4-24.

3.157 In summarizing the environmental impacts that the construction of the proposed LNP would have on terrestrial resources (which include wetlands) the NRC Staff relies, in part, on the COC imposed mitigation measures, but nevertheless concludes that even with these mitigation measures, the construction impacts would be MODERATE, at least in the short term. Id. at 4-71. The FEIS states:

> Based on the review team's independent evaluation of the LNP project, including the ER, the SCA, FDEP Conditions of Certification, PEF's responses to NRC's and USACE's Requests for Additional Information, the identified mitigation measures and BMPs, and consultation with other Federal and State regulatory agencies, the review team concludes that the impacts of construction and preconstruction activities to terrestrial ecological resources (including wetlands and threatened and endangered species) would be MODERATE. This moderate conclusion reflects the impacts on wetlands, wildlife, and Federally and State-listed species at the LNP site and the associated offsite facilities. Even with implementation of BMPs, the proposed wetland mitigation plan, and other mitigation outlined in the FDEP Conditions of Certification, the review team believes that the impacts to wetland and upland terrestrial habitats and their associated wildlife would still be noticeable in the surrounding landscape, especially in the short term. However, the review team also believes that the proposed mitigation measures, especially those in the wetland mitigation plan, would substantially offset the adverse losses to upland as well as wetland habitats in the long term. The review team therefore concludes that the terrestrial impacts resulting from the Levy project would not destabilize the continued existence of any wetland or upland habitats and associated wildlife in the surrounding landscape.

Id. (emphasis added).

3.158 Section 5 of the FEIS addresses "Operational Impacts at the Proposed Site." Id. at 5-1. NRC's discussion and assessment of the environmental impacts of the operation of the

LNP is replete with references to, and reliance upon, the monitoring and mitigation measures imposed by the COC.

3.159 Focusing on hydrological alterations that might be induced by the operation of the LNP, the FEIS recounts certain key provisions of the COC:

> The State of Florida's Conditions of Certification require PEF to develop an environmental monitoring plan, which includes a hydraulic testing program during drilling and installation of the proposed water-supply wells to obtain site-specific hydraulic property estimates and determine whether the wellfield can meet groundwater-usage requirements without significantly affecting water levels in the surficial aquifer (FDEP 2011a). The Conditions of Certification require that during operation of the LNP wellfield, PEF must limit drawdowns in the surficial aquifer to levels that ensure no adverse impacts on wetlands. Section 5.3.1.4 describes in further detail the wetlands monitoring plan. PEF is required by the Conditions of Certification to prepare an alternative water-supply plan. This plan identifies other potential sources of freshwater that could be used to meet LNP requirements.

Id. at 5-5.

3.160 Focusing on groundwater impacts that might be induced by the operation of the LNP, particularly saltwater intrusion, the FEIS relies on the COC mitigation and monitoring requirements in concluding that such impacts would be SMALL:

> Groundwater withdrawals from the Upper Floridan aquifer have the potential to lower potentiometric surfaces and induce saltwater intrusion. However, due to the relatively small amount of groundwater usage for proposed LNP operations compared to the overall groundwater system water balance, and the relatively small drawdowns (less than 2.5 ft at the wells and progressively less farther away from the wells) predicted for the LNP wellfield (PEF 2009e), lateral saltwater intrusion from the CFBC is unlikely. . . . A wellfield water-quality monitoring program would be instituted to detect any detrimental impacts, and wellfield operations would be managed to mitigate any significant decreases in water quality. Under these geohydrologic and operational conditions, the staff concludes that operational groundwater-quality impacts would be SMALL, and mitigation beyond the FDEP Conditions of Certification would not be warranted.

Id. at 5-16.

3.161 Turning to impacts on wetlands that might be induced by the operation of the LNP, the FEIS relies heavily upon the COC monitoring and mitigation measures. The FEIS states that the groundwater models developed to predict such impacts are valuable, but openly acknowledges that "groundwater models are subject to many limitations and their results should

be viewed with a degree of uncertainty." Id. at 5-27. In light of this uncertainty, the FEIS relies upon the COC as follows:

> Because of the inherent uncertainty that exists with groundwater models, and to ensure that the proposed use of groundwater for the LNP project does not cause adverse impacts on wetlands and surface waters, the State of Florida imposed the following conditions in the final site certification issued under the [FEPPSA] (FDEP 2011a), to which PEF has committed:
>
> - Aquifer Performance Testing (APT) Plan that includes hydraulic testing during drilling and construction of the proposed water-supply wells to obtain site-specific hydraulic property estimates and determine whether the wellfield can meet groundwater-usage impacts without significantly affecting water levels in the surficial aquifer.
>
> - Alternative Water Supply Plan to investigate the feasibility of developing alternative water supply projects to offset groundwater use.
>
> - Environmental Monitoring Plan (based on the SWFWMD Wetland Assessment Procedure) to assess the relative biological and physical condition of surface waters and wetlands in areas potentially affected by groundwater withdrawals.
>
> In accordance with SWFWMD's review criteria, groundwater withdrawal cannot cause unacceptable adverse impacts on wetlands or other surface waters. The SWFWMD performance review standards applicable to the Environmental Monitoring Plan, upon which potential impacts on wetlands would be judged, include the following (as summarized from PEF 2009g):
>
> - Wet season water levels shall not deviate from their normal range.
>
> - 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.
>
> - Wetland habitat functions, such as providing cover, breeding, and feeding areas for obligate and facultative wetland animals, shall be temporally and spatially maintained and not adversely affected as a result of withdrawals.
>
> - Habitat for threatened or endangered species shall not be altered to the extent that use by those species is impaired.
>
> Considering the uncertainty associated with existing groundwater modeling for the LNP site, operational impacts from groundwater withdrawal to wetlands on and around the LNP site could affect the hydrological and hence ecological properties of wetlands within a localized area (see Table 5-2 and Figure 5-5). However, if adverse environmental impacts on wetlands and surface waters are predicted or detected through wellfield APT, revised groundwater modeling, or environmental monitoring of wetlands, PEF would be required either to mitigate the adverse impacts or implement an approved alternative water-supply project

> (FDEP 2011a). PEF has performed an analysis of alternative sources of water that demonstrates that alternative sources of water are technically feasible if it is necessary to rely on those alternatives because monitoring reveals significant drawdown impacts on wetlands caused by groundwater withdrawal. Alternative sources could include contributions from seawater desalination by reverse osmosis, stormwater, reclaimed municipal wastewater, municipal water supply, recycling of process water, and brackish water from deep underground wells (PEF 2011a).
>
> If PEF addresses any wetland impacts from groundwater withdrawal by mitigation rather than implementing an alternative water-supply project, it is unlikely that these hydrological alterations would contribute to an increased risk of wildfire in the LNP vicinity. Groundwater drawdown exceeding 0.5 ft that could adversely affect wetlands would be localized, and limited to a total area (upland as well as wetland) of about 7300 ac based upon the recalibrated groundwater model (Figure 5-5). Furthermore, the fire risk in parts of the surrounding area would be reduced through the restoration of a more natural fire regime, as proposed under the applicant's wetland mitigation plan for the LNP project (Entrix 2010). These controlled burns would act to reduce fuel loads in upland and wetland areas on and around the LNP site. If wildfires unexpectedly occur around the LNP project, rapid fire response would be expected, drawing from both onsite (LNP) and offsite fire-protection resources.

Id. at 5-30 to 5-31.

3.162 Turning to the potential impacts on terrestrial resources that may result from the operation of the LNP, the NRC places substantial reliance on the COC monitoring and mitigation measures. The FEIS devotes a subsection to terrestrial monitoring, FEIS § 5.3.1.4 "Terrestrial Monitoring" at 5-44 to 5-45, relying entirely on the monitoring imposed by the FDEP COC, and the USACE. It states, in pertinent part:

> A State Condition of Certification by FDEP (2011a) would require PEF to develop and implement an environmental monitoring plan to evaluate the relative condition of surface waters and wetlands in areas potentially affected by operational groundwater withdrawals. Monitoring would be required for a minimum of 5 years following groundwater use rising to more than 1.25 Mgd. Monitoring results are to be submitted annually to the SWFWMD for compliance review.
>
> If ongoing environmental monitoring, APT, or groundwater modeling predict or detect adverse environmental impacts, PEF would be required to either mitigate the adverse impacts on wetlands or implement an approved alternative water-supply project (FDEP 2011a).
>
> The USACE is continuing its evaluation of groundwater withdrawal for service water for plant operations. If PEF can demonstrate to the USACE that operational groundwater withdrawals at the LNP site would not result in greater

> adverse impacts on wetlands in comparison to practicable alternative sites or to practicable alternatives to groundwater withdrawal for operational water supplies at the LNP site (such as desalination), then the LNP site with groundwater withdrawals could be acceptable as the Least Environmentally Damaging Practicable Alternative (LEDPA). At this time, PEF is developing a groundwater testing and monitoring plan in order to demonstrate to the USACE that the LNP site with groundwater withdrawal for service water for plant operations would be the LEDPA. The groundwater testing and monitoring plan must be submitted by PEF to the USACE for USACE's review and approval before a Department of the Army (DA) permit could be issued. If PEF's groundwater testing and monitoring plan receives USACE approval, implementation of the plan would be required by special conditions of a DA permit, if issued. The USACE's final evaluation of the proposed project and final decision whether to issue a USACE permit will be documented in a separate USACE ROD after issuance of this EIS. USACE's ROD will reference information in this EIS and present any additional information required by the USACE to support its permit decision.
>
> A Condition of Certification by the FDEP (2011a) would also require PEF to prepare an Avian Protection Plan in coordination with the FFWCC and other potentially interested agencies. The plan must detail a program to reduce the operational risk to birds posed by the LNP project, with the goal of reducing avian mortality. An important part of this plan would include a monitoring system to document bird mortalities along transmission lines. This information would be used to identify avian problem areas and potential or known high risks.
>
> Monitoring for Federally and State-listed species may be required to meet conditions stipulated by the FWS and the FFWCC, either associated with the Endangered Species Act of 1973, as amended (ESA), or for State permits to take or relocate State-listed species.

Id. at 5-44 to 5-45.

3.163 In its summary of the operational impacts of the LNP on terrestrial resources, the NRC relies on these monitoring and mitigation measures to conclude that the impacts would be SMALL to MODERATE:

> Based on the review team's independent evaluation of the LNP project, including the ER, the Site Certification Application, PEF's responses to the review team's RAIs, interactions with State and Federal agencies, the public scoping process, and the identified mitigation measures and BMPs, the review team concludes that operational impacts on terrestrial ecological resources (including wetlands and listed species) would be SMALL to MODERATE. A range is provided to account for the uncertainty that exists regarding the potential effects of groundwater withdrawal on wetlands and associated biota. The review team believes that any possible effects of groundwater withdrawals on wetlands would be temporary and localized as long as the FDEP and USACE conditions are met. Additional mitigation beyond that proposed by PEF is not warranted; however, as stated in the State of Florida Conditions of Certification (FDEP 2011a), PEF must monitor groundwater and, if adverse operational hydrological effects on wetlands

> are discovered, PEF must either mitigate the effects or use an alternative water source.

Id. at 5-47 (emphasis added).

FINDINGS CONCERNING STRENGTH AND RELIABILITY OF COC MONITORING AND MITIGATION MEASURES

3.164 As set forth above, the COC was issued by the FDEP as part of a comprehensive, multi-disciplinary, and mutli-agency environmental review process that is well established and that included the participation of numerous members of the public. The COC is authorized and undergirded by a complex of detailed State statutes, regulations, procedures, and compliance guidelines. Major governmental entities, with substantial expertise in environmental matters, such as the FDEP and SWFWMD, took a large role in the development of the conditions of the COC and these same agencies can reasonably be expected to play a continuing and active role in assuring that PEF implements and complies with the COC requirements.

3.165 The COC mandate that PEF be limited to 1.58 million gpd annual average total pumpage on the four proposed LNP groundwater production wells is a firm and enforceable legal requirement imposed by the FDEP and SWFWMD and it was reasonable for the FEIS to base its analysis upon that limitation.

3.166 The COC mandates that PEF develop and implement multiple environmental monitoring programs during the construction and operation of the LNP constitute firm and enforceable legal requirements imposed by the FDEP and SWFWMD.

3.167 The COC mandates that PEF design and develop an EMP. The COC specifies many of the requirements for the required EMP and mandates that PEF follow various state regulations, manuals, and procedures in developing the EMP. The PEF proposed EMP will be reviewed by FDEP, SWFWMD, and USACE and must be approved by them before it is implemented.

3.168 Although the COC identifies a substantial number of criteria that the EMP must satisfy, a final and approved EMP does not yet exist. PEF has developed a proposed EMP dated May 29, 2012, that has been sent to the FDEP, USACE, and SWFWMD. See PEF305. The proposed EMP specifies, in substantial detail, the environmental monitoring program that PEF believes meets the requirements of the COC. For example, the EMP proposes the number and location of various monitoring wells and transects, the frequency of the monitoring activities, the reporting regime and the management threshold values that would be used to assess whether and when mitigation actions must be taken. The May 29, 2012 proposed EMP has not been approved by the SWFWMD, FDEP, or USACE at this time. It is reasonable to expect that the proposed EMP will be modified and adjusted before it becomes final and is approved.

3.169 The NRC did not review the May 29, 2012 proposed EMP before it issued the FEIS on April 27, 2012. Tr. at 1528-29 (Doub, Prasad). The NRC Staff stated that it did not need to review the final and approved EMP for purposes of the FEIS because the COC provisions concerning the EMP and the State and local legal, regulatory, and procedural requirements that underlie it, are highly prescriptive. See Tr. at 1532-33 (Doub).

3.170 Intervenors' assertion that the FEIS is inadequate because "the EMP fails to provide the precise locations that would be monitored," Bacchus Rebuttal at 2, is rejected. First, the proposed EMP does indeed provide specific proposed locations that would be monitored (e.g., the locations of the twelve transects). See PEF305 at 13-14, Figs. 2 and 3. Second, although the monitoring locations specified in PEF's proposed EMP might very well change or be modified before the EMP is duly approved by the SWFWMD and USACE, there is a reasonable degree of confidence that these regulatory agencies will assure that the ultimate monitoring locations are appropriate.

3.171 Intervenors' assertion that the FEIS is inadequate because under the EMP "monitoring would be confined to the proposed LNP site," Bacchus Rebuttal at 2, is rejected. First, the proposed EMP proposes that several of the monitoring locations be located off of the

LNP Site and off of the Proposed Site. See PEF305 at 13-14, Figs. 2 and 3. Second, because although the offsite monitoring locations specified in PEF's proposed EMP may very well change or be modified before the EMP is duly approved by the SWFWMD and USACE, there is a reasonable degree of confidence that these regulatory agencies will assure that the ultimate EMP includes an appropriate number of offsite monitoring locations.

3.172 Intervenors' assertion that the FEIS is inadequate because the EMP "excludes monitoring of groundwater discharges and water quality from nearby springs . . . such as the springs discharging along the Withlacoochee canal and King Spring," Bacchus Rebuttal at 3, is rejected. First, the evidence reflects that there are no springs on the Proposed Site. See Findings of Fact 3.9, 3.10; see also FEIS at 2-32, Fig. 2-12. Second, the evidence indicates that the water seeping from the north bank of the deep cut represented by the CFBC or, as Intervenors would have it, the "Withlacoochee canal," are merely small seeps and do not represent conduits or preferential pathways. See Finding of Fact 3.20. Third, the Big King and Little King Springs are located approximately six miles from the proposed wellfield, Tr. at 1146 (Vermeul), and the evidence does not support the conclusion that they will be affected by the LNP.[82]

3.173 Intervenors' assertion that the FEIS is inadequate because the EMP "fails to acknowledge the existence of supply well #5," Bacchus Rebuttal at 3, is rejected. Supply well number 5 is a small well that will only operate during the construction phase of the LNP, is limited to 90,000 gpd, and is not likely to cause environmental impacts.

3.174 Intervenors' assertion that the FEIS is inadequate because the EMP "failed to consider adequately the influence of preferential flow paths," Bacchus Rebuttal at 3, is rejected because, as set forth in section IV.A.3.a above, the Intervenors have not shown that any

[82] While we do not find that the FEIS is inadequate for its reliance on the EMP, which does not currently propose to monitor the Big and Little King Springs, we recommend that PEF place one of the three "background" monitoring wells provided for by the EMP in the vicinity of those Springs.

significant preferential flow paths exist in the vicinity of the Proposed Site and the reasonable weight of the evidence suggests that they do not. Further, if such preferential flow paths exist, the monitoring imposed by the COC (the EMP in combination with the APT Plan) is likely to identify them.

3.175 Intervenors' assertion that the FEIS is inadequate because the EMP assumes that potential adverse impacts to wetlands are likely to be detected first within the near vicinity of the production wells and therefore proposes to locate the monitoring points near the production wells, id. at 4, is rejected for the same reasons specified in the preceding paragraph.

3.176 Intervenors' assertions that the FEIS is inadequate because the EMP has "flawed assumptions" that would cause it to fail to detect LARGE adverse impacts to natural hydroperiods, id., or because it fails to consider surface water alterations, have been addressed supra and are rejected. Id. at 6. Likewise, Intervenors' assertion that failure of the EMP to address the impacts of salt drift and deposition is a grave omission, id., is rejected because, as is discussed in section IV.B below, we find that the impacts of salt drift and deposition will be minimal and were adequately discussed in the FEIS.

3.177 Intervenors' assertion that the FEIS is inadequate because the EMP allows a "private entity" (i.e., PEF) (1) to set the management thresholds that will be used to evaluate whether mitigation measures should be implemented and (2) to determine whether those management thresholds have actually been met so as to trigger the mitigation measures, id. at 6-7, is rejected. The proposed EMP is, in all respects, subject to the review, modification and approval of the SWFWMD and USACE. These expert governmental agencies will evaluate and determine what "management thresholds" should be in the EMP and will be involved in the assessment as to whether those thresholds are reached or exceeded.

3.178 The Intervenors' assertion that the FEIS is inadequate because the EMP authorizes PEF to request the discontinuation of the EMP after five years of monitoring, id. at 7, Still Rebuttal at 7, is rejected. First, if the environmental impacts of the LNP project are as dire

as the Intervenors suggest, then it seems that they would begin to manifest themselves within 5 years and that the EMP and other monitoring mandated by the COC will detect them. Second, even if PEF requests the termination of the EMP at the five-year point, no such termination will occur unless and until the SWFWMD approves it. Third, we have reasonable confidence that the SWFWMD will diligently review any such request to terminate the EMP and will decline to do so if there is any inkling that the monitoring will detect or predict future adverse environmental impacts. Fourth and finally, given the fact that the public, including the Intervenors, can monitor and comment on any request to terminate the EMP, we have additional assurance no such termination will be made without due and proper consideration.

3.179 The Intervenors' assertion that the FEIS is inadequate because even if the EMP detects adverse environmental impacts, they will be irreversible and mitigation will be ineffective, Bacchus Rebuttal at 8, is rejected. First, the management thresholds, as contained in the proposed EMP, are set at water levels (not adverse impact levels) and these are water "levels at which there is concern for wetland hydrology, but before harm is expected to occur." PEF305 at 17. Second, the FEIS reliance on monitoring and, if necessary, mitigation, is reasonably well-founded, and we are not convinced, as Intervenors suggest, that these measures will be ineffective.

3.180 Turning to another monitoring provision, the COC mandates that PEF design and develop an Aquifer Performance Testing (APT) Plan. The COC specifies many of the requirements for the required APT Plan and mandates that PEF follow various state regulations, manuals and procedures in developing the EMP. The PEF proposed APT Plan will be reviewed by FDEP, SWFWMD, and USACE and must be approved by them before it is implemented.

3.181 Although the COC identifies a substantial number of criteria that the APT Plan must satisfy, the APT Plan does not yet exist. PEF has developed a proposed APT Plan dated May 29, 2012, that has been sent to the FDEP, USACE, and SWFWMD. See PEF304. The

proposed APT Plan specifies, in substantial detail, the aquifer performance testing program that PEF believes meets the requirements of the COC. The May 29, 2012 proposed APT Plan has not been approved by the SWFWMD, FDEP, or USACE at this time. It is reasonable to expect that the May 29, 2012 proposed APT Plan will be modified and adjusted during the approval process before it is final and approved.

3.182 The NRC did not review the May 29, 2012 proposed APT Plan before it issued the FEIS on April 27, 2012.

3.183 The COC mandates that PEF design and develop an Alternate Water Supply (AWS) Plan. The COC specifies many of the requirements for the required AWS Plan and mandates that PEF follow various state regulations, manuals, and procedures in developing the AWS Plan. PEF's proposed EMP will be reviewed by SWFWMD and must be approved by it before the AWS Plan is implemented.

3.184 Although the COC identifies a substantial number of criteria that the AWS Plan must satisfy, neither the AWS Plan nor a proposed AWS plan yet exists.

3.185 Although the final and approved versions of the EMP, APT Plan, and other mandated monitoring plans, did not exist as of the date the FEIS was issued, and thus were not evaluated in the FEIS, the COC provisions imposing these monitoring plans, together with the State and local statutory, regulatory, and procedural requirements that underlie these requirements, establish a highly prescriptive regime.

3.186 Given that (1) the need for mitigation is contingent and only mandated if monitoring unexpectedly "detects or predicts" that adverse environmental impacts are occurring or may occur, (2) the COC does not assume that adverse environmental impacts will occur, and (3) the design of any specific mitigation plan necessarily depends on the specific adverse impacts in question, it is reasonable that the COC does not prescribe specific mitigation measures.

3.187 Based on the thoroughness and professionalism of the process used by the State of Florida in developing and issuing the COC, involving such entities as the FDEP, SWFWMD, USACE, Administrative Law Judge Johnson, and the Governor and Cabinet of the State of Florida sitting as the Siting Board that authorized the issuance of the COC, it is realistic and reasonable to expect that the State and Local agencies will make sure that these monitoring and mitigation measures will be adequately implemented and enforced in a timely fashion.

3.188 The NRC Staff testimony, the fact that the NRC required PEF to recalibrate the groundwater model, and the numerous references to and discussion of the COC and its monitoring and mitigation requirements that are in the FEIS, demonstrate that, in assessing the environmental impacts of the LNP, the NRC Staff independently and critically assessed the work of the FDEP, SWFWMD, and other agencies.

3.189 Although the NRC Staff relies on the monitoring and mitigation measures imposed in the FDEP COC, the COC and its various conditions imposing monitoring and mitigation are not enforceable by NRC. Nor does the NRC propose to incorporate or impose any of the COC's monitoring or mitigation requirements into the COL so as to make them enforceable by the NRC.

3.190 Based on the foregoing Findings of Fact, the Board concludes that the NRC does not need to incorporate these monitoring and mitigation measures into the COL.

4. Dewatering Impacts: Subpart 2 - Connection to Floridan Aquifer System

Contention 4A asserts that the FEIS inadequately addresses "[i]mpacts to wetlands, floodplains, special aquatic sites, and other waters, associated with dewatering . . . resulting from the connection of the site to the underlying Floridan Aquifer system." C4A Order, Att. A at 1.

a. Evidence Regarding Connection to Floridan Aquifer System

Dr. Bacchus stated that "active and passive dewatering during construction and operation of the proposed LNP would have a more substantial and irreversible adverse effect on wetlands, wildlife habitat, the aquatic environment and endangered and threatened species than the FEIS presents, including on the underlying Floridan aquifer system." Bacchus Testimony at 4. Dr. Bacchus provided extensive testimony regarding the interconnected nature of the surficial aquifer and the Floridan Aquifer.[83] See id. at 10-12. In her discussion of hydroperiod alterations, she noted that "the surficial aquifer that maintains wetland soils and rootzones is hydrologically connected to the Floridan aquifer system." Id. at 17.

Dr. Bacchus conceded that the FEIS discusses the connection between the surficial aquifer and the Floridan Aquifer. Id. at 18. Further, she conceded that the FEIS notes that this connectivity implies that groundwater withdrawals from the Floridan Aquifer could cause adverse impacts to the surficial aquifer and therefore to the wetlands on and around the LNP site. Id. She maintained, however, that even though the FEIS acknowledges the connection between the two aquifers, "the FEIS should have realized that surface water and groundwater withdrawals proposed for the LNP would affect wetlands on and around the LNP site by changing natural hydroperiods." Id. at 19.

Dr. Bacchus also noted that the FEIS states, "Building-related groundwater withdrawals from the Upper Floridan aquifer, have the potential to decrease water levels at the site and induce lateral saltwater intrusion from the CFBC and vertical migration of saline waters from deeper Floridan aquifer intervals." Id. at 58 (quoting FEIS at 4-27). She insisted, however, that

[83] Because we have discussed at length Intervenors' allegations regarding the karstic nature of the ground underlying the LNP site in the section on Site Characterization, we need not rehash those allegations at length here.

"[t]here was no attempt to define the parameters where the impacts of salt water intrusion would be significant enough to warrant a more thorough analysis." Id. at 58.

Dr. Bacchus also took issue with a Tech Memo prepared by CH2M HILL for PEF (INT104). See Bacchus Rebuttal at 3-4. Specifically, she contended that the Tech Memo incorrectly illustrates the long-term drawdown impacts to the surficial aquifer and the Floridan Aquifer. See id. at 3. The illustrations within the Tech Memo seem to demonstrate that the cumulative drawdown of the Floridan Aquifer would be slightly larger than the cumulative drawdown to the surficial aquifer over the life of the proposed LNP. See INT104 at 44-45, Figs. 28 and 29. Dr. Bacchus asserted:

> [T]he magnitude and extent of the drawdowns in the surficial aquifer will mimic those in the upper Floridan aquifer. That is because the fractures and associated relict sinkholes extending throughout the proposed LNP site and surrounding vicinity will result in vertical and lateral induced recharge or "capture" of water from the surficial aquifer by the UFA where the proposed groundwater wells will be withdrawing water.

Bacchus Rebuttal at 3-4. Dr. Bacchus argued, "The FEIS provided no scientific support to conclude that these 'modeled' drawdowns would not result in LARGE adverse impacts to wetlands." Bacchus Testimony at 66.

b. Findings of Fact Regarding Connection to Floridan Aquifer System

After reviewing the evidence and the testimony submitted, the Board finds as follows:

4.1 The Upper Floridan Aquifer (UFA) is connected to the surficial aquifer in the area on and around the LNP site. FEIS at 2-22, 5-19.

4.2 The FEIS discusses this connection in multiple locations. For example, the FEIS states that the UFA discharges to the surficial aquifer. Id. at 2-27. The surficial aquifer's potentiometric surface is reasonably expected to mimic that of the UFA. Id. Vertical hydraulic gradients between the surficial aquifer and the UFA are discussed. Id. at 2-27 to 2-28. Water quality characteristics are similar between the surficial aquifer and the UFA. Id. at 2-38.

4.3 The FEIS states that "groundwater usage from the Upper Floridan aquifer will, after 60 years of operation, result in surficial aquifer drawdowns of as much as 2 ft in areas where wetlands are present." Id. at 5-5.

4.4 The FEIS states, "[b]ecause the surficial aquifer that supports local wetlands is hydrologically connected to the Floridan aquifer system, groundwater withdrawal from the Floridan aquifer system could affect wetlands on and around the LNP site." Id. at 5-19.

4.5 The FEIS states, "[b]uilding-related groundwater withdrawals from the Upper Floridan aquifer have the potential to decrease water levels at the site and induce lateral saltwater intrusion from the CFBC and vertical migration of saline waters from deeper Floridan aquifer intervals." Id. at 4-27.

4.6 We have already found that the FEIS's discussion of groundwater modeling is adequate. See supra at Section IV.A.3.b. Thus, to the extent Intervenors present concerns related to groundwater modeling or the impacts that will occur as a result of modeled drawdowns, see, e.g., Bacchus Testimony at 65, such arguments fail.

4.7 We have already found that the FEIS's discussion of site characterization is adequate. See supra at Section IV.A.3.a. Thus, to the extent Intervenors again raise challenges regarding site characterization, such arguments fail.

4.8 We have already found that the FEIS's discussion of hydroperiod alterations is adequate. See supra at IV.A.3.c. Thus, to the extent that Intervenors raise arguments regarding hydroperiod alterations, see, e.g., Bacchus Testimony at 19, such arguments fail.

4.9 Because these other portions of the contention have been resolved, we are left with the core of this portion of the contention, which alleges that the FEIS does not adequately describe the connection between the surficial and the Floridan aquifers and does not adequately describe the adverse impacts resulting from that connection.

4.10 We find that the FEIS adequately describes the connection between the surficial and Floridan aquifers. See FEIS at 2-22.

4.11 We find that the FEIS adequately describes the potential adverse impacts arising from the connection between the surficial and Floridan aquifers. See id. at 4-27, 5-5, 5-19.

5. Dewatering Impacts: Subpart 3 - Impacts to Outstanding Florida Waters

a. Evidence Regarding Impacts to Outstanding Florida Waters

The Intervenors argued that the FEIS does not adequately consider the impacts of construction and operation of the LNP on Outstanding Florida Waters (OFWs). See Bacchus Testimony at 4, 33-36, 46-47, 66-67. This argument appears to be closely linked to other portions of Contention 4A, as Intervenors asserted that the FEIS has not adequately analyzed the cumulative impacts of the LNP and other groundwater withdrawals on OFWs, id. at 33-34, 66, or the impacts of salt drift and deposition on OFWs. Id. at 34-35, 46. Cumulative impacts are discussed supra at Section IV.A.3.f, and salt drift and deposition are discussed infra at Section IV.B.

In particular, Intervenors claim that "water quantity and hydroperiod impacts from the proposed LNP alone and cumulatively with the hydroperiod impacts from the proposed Tarmac limestone mine, the proposed Knight sand mine and the proposed Adena Ranch . . . will be significant on Outstanding Florida Waters such as the Withlacoochee and Waccasassa Rivers." Bacchus Testimony at 33. In addition, Intervenors argue, "[t]he FEIS also fails to provide an accurate evaluation of the cumulative water quality impacts that will ensue in the coastal estuary system, including Withlacoochee Bay and Withlacoochee and Waccasassa Rivers, due to the LNP's proposed withdrawals of substantial freshwater and groundwater currently flowing into [them]." Id. at 34.

Intervenors also contend that "the FEIS fails to provide any scientifically valid analysis of the impacts of increased salinities in Outstanding Florida Waters from decreased water quantity and the addition of salt to surface and ground water via salt drift and aerial deposition from the

proposed LNP." Id. at 34-35. Intervenors state that the discussion of salt deposition in the FEIS:

> is misleading because it discusses increases in salt concentrations based on average precipitation, ignoring significantly greater salt concentrations that will result during the dry season and periods of drought, and immediately following the dry season and droughts when the first rain events flush the concentrated salt deposited via salt drift into surrounding Outstanding Florida Waters and other surface waters and the aquifer.

Id. at 35.

b. Findings of Fact Regarding Impacts to Outstanding Florida Waters

After reviewing the evidence and the testimony submitted, the Board finds as follows:

5.1 "The State of Florida designates waters in the national parks, preserves, memorials, wildlife refuges, wilderness areas, State Park System and Wilderness Areas, national forests, seashores, monuments, and marine sanctuaries, scenic rivers, and other waters within areas specified by State laws as OFWs." FEIS at 2-19 to 2-21.

5.2 OFWs in the general vicinity of the Proposed Site are depicted on Board exhibit BRD002 and include the Withlacoochee River, the Wacasassa Bay State Preserve, and the Goethe State Forest, among others. See BRD002; Griffin Testimony at 7-8.

5.3 Surface water runoff from the Proposed Site flows into the Spring Run Creek sub-basin, directly into the Gulf of Mexico, or into the Withlacoochee River sub-basin. See BRD002; FEIS at 2-18, Fig. 2-8; Griffin Testimony at 8.

5.4 The Wacasassa River lies to the north of the Spring Run Creek sub-basin. Griffin Testimony at 8. Therefore, runoff from the Proposed Site will not enter the Wacasassa River. Id.

5.5 The Goethe State Forest lies to the north and east of the LNP Site. Id. Because surface water does not flow to the east from the Proposed Site, the Goethe State Forest would not be affected either. Id.

5.6 Therefore, the only relevant OFW in the vicinity of the LNP site is the lower Withlacoochee River. Id.

5.7 The FEIS recognizes that "[p]rimary discharge areas for the surficial aquifer are the Withlacoochee River and CFBC to the south and southwest of the site and the saltwater marshes that discharge to the Gulf of Mexico to the west of the site." FEIS at 2-27.

5.8 The FEIS states, "The review team determined that the operations of LNP Units 1 and 2 would not alter the surface-water hydrology of the Withlacoochee River." Id. at 5-4.

5.9 The FEIS states:

> Results from the predictive simulations (PEF 2010a) indicate that annual average LNP groundwater usage from the Upper Floridan aquifer is minor relative to the overall model water balance (Figure 5-2). As indicated, average LNP operational usage (1.58 Mgd) represents only a small percentage (0.8 percent) of the total water flux (208 Mgd) through the model domain (Figure 2-12). At this withdrawal rate, the LNP wellfield is predicted to decrease the surficial and Upper Floridan aquifer discharge to surface-water bodies within the model domain by approximately 0.4 Mgd, or about 2 percent of the total simulated groundwater discharge to rivers and lakes. These simulated impacts on Lake Rousseau and the lower Withlacoochee River, which is designated as an Outstanding Florida Water, are minor relative to the 37-year recorded average daily discharge of 687 Mgd through the bypass channel to the lower Withlacoochee River.

Id. at 5-8.

5.10 The FEIS states, "[T]he review team determined the impact of operating LNP Units 1 and 2 on surface-water quality of the CFBC, OWR, lower Withlacoochee River, and other nearby streams would be SMALL and mitigation beyond the FDEP Conditions of Certification would not be warranted." Id. at 5-16.

5.11 The FEIS states:

> Based [on] groundwater modeling, there may be a reduction of 0.4 Mgd of the groundwater discharge to the Lower Withlacoochee River and Lake Rousseau as a result of service-water pumping from groundwater wells for proposed LNP Units 1 and 2. As discussed in Section 5.2.2.2, the reduction is expected to have minimal impact on the estimated total groundwater discharge of 687 Mgd to the Lower Withlacoochee River/Lake Rousseau watersheds and thus would have minimal impact on the ecology of these waterbodies.

Id. at 5-58.

5.12 The FEIS states, "[d]eposition of salt decreases rapidly with increasing distance from cooling towers, and is therefore not expected to detectably affect the closest freshwater bodies, which are approximately 3 mi[les] to the south (Lake Rousseau and the Lower Withlacoochee River) from the LNP site." Id. at 5-55.

5.13 In a Chapter entitled "Cumulative Impacts," the FEIS states, "[t]he increase in sea level relative to the CFBC and the Withlacoochee River, potentially coupled with reduced streamflow (also due to global climate change), could result in the saltwater front in the CFBC and the Withlacoochee River moving upstream." Id. at 7-12 to 7-13.

5.14 As discussed supra, the FEIS discusses cumulative impacts related to water use and quality at pages 7-10 through 7-20.

5.15 We have already stated that the FEIS's discussion of cumulative impacts is adequate. See supra at Section IV.A.3.f.

5.16 As discussed infra, the FEIS discusses impacts related to salt drift and deposition at pages 5-19 through 5-25 and pages 5-85 through 5-86.

5.17 We hold below that the FEIS's discussion of salt drift and deposition is adequate. See infra at Section IV.B.

5.18 Because these two topics are so closely related to the instant portion of the contention, and because the FEIS specifically discusses impacts to the Withlacoochee River (the only OFW that is likely to be impacted by the LNP), we find that the FEIS's discussion of impacts to OFWs is adequate.

6. Dewatering Impacts: Subpart 4 - Nutrient Concentration Impacts

a. Evidence Regarding Nutrient Concentration Impacts

Dr. Bacchus testified that "harmful increases in nutrient levels, known as eutrophication, will result from the LNP's withdrawal . . . of water . . . because the proposed LNP withdrawals will concentrate the existing nutrient pollution in the remaining, flow-depleted waters." Bacchus

Testimony at 37. She provided the following USGS definition of eutrophication: "A process where water bodies receive excess nutrients that stimulate excessive plant growth." Id. (citing http://toxics.usgs.gov/definitions). She also provided the following definition from the EPA: "A reduction in the amount of oxygen dissolved in water. The symptoms of eutrophication include blooms of algae (both toxic and non-toxic), declines in the health of fish and shellfish, loss of seagrass beds and coral reefs, and ecological changes in food webs." Id. (citing http://www.epa.gov/acidrain/glossary.html).

Dr. Bacchus argued that "the FEIS does not appear to include even a single reference to eutrophication as one of the LARGE adverse impacts of construction and operation of the proposed LNP, although these impacts clearly meet the definition of LARGE: 'Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.'" Id. She opined that construction and operation of the LNP "would result in LARGE adverse impacts to water quality and increase the harm from existing concentrations of nutrients in the water by decreasing the volume of water available to dilute nutrient contaminants in the surface waters in the vicinity of the proposed LNP." Id. at 38.

b. Findings of Fact Regarding Nutrient Concentration Impacts

After reviewing the evidence and the testimony submitted, the Board finds as follows:

6.1 The FEIS does not directly address the issue of potential increases in nutrient concentration or eutrophication as a result of dewatering associated with construction and/or operation of the proposed LNP.

6.2 The FEIS does, however, state:

> Nutrients introduced to groundwater from natural or man-made events such as fires may affect nutrient loading in surface waters. Nutrients would be discharged to groundwater through infiltration of surface waters located as stormwater-detention ponds on the LNP site and are not expected to affect offsite waterbodies such as the Withlacoochee River or Lake Rousseau.

FEIS at 7-33.

6.3 Increases in nutrient concentrations can lead to excessive growth of algae, which can cause harm to other aquatic wildlife. See Bacchus Testimony at 37.

6.4 Intervenors have presented no evidence, other than Dr. Bacchus's opinion evidence, that construction and operation of the LNP will lead to harmful increases in nutrient concentrations.

6.5 One of the functions of wetlands is to trap nutrients. NRC Testimony at 145 (Doub, Aston).

6.6 We have already found that the FEIS's conclusion that impacts to wetlands will be SMALL to MODERATE was reasonable.

6.7 Because wetlands trap nutrients, it reasonably follows from the general conclusion that wetlands are not likely to be adversely impacted that their ability to trap nutrients will also not likely be adversely impacted. See id. at 143-44 (Doub, Aston).

6.8 Therefore, we find that the FEIS's failure to directly address the issue of increased nutrient concentrations resulting from construction and/or operation of the proposed LNP was reasonable.

7. Dewatering: Subpart 5 - Destructive Wildfires

a. Evidence Regarding Destructive Wildfires

Dr. Bacchus testified that construction of the LNP would increase the frequency of destructive wildfires in and around the LNP site. Bacchus Testimony at 38. She stated, "In my professional opinion . . . long-lasting smoldering fires only occur in areas where the natural hydroperiod has been altered by excavations, groundwater pumping, or a combination of those actions, not in areas solely with a build up of leaf litter." Id. She testified that "[b]ecause of changes in soil moisture and related conditions due to the hydroperiod alterations, soil moisture is depleted so the trees are not properly hydrated and the fires kill them. In other words, when natural hydroperiods are altered, fires that would have been beneficial – and even essential –

become lethal." Id. at 39. She also stated that PEF's Wetland Mitigation Plan is flawed in its reliance on controlled burns and rapid fire response. Id. at 40. She contended that the use of controlled or prescribed burns has failed to establish "restoration of a more natural fire regime" in areas throughout Florida that have experienced hydroperiod alteration. Id. In addition, she testified that "rapid fire response" cannot be relied on because "there is no evidence to support a conclusion that the fires could be contained or controlled." Id.

b. Findings of Fact Regarding Destructive Wildfires

After reviewing the evidence and testimony submitted, the Board finds as follows:

7.1 The FEIS discusses the potential for adverse impacts resulting from wildfires at pages 5-31 and 7-33.

7.2 The FEIS states, "[i]f PEF addresses any wetland impacts from groundwater withdrawal by mitigation rather than implementing an alternative water-supply project, it is unlikely that these hydrological alterations would contribute to an increased risk of wildfire in the LNP vicinity." FEIS at 5-31.

7.3 The FEIS reaches this conclusion because "[g]roundwater drawdown exceeding 0.5 ft that could adversely affect wetlands would be localized" and because "the fire risk in parts of the surrounding area would be reduced through the restoration of a more natural fire regime." Id.

7.4 The FEIS also states that "appropriate stewardship of the site by the applicant is expected to significantly reduce the potential for uncontrolled fires involving onsite vegetation," id. at 7-33, and that should a wildfire break out on or around the LNP site, "rapid fire response would be expected." Id. at 5-31.

7.5 Wildfires are initially caused by ignition sources such as "lightning strikes, and other anthropogenic sources like automobile exhaust systems, campfires, cigarettes, etc." Robertson Testimony at 5.

7.6 No persuasive evidence has been presented to demonstrate that construction and operation of the LNP would increase the amount of ignition sources on or around the LNP site.

7.7 The severity of wildfires is dependent on such factors as weather conditions, topography, fuel characteristics, barriers to fire spread, and fire suppression. Id.

7.8 No evidence has been presented to demonstrate that construction and operation of the LNP would alter weather conditions, topography, or barriers to fire spread in such a way that wildfires would spread more easily on or around the LNP site.

7.9 The presence of the LNP on the site would actually increase the fire suppression capabilities at the site, as the LNP would provide additional fire response capabilities to those already in existence. See FEIS at 5-31.

7.10 The prescribed burns that will be conducted at the LNP site will serve to reduce fuel load, in turn reducing the severity of subsequent wildfires. Robertson Testimony at 12.

7.11 This type of prescribed burning "allows wildfires to be rapidly contained before spreading over large areas and minimizes fire severity." Robertson Rebuttal at 3.

7.12 Although construction and operation of the LNP will likely have no impact on the amount of wildfire ignitions, it will likely reduce the severity of any wildfires that do occur through faster and more substantial fire response capabilities and the restoration of a more natural fire regime through prescribed burns. Robertson Testimony at 12.

7.13 "[L]ong-lasting wildfires are primarily associated with droughts and are not limited to areas with man-made dewatering." Robertson Rebuttal at 2.

7.14 Therefore, we find that the FEIS's conclusion that increased risk of wildfire at and around the LNP site is "unlikely" was reasonable.

B. SALT DRIFT AND SALT DEPOSITION

1. Evidence Regarding Salt Drift and Salt Deposition

Dr. Bacchus testified that the FEIS's analysis of salt drift was flawed in many ways. First, she stated that "the salt drift and deposition model . . . uses wind directions from Tampa that do not correlate closely enough with the data from the LNP site." Bacchus Testimony at 41. She claimed that using LNP site data rather than data from Tampa would demonstrate that "significant amounts of salt drift would be deposited to the southwest" of the cooling towers. Id. Because the supply wells, which would cause active dewatering, will be located to the south of the cooling towers, she claimed that "the LARGE adverse impacts from the induced recharge that would result from the proposed LNP supply wells also would result in cumulative adverse impacts from this salt deposition pattern." Id. at 42.

Dr. Bacchus testified further that the salt drift model does not account for "excavations into the water table" such as mines in the area that directly expose areas of the aquifer. Id. She contended that those areas would "suffer contamination directly from aerial deposition of salt particles" and that the model used in the FEIS therefore "inaccurately portrays salt deposition rates and locations and underestimates the ensuing effects." Id.

In addition, Dr. Bacchus stated that the FEIS did not quantify salt drift using comparable existing cooling towers and did not consider the cumulative impacts of salt drift from the cooling towers with naturally occurring airborne salt from the Gulf of Mexico coast. Id. at 43.

Dr. Bacchus also testified that the FEIS's reliance on corn as an "indicator species" was inadequate because "there is no corn in the vicinity" of LNP and "there is no scientific documentation supporting the presumption that corn is as sensitive as the native species in the area" of the LNP. Id. at 44. She also argued that the FEIS's reliance on salt drift monitoring from the nearby Crystal River Energy Complex (CREC) was flawed because "the cooling towers were not all in operation, . . . and the monitoring sites were moved periodically." Id. In addition, she testified that salt drift monitoring from CREC was flawed in that deposition collectors were

placed in forested areas where the tree canopy may have intercepted some of the deposition. Id. at 45. Finally, she argued that the FEIS cannot rely on data from CREC because CREC is located on the Gulf of Mexico coast, while the LNP is located inland, where vegetation has not adapted salt resistance like coastal vegetation. See id. at 45-47.

2. Findings of Fact Regarding Salt Drift and Salt Deposition

After reviewing the testimony and evidence submitted, the Board finds as follows:

8.1 The FEIS discusses environmental impacts from salt drift and deposition in Section 5.3.1.1, "Terrestrial Resources – Site and Vicinity," and Section 5.7.2, "Cooling-System Impacts." See FEIS at 5-19 to 5-26, 5-85 to 5-86.

8.2 The FEIS notes that, through the use of mechanical draft cooling towers, "[a] small percentage of the water in the [circulating water system] would unavoidably be released into the atmosphere as fine droplets (i.e., cooling-tower drift) containing elevated levels of [total dissolved solids] that can be deposited on nearby vegetation." Id. at 5-20.

8.3 The FEIS states that "[t]he maximum predicted onsite deposition during normal plant operation is predicted to be 10.75 kg/ha/mo [kilograms per hectare per month] of total solids, as determined from the 2004 meteorological data year" and "[t]he maximum predicted offsite deposition rate would be approximately 6.8 kg/ha/mo of total solids at the property boundary west of the cooling towers, as determined from the 2002 meteorological data year." Id.

8.4 The FEIS notes that NRC guidance provides that visible leaf damage is possible when deposition rates exceed 10 kg/ha/mo. Id. at 5-21. As such, the FEIS states that "some vegetation on the LNP site could suffer leaf damage from salt drift in some years," but that off-site vegetation would not suffer any damage. Id.

8.5 The FEIS also states that damage to vegetation resulting from soil salinization is unlikely because "sufficient rainfall would be received to leach salts from the predominantly

sandy soil profile," noting that "[i]n humid environments such as Levy County, [salt deposition effects on soils] were found to be transitory to undetectable." Id. at 5-22. It concludes that "the impact on vegetation from salt drift is expected to be minor, infrequent, and limited to the LNP site." Id.

8.6 The FEIS also discusses the potential for salt drift and deposition to impact surface waters. It concludes that, although "[a] potential exists for cooling-tower drift to increase the salinity of surface water in wetlands on the LNP site[,] . . . [c]onsidering the very low additional contribution to surface-water salinity from cooling-tower drift and the low likelihood for substantial concentration of salts in surface waters, cooling-tower drift is not expected to impair freshwater ecosystems on the LNP site." Id. at 5-24.

8.7 The FEIS concludes that "[i]ncidents of salt toxicity in animals that reside around the LNP site would be highly unlikely." Id. at 5-25.

8.8 Operation of the mechanical draft cooling towers at the LNP will result in the deposition of salt via "salt drift" in the general vicinity of the LNP site, both on site and off site. See id. at 5-20.

8.9 Salt drift modeling "was performed using an EPA dispersion model" known as "the American Meteorological Society/Environmental Protection Agency Regulatory Model ('AERMOD')." Howroyd Testimony at 6.

8.10 Salt deposition can cause visible damage to vegetation at concentrations exceeding approximately 10 kg/ha/mo. FEIS at 5-21.

8.11 Concentration of salt deposition on site is not expected to exceed 10.75 kg/ha/mo. Id. at 5-20; Howroyd Testimony at 11-12.

8.12 Concentration of salt deposition off site is not expected to exceed 6.8 kg/ha/mo. FEIS at 5-20; Howroyd Testimony at 10.

8.13 These rates of deposition are based on a worst-case scenario, and actual deposition rates are likely to be lower. Howroyd Testimony at 10-12.

8.14 Therefore, visible damage might occur to vegetation on site, but is not expected to occur to vegetation off site.

8.15 Freshwater plants might experience damage at salinity levels exceeding 1 part per thousand (ppt). Blancher Testimony at 7.

8.16 The maximum salt concentration on the ground and in the waters on and around the LNP site resulting from LNP-associated salt drift and deposition is not expected to exceed 0.03 ppt. Id.

8.17 Therefore, operation of the LNP cooling towers is not expected to cause measurable damage to surrounding freshwater plants.

8.18 Salt toxicity in animals resulting from salt-drift has not been observed at any nuclear plant site. FEIS at 5-25.

8.19 Salt deposition at the LNP site is not expected to cause measurable harm to animals on or around the site. Id.

8.20 PEF has relied on weather data from Gainesville, Florida, not from Tampa, Florida, as Intervenors contend. See Howroyd Testimony at 8, PEF505 at 2.

8.21 The FEIS's failure to base its salt deposition calculations on data from cooling towers similar to those proposed for the LNP was reasonable, as the calculations were performed using the LNP's design specifications. Howroyd Rebuttal at 6.

8.22 The LNP site is approximately 15 kilometers from the Gulf of Mexico. Id. Therefore, the FEIS was reasonable to assume that the cumulative effects of airborne salt from the cooling tower operation, in combination with salt spray from the Gulf would be negligible. Id.

8.23 The results of the CREC salt drift study are reliable. Id. at 7. That study found no appreciable damage to vegetation resulting from cooling tower operation. Id. Moreover, the FEIS does not appear to rely "heavily" on the study, as Intervenors contend. See Bacchus Testimony at 44. Rather, the FEIS appears to use the results of the study as additional support to supplement the results of the salt drift modeling that was performed. See, e.g., FEIS at 5-23.

8.24 Corn is used as an indicator species because "its response to stressors is typical for broad-leaved plants, especially those not adapted to certain stressors such as salt." Blancher Rebuttal at 3. However, the FEIS uses five other indicator species as well, which are soybeans, cotton, dogwood, white ash, and Canadian hemlock. FEIS at 5-21.

8.25 Areas of the aquifer that are directly exposed are not likely to suffer adverse consequences, as rainfall will dilute the salt deposits to such an extent that they will not impact the aquifer. Blancher Rebuttal at 1-2.

8.26 Therefore, we find that the FEIS has adequately and reasonably discussed the issues of salt drift and salt deposition.

C. CONSEQUENTIAL ALLEGATIONS

This portion of Contention 4A reads as follows:

> As a result of the omissions and inadequacies described above, the Draft 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.

C4A Order, Att. A at 1 (emphasis added).

By its very nature, this portion of Contention 4A only arises "as a result" of the other "omissions and inadequacies" alleged in the earlier parts of the contention. See 70 NRC at 85, 105, 106. This portion of the contention is "entirely dependent on the existence of the deficiencies alleged in the first and/or second parts" of the contention. See supra at Section I. Here, we have already rejected the first and second parts of Contention 4A, i.e., we have rejected the proposition that there are "omissions and inadequacies" with respect to the FEIS

discussion and analysis of (1) dewatering and (2) salt drift/deposition. Because there are no such omissions and inadequacies, there can be no "consequence" of such omissions and inadequacies. Thus, the "consequential" portion of Contention 4A is rejected.

V. CONCLUSIONS OF LAW

As set forth in Section II, before NRC decides whether to issue a license to construct and operate a nuclear power plant, NEPA requires that the agency develop and "carefully consider, detailed information concerning significant environmental impacts of the proposed action." Robertson, 490 U.S. at 349. NEPA is intended to ensure that "important effects will not be overlooked or underestimated only to be discovered after resources have been committed or the die otherwise cast." Id. The FEIS must review and consider all significant environmental impacts, whether direct, indirect, cumulative, onsite, or offsite, that are a reasonably foreseeable consequence of the proposed action. Id. at 356, 359.

Based on our review of the entire record in this proceeding and our findings of fact set forth above, the Board concludes, as a matter of law, that NRC has met these standards with regard to the contested issues raised in Contention 4A. More specifically, as set forth below, we conclude that (A) the FEIS is an adequate and fair analysis of the potential environmental impacts of the proposed LNP that meets the NEPA rule of reason, (B) the NRC exercised independent judgment with regard to its identification and assessment of the potential environmental impacts of the proposed LNP, and (C) the FEIS reliance on the various monitoring and mitigation measures mandated by the FDEP COC was reasonable and did not violate NEPA.

A. FEIS IS AN ADEQUATE AND FAIR ANALYSIS

The legal adequacy of an FEIS is assessed under the "rule of reason."[84] This principle is of key importance here, because one of the Intervenors' "overarching themes" is that the FEIS is "grossly oversimplified" and that a substantial amount of additional site investigation and groundwater modeling must be done before NEPA can be satisfied. See, e.g., Bacchus Testimony at 5. As described in detail in Section IV, the Intervenors assert that much more study must be done. According to the Intervenors, more wells must be drilled to investigate the geology and hydrology of the Proposed Site; hypothesized preferential pathways and conduits must be identified and tracked; tracer studies should be done; an integrated surface water and groundwater model is needed; the geographic area of the groundwater models used by NRC should be expanded; the baselines used in the FEIS require more data; the FEIS should consider more data, over a longer term, regarding seasonal fluctuations and hydroperiods; etc.

The NEPA "rule of reason" is the criterion used to assess whether such additional study and data are legally required. In discussing the rule of reason, the Commission has stated:

> It is well established that NEPA requires only a discussion of 'reasonably foreseeable' impacts. Grappling with this concept, various courts have described it as a 'rule of reason' or 'rule of reasonableness,' which excludes 'remote and speculative' impacts or 'worst-case' scenarios. Courts have excluded impacts with either a low probability of occurrence, or where the link between the agency action and the claimed impact is too attenuated to find the proposed federal action to be the 'proximate cause' of that impact. NEPA does not call for 'examination of every conceivable aspect of federally licensed projects.'

Private Fuel Storage, LLC (Independent Fuel Storage Installation), CLI-02-25, 56 NRC 340, 348 (2002) (citations omitted).

[84] See, e.g., Potomac Alliance v. NRC, 682 F.2d 1030, 1035 (D.C. Cir. 1982); Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc. (Pilgrim Nuclear Power Station), CLI-10-22, 72 NRC 202, 208 (2010); see also Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, 435 U.S. 519, 551 (1978) ("To make an impact statement something more than an exercise in frivolous boilerplate the concept of alternatives must be bounded by some notion of feasibility.").

More recently, the Commission has stated "NEPA 'should be construed in the light of reason if it is not to demand virtually infinite study and resources.'"[85] The Commission added that an EIS is not "intended to be a research document"[86] and does not require the NRC to use the absolutely "best scientific methodology" available.[87] The Commission stated "while there 'will always be more data that could be gathered [agencies] must have some discretion to draw the line and move forward with decisionmaking.'"[88] The Commission concludes that "NEPA allows agencies to select their own methodology as long as that methodology is reasonable."[89]

As the Second Circuit has stated: "[A]n EIS is required to furnish only such information as appears reasonably necessary under the circumstances for evaluation of the project, rather than to be so all-encompassing in scope that the task of preparing it would become either fruitless or well nigh impossible." Natural Resources Defense Council v. Callaway, 524 F.2d 79, 88 (2d Cir. 1975).

After considering the entire record in this proceeding, the Board concludes that, with respect to the issues raised in Contention 4A, the NRC Staff conducted a thorough and reasonable investigation to identify all of the significant and reasonably foreseeable environmental impacts of the proposed LNP and that this FEIS complied with the NEPA rule of reason. The NRC gathered and evaluated a very substantial amount of regional and site specific information concerning the Proposed Site and its vicinity. The FEIS is based on

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[85] Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc. (Pilgrim Nuclear Power Station), CLI-10-11, 71 NRC 287, 315 (2010) (quoting Natural Resources Defense Council v. Hodel, 865 F.2d 288, 294 (D.C. Cir. 1988)).

[86] Id. (citing Town of Winthrop v. Federal Aviation Administration, 535 F.3d 1, 11-13 (1st Cir. 2008)).

[87] Id. (citing Hells Canyon Alliance v. U.S. Forest Service, 227 F.3d 1170, 1185 (9th Cir. 2000)).

[88] Id. (citing Town of Winthrop v. Federal Aviation Administration, 535 F.3d 1, 11 (1st Cir. 2008)).

[89] Id. (citing Town of Winthrop v. Federal Aviation Administration, 535 F.3d 1, 11 (1st Cir. 2008)).

substantial geotechnical and hydrologic data regarding the Proposed Site, which was backstopped by a large amount of consistent regional information. The groundwater modeling, including the Regional Model, Model 1, and Model 2, was well done and professional.

We reject the Intervenors' claim that the FEIS is grossly oversimplified and that it must be expanded and amplified in numerous ways. The FEIS is not "intended to be a research document," nor does it need to be. The Intervenors hypothesize the existence of groundwater conduits and preferential pathways under the Proposed Site and, from there, assert that a great deal of additional site specific data must be collected. But we find no persuasive evidence that significant conduits or preferential pathways exist under the Proposed Site, or in its vicinity. Nor does the evidence support the proposition that NEPA requires thousands of boreholes to be drilled on the site, or that tracer studies must be performed, or that an integrated surface and groundwater model is needed. It is always possible to ask for more data and more study, but the rule of reason allows the NRC to draw a reasonable line as to how much study is enough to satisfy NEPA. We think that the FEIS draws the line at a fair and reasonable point. Likewise, the FEIS makes a reasonable effort to identify and discuss the annual, seasonal, and longer term hydrologic fluctuations that occur at the Proposed Site and recognizes that the impacts of the LNP may vary with regard to these hydroperiods. NEPA does not require that the FEIS be a Ph.D. dissertation on these topics.[90]

We acknowledge that NRC could have gathered additional data, and could have used different methodologies in conducting the FEIS. But the appropriate inquiry under NEPA is not whether there are alternative models that NRC could have used, or whether the analysis could have been refined, or improved by gathering additional data, but is whether the NRC's chosen methodology is reasonable. Pilgrim, CLI-10-11, 71 NRC at 315-16. We conclude that it is.

[90] See Southern Nuclear Operating Company (Early Site Permit for Vogtle ESP Site), LBP-09-07, 69 NRC 613, 648-50, 662, 671-74, 681-82 (2009).

As described in the findings of fact set forth above, the FEIS is a substantial, professional, and reasonable effort to identify and assess all significant and reasonably foreseeable environmental impacts. The FEIS uses methodologies that are reasonable, that conform to the methodologies used by the relevant and expert federal, state, and local agencies (e.g., USACE, FDEP, SWFWMD), and that are consistent with accepted industry standards and practices. Accordingly, as a matter of law, we conclude that the additional studies and data collection efforts sought by the Intervenors are not required under NEPA.

B. NRC EXERCISED INDEPENDENT JUDGMENT

NEPA requires that NRC exercise its independent judgment in identifying and assessing the significant and reasonably foreseeable impacts of a proposed licensing action. For example, the NRC is required to independently assess the validity of the information that the applicant submits in its environmental report. See 10 C.F.R. § 51.41 ("The Commission will independently evaluate and be responsible for the reliability of any information which it uses in fulfilling its duties under NEPA."). More generally, the regulations state that the "NRC staff will independently evaluate and be responsible for the reliability of all information used in the [DEIS]." 10 C.F.R. § 51.70(b).

The duty to exercise independent judgment does not, however, mean that NRC must reinvent every wheel or duplicate competent and professional environmental data and studies that have already been done on a proposed site.[91] For example, the Appeal Board has stated,

[91] See State of North Carolina v. FAA, 957 F.2d 1125, 1129-30 (4th Cir. 1994) (NEPA "precludes an agency from avoiding the Act's requirements by simply relying on another agency's conclusions about a federal action's impact on the environment."); Calvert Cliffs' Coordinating Committee v. AEC, 449 F.2d 1109, 1123 (D.C. Cir. 1971) (holding that the AEC may not abdicate its duty under NEPA to consider environmental impacts to other agencies, even if those agencies have special expertise relating to environmental impacts); Philadelphia Electric Co. (Limerick Generating Station, Units 1 and 2), ALAB-785, 20 NRC 848, 868 (1984) (The NRC need not "perform a wholly independent analysis from scratch. As the Licensing Board correctly observed, the staff may rely on the scientific data and inferences drawn by the DRBC. . . . The critical factor is that the staff (and the NRC) exercise independent judgment with regard to its ultimate conclusions about the environmental impacts of the project."); Philadelphia

in discussing whether the NRC Staff may rely on an environmental analysis done by another federal agency:

> This is not to say that the NRC must perform a wholly independent analysis from scratch. As the Licensing Board correctly observed, the staff may rely on the scientific data and inferences drawn by the DRBC [Delaware River Basin Commission]. On the other hand, the Commission need not slavishly defer to either the DRBC's findings or its conclusions about water quality. The critical factor is that the staff (and the NRC) exercise independent judgment with regard to its ultimate conclusions about the environmental impacts of the project.

Philadelphia Electric Co. (Limerick Generating Station, Units 1 and 2), ALAB-785, 20 NRC 848, 868 n.65 (1984).

In another case, the Appeal Board held that, where the Licensing Board "independently analyzed the data in the record and made its own [need-for-power] projection based thereon,"[92] the NRC did not abdicate its NEPA responsibilities by placing "heavy reliance upon the judgment of local regulatory bodies [e.g., the North Carolina Utilities Commission] which are charged with the duty of insuring that the utilities within their jurisdiction fulfill the legal obligation to meet customer demands." Id. at 241.

Based on our review of the FEIS and of the entire record of this proceeding, we conclude, consistent with our findings of fact enumerated above, that the NRC Staff exercised independent judgment with regard to its ultimate conclusions about the environmental impacts of the proposed LNP. Although the NRC did not mandate that PEF drill additional boreholes on

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Electric Co. (Limerick Generating Station, Units 1 and 2), ALAB- 262, 1 NRC 163, 193 (1975) ("In analyzing the predictions of water availability in the TAMS report, the staff consulted with the DRBC and the Corps of Engineers to determine whether data from either of those agencies could be obtained to prepare a new water availability prediction. From the information supplied by those agencies, the staff determined that the data used in the TAMS report were the best available, and that, given the validity of the TAMS data and the built-in conservatisms in the TAMS calculations, a completely new computation was unnecessary. . . . In these circumstances, the staff was entirely justified in choosing to review the TAMS report rather than to prepare a de novo computation.").

[92] Carolina Power & Light Co. (Shearon Harris Nuclear Power Plant, Units 1,2, 3, and 4), ALAB-490, 8 NRC 234, 236 (1978).

the Proposed Site, and did not attempt to run the groundwater models itself, NRC challenged the groundwater modeling approach (Model 1) used by PEF and by the SWFWMD and NRC required that it be recalibrated and re-run (Model 2). The FEIS reflects that NRC, working with the USACE and other agencies, based its FEIS analysis on more than just the ER and the COC. NRC took a hard look at the data and information, and plainly acknowledged that the information, and the predictions generated by the SWFWMD and PEF groundwater models, were subject to uncertainty. The NRC Staff did not "slavishly defer" either to PEF, the SWFWMD, the FDEP or to the judgment of any other agency or entity. The FEIS shows that NRC gathered, assessed, and grappled with a very large amount of environmental information and that the agency satisfied its legal obligation under NEPA to exercise its independent judgment in the identification, assessment, and quantification of the reasonably foreseeable environmental impacts of the proposed LNP.

C. FEIS RELIANCE ON THE MONITORING AND MITIGATION REQUIREMENTS IN THE COC WAS REASONABLE

Intervenors assert that the FEIS characterization of the environmental impacts of the proposed LNP as "SMALL" or "SMALL to MODERATE" is inadequate because it relies too heavily on monitoring and mitigation measures imposed, but not yet fully developed or finalized, by the Conditions of Certification issued by the Florida Department of Environmental Protection. This is one of the Intervenors' central arguments and it underpins many aspects of Contention 4A.

Our findings of fact confirm several aspects of the Intervenors' position. First, the FEIS quantification of the environmental impacts of the LNP clearly relies on the monitoring and mitigation measures prescribed in the COC. For example, the FEIS concludes that the LNP construction impacts on terrestrial ecological resources including wetlands will be MODERATE, "[e]ven with implementation of BMPs [Best Management Practices], the proposed wetland mitigation plan, and other mitigation outlined in the FDEP Conditions of Certification." FEIS at

4-71; Finding of Fact 3.157. Similarly, with regard to saltwater intrusion impacts that might be caused by the operation of the LNP, the FEIS states that, under the COC, "[a] wellfield water quality monitoring program would be instituted to detect any detrimental impacts, and wellfield operations would be managed to mitigate any significant decreases in water quality" and that "[u]nder these geohydrologic and operational conditions, the staff concludes that the operational groundwater-quality impacts would be SMALL." FEIS at 5-16; Finding of Fact 3.160. Likewise, with regard to the operational impacts of the LNP, the FEIS states that "based on the review team's independent evaluation of the LNP project, including . . . the identified [COC] mitigation measures and BMPs, the review team concludes that operational impacts on terrestrial ecological resources (including wetlands and listed species) would be SMALL to MODERATE[;] . . . any possible effects of groundwater withdrawals on wetlands would be temporary and localized as long as the FDEP and USACE conditions are met." FEIS at 5-47; Finding of Fact 3.163.

Next, our findings of fact confirm that most of the monitoring and mitigation measures prescribed by the COC have not been established or finalized yet. The COC requires PEF to develop an EMP, an APT Plan, and an AWS Plan (and numerous other monitoring and mitigation measures). See Findings of Fact 3.134, 3.136-138. But none of these plans currently exists. See Findings of Fact 3.168, 3.181, 3.184. Likewise, the COC mandates that "if adverse impacts are detected or predicted through the EMP or through aquifer performance testing or groundwater modeling" then PEF shall mitigate such adverse impacts either via an AWS project or by other mitigation measures. Finding of Fact 3.150. Again, these mitigation programs and plans do not currently exist. Finding of Fact 3.185.

Third, our findings of fact confirm that NRC is relying on monitoring and mitigation measures that NRC does not intend to incorporate into the NRC license, i.e., the COL. Finding of Fact 3.189.

Based upon the foregoing facts, the Intervenors assert that, by relying on State-imposed monitoring and mitigation plans that have not yet been issued or finalized, the NRC is "punting environmental issues into the future without addressing them in the FEIS." Intervenors' ISOP at 2-3, 13. This, they say, "violates NEPA's cardinal principle that environmental impacts of agency action must be considered before the action is taken, not afterward." Id. (emphasis in original).

Based on our review of the entire record in this proceeding and our findings of fact set forth above, the Board concludes, as a matter of law, that the FEIS reliance on the various monitoring and mitigation measures mandated by the FDEP COC, even though they have not yet been developed and finalized, was reasonable and did not violate NEPA. Our legal analysis on this issue is set forth below.

We have already discussed some of the basic NEPA principles above. These include (a) the FEIS must be adequate and (b) it must be completed before the agency makes its decision and grants (or denies) the license. The Intervenors' "unlawful reliance" argument requires us to review several additional legal points.

The first principle is that NEPA requires each EIS to include a detailed discussion of mitigation, i.e., measures that might mitigate the adverse environmental consequences of the proposed action. Robertson, 490 U.S. at 351. As the Supreme Court has stated: "The requirement that an EIS contain a detailed discussion of possible mitigation measures flows both from the language of the Act and, more expressly, from CEQ's [the Council on Environmental Quality's] implementing regulations." Id. The discussion of mitigation measures is an "important" part of an agency's "'hard look' at the environmental consequences of proposed federal action." Id. at 352.[93]

[93] The Supreme Court cites with approval the numerous CEQ regulations that require an agency to discuss possible mitigation measures, e.g., 40 C.F.R. §§ 1508.25(b), 1502. 14(f), 1502.16(h), and 1508.20 (the definition of "mitigation"). Robertson, 490 U.S. at 352.

The second NEPA principle of importance to this analysis is that NEPA does not require that "a complete mitigation plan be actually formulated and adopted" before the agency makes its decision. Id. at 352. All that is required is that "mitigation be discussed in sufficient detail to ensure that environmental consequences have been fairly evaluated." Id. The Court has stated that "it would be inconsistent with NEPA's reliance on procedural mechanisms - - as opposed to substantive, result-based standards - - to demand the presence [in an EIS] of a fully developed plan that will mitigate environmental harm before an agency can act." Id. at 353.

The third NEPA principle relevant here is that, as a general rule, NEPA does not mandate that the identified mitigation measures be implemented. Id. at 353 ("We thus conclude that the Court of Appeals erred first in assuming that NEPA requires that action be taken to mitigate the adverse effects of major federal actions.") (internal quotation marks omitted). This follows logically from the basic precept that NEPA does not mandate particular results, i.e., so long as the "adverse effects of the proposed action are adequately indentified and evaluated, the agency is not constrained by NEPA from deciding that other values outweigh the environmental costs." Id. at 350 (citing Strycker's Bay Neighborhood Council, Inc. v. Karlen, 444 U.S. 223, 227-28 (1980) (per curiam); Vermont Yankee, 435 U.S. at 558).

Fourth, the fact that, as a general rule, NEPA does not require the implementation of mitigation measures to avert adverse environmental impacts, does not mean that NEPA or NRC are neutral on the subject of environmental protection, or that NRC is powerless to act. To the contrary, NEPA pronounces our "national environmental policy" as follows: "it is the continuing policy of the Federal Government . . . to use all practicable means and measures . . . to create and maintain conditions under which man and nature can exist in productive harmony." 42 U.S.C. § 4331(a). Likewise, the Atomic Energy Act prohibits NRC from issuing a license to a nuclear power reactor if it would be "inimical . . . to the health or safety of the public." 42 U.S.C. § 2133(d). NRC regulations clearly authorize the agency to require licensees to protect the environment and to prevent them from causing adverse environmental impacts. ("[E]ach

combined license under part 52 of this chapter may include conditions to protect the environment during construction" [and] "during operation." 10 C.F.R. § 50.36b(a) and (b)). The NRC's NEPA regulations underscore this point, specifying that in every COL proceeding, the presiding officer must "determine . . . whether the combined license should be issued, denied, or appropriately conditioned to protect environmental values." 10 C.F.R. § 51.107(a)(3) (emphasis added). Environmental protection is part of NRC's core mission statement. ("The NRC licenses and regulates the Nation's civilian use of radioactive materials to protect public health and safety, promote the common defense and security, and protect the environment." NRC Mission Statement, http://www.nrc.gov/about-nrc.html.) NRC can and does impose environmental conditions when it issues COLs. The question is whether the AEA, NEPA, and 10 C.F.R. § 50.36 and 51.107 require NRC to impose such conditions here.

The fifth legal principle relevant here is that, as noted above, NEPA does not require NRC to generate every environmental data point, study, and assessment from scratch. NRC may rely on competent and professionally developed data and studies performed by the applicant or by appropriate federal, state, and local governmental entities, provided that NRC exercises its own independent judgment with regard to the ultimate conclusions about the environmental impacts of the project.[94]

Finally, we note that, absent information to the contrary, NRC may properly assume that an applicant or licensee will comply with concrete and enforceable conditions and requirements imposed by statutes, regulations, licenses, or permits issued by competent federal, state, or local governmental entities.[95] Thus, if a Federal or State environmental agency issues a permit

[94] We note that the NRC is not simply relying on a claim that the FDEP is "on duty." The United States Court of Appeals for the District of Columbia Circuit rejected an NRC argument that leaks from spent fuel pools "will not occur because the NRC is 'on duty.'" New York v. NRC, 681 F.3d 471, 481 (D.C. Cir. 2012). Here, the NRC relies on more than a claim that FDEP is "on duty." That is, it relies on a number of well-developed and detailed plans and regulatory processes.

[95] See, e.g., Pacific Gas & Elec. Co. (Diablo Canyon Power Plant, Units 1 and 2), CLI-03-02, 57 NRC 19, 29 (2003) ("[W]e assume that our licensees will comply with this agency's safety

to the operator of a nuclear power plant that imposes numerical limits on the amount of pollution that the plant may emit, then the NRC's FEIS may reasonably assume that the company's emissions will comply with those numerical limits.[96]

Applying the foregoing NEPA legal principles to the facts of this case, we note that the monitoring and mitigation measures discussed in the instant FEIS are the crucial justification for the FEIS conclusions that the environmental impacts of the proposed LNP will be SMALL or SMALL to MODERATE. This is not a situation where the NRC concludes that the environmental impacts will be LARGE, and then discusses some mitigation measures that are optional possibilities. Instead, the NRC has concluded that the impacts will be SMALL in specific reliance on the implementation and efficacy of certain prescribed mitigation measures. In this situation, the mitigation measures are not merely optional. But for the monitoring and mitigation measures specified in the COC, the NRC would not have reasonable assurance that the environmental impacts would be SMALL or SMALL to MODERATE, and the FEIS conclusions to that effect would be unwarranted. But for the monitoring and mitigation measures, the FEIS's conclusion that the impact will be SMALL would lack sufficient support.

On this basis, we conclude, as a matter of law, that if, as here, an FEIS relies on monitoring and mitigation as a necessary basis for concluding that the environmental impacts of issuing a license will be SMALL, then the NRC must have reasonable assurance that the monitoring and mitigation will actually be implemented and successful. In such a circumstance, the monitoring and mitigation measures are not merely options that can be ignored or discarded at will.

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regulations."); U.S. Dept. of Energy (High Level Waste Repository), LBP-09-06, 69 NRC 367, 466 (2009) ("[T]he NRC generally presumes that licensees will comply with its regulations.").

[96] See, e.g., 10 C.F.R. § 51.71(d) n.3 ("Compliance with the environmental quality standards and requirements of the Federal Water Pollution Control Act (imposed by EPA or designated permitted states) is not a substitute . . . for NRC to weigh all environmental impacts of the proposed action.").

Next, we turn to the issue as to whether NRC must incorporate the COC monitoring and mitigation measures into the COL in order to have reasonable assurance that they will actually be implemented and successful.

We hold that reasonable assurance does not always require incorporation into the COL. This Board has examined the COC and the statutory and regulatory system that generated the COC and that will enforce its provisions. The monitoring and mitigation conditions specified in the COC are concrete, mandatory, and specific. This Board has reasonable assurance that the relevant expert State and local agencies, e.g., the FDEP and SWFWMD, will actively monitor and police compliance with these COC monitoring and mitigation measures. Likewise, we conclude, as a matter of law, that there is reasonable assurance that PEF will comply with the monitoring and mitigation measures mandated by the COC.

Now we turn to the issue as to whether it is unlawful for the FEIS to rely on monitoring and mitigation plans (e.g., the EMP, APT Plan, AWS Plan) that do not yet exist.

We hold that the concrete and highly prescriptive provisions of the State COC, mandating the development and finalization of the EMP, APT Plan, AWS Plan, and other monitoring and mitigation measures, combined with the active oversight and policing of the state and local environmental agencies (e.g., the FDEP and SWFWMD) provide the NRC with reasonable assurance that sound monitoring and mitigation measures will actually be implemented and will be successful.[97] This case is analogous to the facts in Robertson, where the EIS issued by the United States Forest Service relied on mitigation measures that were yet to be developed. Robertson, 490 U.S. at 347. ("[T]he EIS made it clear that commercial

[97] The Council on Environmental Quality (CEQ) has recently issued guidance on the appropriate use of mitigation and monitoring under NEPA. See CEQ "Final Guidance for Federal Departments and Agencies on Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact," 76 Fed. Reg. 3,843 (Jan 21, 2011). The guidance "ensures that the public and decisionmakers are fully informed of any promised mitigation and an agency's clear commitment to perform or ensure the performance of that mitigation." Id. at 3,844.

development in the Methow Valley will result in violations of state air-quality standards unless effective mitigation measures are put in place by the local governments and private developer.") The Court held that NEPA does not require that a "complete mitigation plan be actually formulated and adopted" before the federal agency can issue an EIS and render its decision. Id. at 371.

> In this case, the off-site effects on air quality and on the mule deer herd cannot be mitigated unless nonfederal governmental agencies take appropriate actions. Since it is those state and local governmental bodies that have jurisdiction over the area in which the adverse effects need to 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 371-72.

On this basis, we conclude that it was reasonable for NRC to rely on the monitoring and mitigation measures mandated by the COC, even though the specific measures are yet to be developed and finalized, and to rely on the FDEP and SWFWMD to assure that such measures will actually be implemented and successful. In the circumstances presented here, as in Robertson, NEPA does not require that all of these measures be fully developed and finalized before the NRC can act.[98]

[98] The facts and posture of this case is substantially different from the situation posed in Detroit Edison Company (Fermi Nuclear Power Plant, Unit 3), LBP12-23, 76 NRC __ (slip op.) (Nov. 9, 2012). Like this case, in Fermi the intervenors challenged the adequacy of the DEIS characterization that the environmental impacts of the proposed COL on the Eastern Fox Snake would be SMALL because the DEIS relied on a certain mitigation measures, i.e., an Eastern Fox Snake Conservation Plan developed by the applicant. Id. at 17. The applicant moved for summary disposition, asserting that its Conservation Plan established that there could be no genuine dispute that the mitigation would be implemented and successful. Id. The Fermi Board denied the motion on the ground that Conservation Plan was not sufficient to resolve all disputed questions of material fact. Id. at 23. The Fermi Board noted that there were material factual questions as to whether the State agency would require implementation of the Conservation Plan. Id. at 24. The Board noted that the record failed to show that the Conservation Plan was "imposed by statute or regulation" or has been so integrated into the applicant's proposal to build an new nuclear power reactor that it is impossible to define the proposal without the mitigation. Id. at 26. The Fermi Board noted that the DEIS indicated that the State would "probably" impose the Conservation Plan and it would probably work. Id. Thus,

VI. CONCLUSION AND ORDER

Based on our review of the entire evidentiary record in this proceeding and our findings of fact and conclusions of law set forth above, the Board concludes that, with regard to the specific issues raised by Contention 4A, the NRC has carried its burden of demonstrating that its Final Environmental Impact Statement complies with the National Environmental Policy Act and with 10 C.F.R. Part 51.[99] Contention 4A is resolved in favor of the NRC.[100]

This partial initial decision[101] shall constitute the partial final decision of the Commission unless, within twenty-five (25) days of its service, a petition for review is filed in accordance with

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the Fermi decision is distinct from this case in two major respects. First, here, the State has already issued the COC mandating that the EMP, APT Plan, AWS Plan, etc will be developed and finalized in accordance with a strict and thorough array of State statutory and regulatory requirements. Second, the denial of a motion for summary disposition, on the ground that there are material facts that are still in dispute, is entirely different from this case, where we have conducted a two-day evidentiary hearing addressing the reliability of the COC-mandated monitoring and mitigation measures. The monitoring and mitigation measures imposed by the COC are not mere hypothetical or voluntary commitments that may never materialize. They are concrete and reliable actions that NRC can have reasonable assurance will be implemented.

[99] This proceeding has concerned a contested aspect of the PEF license application, i.e., Contention 4A. Given that PEF's application involves construction of a new nuclear power plant, Section 189a of the Atomic Energy Act also requires that the NRC conduct a hearing on the uncontested environmental and safety aspects of the proposed Levy Nuclear Plant. 42 U.S.C. § 2239(a)(1)(A). See 10 C.F.R. § 51,107(a)(1)-(4). The NRC Commissioners plan to conduct that "mandatory" hearing at a later date.

[100] Pursuant to 10 C.F.R. § 2.1207(a)(3)(iii), the Board, by separate order, is providing to the Commission's Secretary, a copy of all questions submitted by the parties prior to and during the course of the evidentiary hearing.

[101] This initial decision is partial because on July 9, 2012, the Intervenors filed a motion to admit a new contention based on the decision in New York v. NRC, 681 F.3d 471 (D.C. Cir. 2012), invalidating certain portions of the NRC's Waste Confidence Rule. On August 7, 2012, the Commission ordered that this proposed new contention be held in abeyance. Calvert Cliffs Nuclear Project, LLC (Calvert Cliffs Nuclear Power Plant Unit 3), et al., CLI-12-16, 76 NRC __, __ (slip op. at 6) (Aug. 7, 2012). This contested adjudicatory proceeding will remain pending until the proposed waste confidence rule contention is resolved.

10 C.F.R. §§ 2.1212 and 2.341(b).[102] Filing of a petition for review is mandatory for a party to exhaust its administrative remedies before seeking judicial review. 10 C.F.R. § 2.341(b)(1).

It is so ORDERED.

THE ATOMIC SAFETY AND
LICENSING BOARD

/RA/

_____
Alex S. Karlin, Chairman
ADMINISTRATIVE JUDGE

/RA/

_____
Dr. Anthony J. Baratta
ADMINISTRATIVE JUDGE

/RA/

_____
Dr. Randall J. Charbeneau
ADMINISTRATIVE JUDGE

Rockville, Maryland
March 26, 2013

[102] The time to file a petition for review under 10 C.F.R. § 2.341(b) was recently extended from fifteen (15) days to twenty-five (25) days. Amendments to Adjudicatory Process Rules and Related Requirements, Final Rule. 77 Fed. Reg. 46,561, 46,596, (Aug. 3, 2012).

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing **PARTIAL INITIAL DECISION (RULING ON CONTENTION 4A) LBP-13-04** have been served upon the following persons by Electronic Information Exchange.

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Office of the Secretary of the Commission

Dated at Rockville, Maryland
this 26th day of March 2013