UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)		
	)	Docket Nos.	52-040-COL
Florida Power & Light Company	)		52-041-COL
	)		
Turkey Point Units 6 and 7	)	ASLBP No.	10-903-02-COL
(Combined License Application)	)		

FLORIDA POWER & LIGHT, CO.'S INITIAL STATEMENT OF POSITION IN THE CONTESTED HEARING FOR CONTENTION 2.1

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I. Introduction

Pursuant to the Atomic Safety and Licensing Board's ("Board") Initial Scheduling Order in this proceeding of March 30, 2011,[1] as revised by the Board's November 15, 2016 Final Scheduling Order,[2] Florida Power & Light, Co. ("FPL") hereby submits its Initial Statement of Position ("Initial Statement") in the contested hearing regarding Contention 2.1. For the reasons set forth below, the October 28, 2016 Final Environmental Impact Statement ("FEIS")[3] prepared by the Nuclear Regulatory Commission ("NRC") Staff specifically and adequately addresses, and appropriately characterizes as "small," the environmental impacts at issue in Contention 2.1, as required under the NRC's regulations at 10 C.F.R. Part 51 and the National Environmental Policy Act ("NEPA").

In general, Contention 2.1 challenges the FEIS's[4] analysis and characterization of the environmental impact of four chemicals in certain concentrations that may be present in wastewater that Turkey Point Units 6 & 7 will inject into the Boulder Zone in southeastern Florida. However, as demonstrated in this Initial Statement and in the testimony and related exhibits sponsored by FPL's four witnesses, the FEIS has taken the required "hard look" at the "reasonably foreseeable" environmental impacts at issue in Contention 2.1. In addition, the FEIS

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[1] Florida Power & Light Co. (Turkey Point Units 6 and 7), Order (Initial Scheduling Order and Administrative Directives) (Mar. 30, 2011) (unpublished) (ML110890768).

[2] Florida Power & Light Co. (Turkey Point Units 6 and 7), Order (Final Scheduling Order) (Nov. 15, 2016) (unpublished) (ML16320A248).

[3] NUREG-2176, "Environmental Impact Statement for Combined Licenses (COLs) for Turkey Point Nuclear Plant Units 6 and 7," Final Report (Oct. 28, 2016) (ML16300A104, ML16300A137, ML16301A018, and ML16300A312).

[4] Contention 2.1 directly challenges the Draft Environmental Impact Statement ("DEIS"). NUREG-2176, "Environmental Impact Statement for Combined Licenses (COLs) for Turkey Point Nuclear Plant Units 6 and 7," Draft Report (ML155055A103 and ML155055A109). However, since the FEIS has superseded the DEIS, FPL will refer to Contention 2.1 as challenging the FEIS.

discloses those potential impacts in great detail and accurately characterizes them as "small." Accordingly, Contention 2.1 is without merit.

II. Background

A. History of the Proceeding

In 2009, FPL submitted to the NRC a combined license ("COL") application, including an Environmental Report ("ER"), for two AP1000 pressurized water reactors to be located at the Turkey Point site, adjacent to existing units, near Homestead, Florida.[5] In its application, FPL proposes to use reclaimed water provided by the South District Wastewater Treatment Plant ("South District Plant") in Miami-Dade County, Florida, as a source of makeup water for the circulating cooling water system proposed at Turkey Point. FPL proposes to discharge Turkey Point's wastewater, which would include the reclaimed water, through a pipeline system into deep wells that inject into the Boulder Zone of the floridan aquifer system.

On September 4, 2009, the NRC Staff accepted FPL's application for docketing.[6] On June 18, 2010, the NRC published a Notice of Hearing and Opportunity to Petition for Leave to Intervene in this proceeding.[7] On August 17, 2010, Mark Oncavage, Dan Kipnis, Southern Alliance for Clean Energy, and National Parks Conservation Association ("Joint Intervenors") filed a timely petition to intervene.[8] The Board admitted Joint Intervenors' proposed Contention

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[5] See Letter from M. K. Nazar, FPL, to M. Johnson, Office of New Reactors, NRC (June 30, 2009) (ML091830589).

[6] 74 Fed. Reg. 51,621 (Oct. 7, 2009).

[7] 75 Fed. Reg. 34,777 (June 18, 2010).

[8] Petition for Intervention by Mark Oncavage, Dan Kipnis, Southern Alliance for Clean Energy, and National Parks Conservation Association (August 17, 2010) (ML102300582).

2.1,[9] which—after various revisions and summary judgment motions—was ultimately reformulated by the Board on April 21, 2016 to allege that:

> The [Draft Environmental Impact Statement ("DEIS")] is deficient in concluding that the environmental impacts from FPL's proposed deep injection wells will be 'small.' The chemicals ethylbenzene, heptachlor, tetrachloroethylene, and toluene in the wastewater injections at concentrations listed in DEIS Table 3-5 may adversely impact the groundwater should they migrate from the Boulder Zone to the Upper Floridan Aquifer.[10]

On October 28, 2016, the NRC published its FEIS for Turkey Point. Table 3-5 of the FEIS[11] contains concentration data for ethylbenzene, heptachlor, tetrachloroethylene, and toluene (the "four chemicals") that FPL provided in ER Table 3.6-2,[12] and that the NRC Staff previously included in Table 3-5 of the DEIS.[13] The FEIS also includes a thorough analysis of the potential for wastewater to migrate out of the Boulder Zone and impact the environment.[14]

In the FEIS, the NRC Staff concluded that "[a]fter considering the environmental aspects of the proposed action before the NRC, the NRC staff's recommendation to the Commission is that the COLs be issued as proposed."[15] The FEIS adds:

> [t]his recommendation is based on (1) the application, including the Environmental Report (ER), submitted by FPL; (2) consultation with Federal, State, Tribal, and local agencies; (3) the review team's independent review; (4) the consideration of public comments received on the environmental review; and

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[9] Florida Power & Light Co. (Turkey Point Nuclear Generating Plant, Units 6 and 7), LBP-11-06, 73 NRC 149, 187 (2011).

[10] Florida Power & Light Co. (Turkey Point Nuclear Generating Plant, Units 6 and 7), LBP-16-3, 83 NRC 169, 186 (2016).

[11] NRC-008A (FEIS) at 3-39.

[12] ER, Rev. 3, § 3.6 at 3.6-7 (ML11362A171).

[13] DEIS at 3-38 (ML15055A103).

[14] See, e.g., NRC-008A (FEIS) at 2-55 to 2-58, 5-20 to 5-29, 5-39 to 5-42; NRC-008C (FEIS) at G-48 to G-50.

[15] NRC-008A (FEIS) at iii.

> (5) the assessments summarized in this EIS, including the potential mitigation measures identified in the ER and this EIS.[16]

Specifically relevant to the issues raised by Contention 2.1, the FEIS also found that "significant upwelling of injected wastewater is not likely at the Turkey Point site and that, if upwelling did occur it would not noticeably impact overlying [underground source of drinking water] aquifers."[17] Thus, according to the FEIS, the environmental impact of injected wastewater from Turkey Point would be "small."[18]

In addition to NRC's review under NEPA, the Florida Department of Environmental Protection ("FDEP") has reviewed and will continue to review FPL's plan to use deep-well injection and its environmental impacts. Applying its comprehensive regulations, the FDEP has already granted Turkey Point a permit to build an exploratory well ("EW-1") and convert that well into an injection well to begin operational testing.[19] Each additional well at the Turkey Point site will go through the permit process.[20] As a result, each of the injection wells that Turkey Point wants to construct at the site must undergo a suite of testing to demonstrate the presence or absence of a confining zone.[21] The FDEP will then review the data to determine if there is sufficient evidence of confinement at each well.[22] If the FDEP determines that any injection well does not have sufficient confinement, it will not issue a permit approving the use

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[16] NRC-008A (FEIS) at iii-iv.
[17] NRC-008A (FEIS) at 5-21.
[18] See NRC-008A (FEIS) at 5-41 to 42.
[19] FDEP, Notice of Permit (July 29, 2013) (ML16278A746).
[20] See NRC-008A (FEIS) at 5-41.
[21] FPL-002 (McNabb) at ¶ 34.
[22] See FPL-002 (McNabb) at ¶¶ 10, 33.

of the well.[23] This FDEP regulation of Turkey Point's injection system provides additional assurance that the impact of wastewater injection will be "small." See FEIS at 5-41 to 42.

III. Experts

This Initial Statement is supported by Pre-Filed Direct Testimony (including related exhibits) from the following FPL witnesses:

A. Mr. Paul Jacobs

- Mr. Jacobs' fact witness testimony describes FPL's proposed processes for obtaining, treating, using, and disposing of wastewater associated with the circulating water system for Turkey Point Units 6 & 7. He also testifies that, if the wastewater is not used at Turkey Point, it would be directly injected into the Boulder Zone at the South District Plant.

- Mr. Jacobs is the Supervising Engineer for the Turkey Point Units 6 & 7 nuclear projects. He has approximately 40 years of experience working as a nuclear engineer. He has taken graduate courses in Nuclear Engineering at New York University and has a B.S. in Nuclear Engineering from the State University of New York, Maritime College, New York.

- Mr. Jacobs' testimony is set forth in FPL-001.

B. Mr. David McNabb

- Mr. McNabb's expert testimony shows how data from Turkey Point's exploratory well EW-1 indicates that the wastewater injected by Turkey Point will be confined in, or near, the Boulder Zone. He testifies that FPL has followed standard industry practice in demonstrating such confinement with respect to well EW-1 to the satisfaction of the FDEP.

- Mr. McNabb also testifies that the design of Turkey Point's injection wells, and the process by which those wells will be constructed, will contribute to such confinement. He also testifies that state-required well monitoring programs will enable FPL and the FDEP to address the unlikely events of any leaks or migration of Turkey Point wastewater into an underground source of drinking water ("USDW").

[23] FPL-002 (McNabb) at ¶ 10.

- Mr. McNabb holds a M.S. in Geology from the University of Texas at Arlington, and a B.S. in Geology from Indiana University. He is a Registered Professional Geologist in the State of Florida, and has worked as a geologist in Florida for 24 years. In his career, Mr. McNabb has focused on the siting, design, construction oversight, testing, and permitting of deep injection wells in Florida, obtaining approximately 35 to 40 underground injection control permits from the FDEP.

- Mr. McNabb's testimony is set forth in FPL-002, and he sponsors Exhibit No. FPL-005.

C. Dr. Robert G. Maliva

- Dr. Maliva's expert testimony concludes that it is highly unlikely that wastewater injected into the Boulder Zone at Turkey Point will migrate upward through a 1,465 foot confining zone into a USDW and impact a public water supply well.

- Dr. Maliva also testifies that FPL and the NRC Staff have developed sufficient data, consistent with industry standards, to determine the likelihood of confinement at the Turkey Point site.

- Dr. Maliva holds a Ph.D. in Geology from Harvard University, a M.S. in Geology from Indiana University Bloomington, and a B.S. in Geology from the State University of New York at Binghamton. He is a Registered Professional Geologist in Florida and Texas. Dr. Maliva has worked as a hydrogeologist specializing in Florida geology for over 20 years. He has extensive experience working on alternative water supply and disposal projects, such as injection well systems. Dr. Maliva is one of the world's preeminent experts in the geology of South Florida, and has published various peer-reviewed papers on the subject.

- Dr. Maliva's testimony is set forth in FPL-003, and he sponsors Exhibit Nos. FPL-006 to FPL-029.

D. Dr. Christopher M. Teaf

- Dr. Teaf's expert testimony demonstrates that the four chemicals in the concentrations at issue in Contention 2.1 would exert undetectable, much less small, effects on the USDW (1) in the unlikely event that the wastewater were to migrate upward; or (2) even if the wastewater were to be injected directly into drinking water in South Florida (which is not proposed here).

- Dr. Teaf testifies that the chemicals in the concentrations at issue in Contention 2.1, are all well below Federal drinking water standards, which means that they are safe for consumption in drinking water.

- Dr. Teaf holds a Ph.D. in Toxicology from the University of Arkansas for Medical Sciences, a M.S. in Biological Science from Florida State University, and a B.S. in Biology (with Honors) from Pennsylvania State University. He has been a Director and Associate Director of the Center for Biomedical and Toxicological Research at Florida State University for over three decades. Dr. Teaf is a Board-certified Fellow of the Academy of Toxicological Sciences, and has practiced in the field of toxicology for over 30 years. He has performed several hundred chemical risk assessments addressing human health, chemicals management, and evaluations of potential for exposure and adverse effects related to chemical exposures.

- Dr. Teaf's testimony is set forth in FPL-004, and he sponsors Exhibit Nos. FPL-030 to FPL-059.

IV. Legal Standards

A. NEPA's Hard Look Requirement and the Rule of Reason

Section 102 of NEPA, as amended, directs that an Environmental Impact Statement ("EIS") be prepared for all Federal Actions that significantly affect the quality of the human environment.[24] The NRC has implemented Section 102 of NEPA in Title 10 of the Code of Federal Regulations ("C.F.R.") Part 51. In 10 C.F.R. § 51.20, the NRC has determined that issuance of a COL under 10 C.F.R. Part 52 is an action that requires preparation of an EIS.

The Commission has found that NEPA serves a dual purpose: 1) to ensure that Federal officials fully take into account the environmental consequences of a Federal action before reaching major decisions, and 2) to inform the public, Congress, and other agencies of those consequences.[25] According to the U.S. Supreme Court, an EIS:

> ensures that the agency, in reaching its decision, will have available, and will carefully consider, detailed information concerning *significant* environmental impacts; it also guarantees that the relevant information will be made available to

[24] 42 U.S.C. § 4332(C)(i).

[25] Private Fuel Storage L.L.C. (Independent Spent Fuel Storage Installation), CLI-02-25, 56 NRC 340, 347 (2002).

> the larger audience that may also play a role in both the decisionmaking process and the implementation of that decision.[26]

NEPA itself does not mandate particular results, but 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.[28] "Other statutes may impose substantive environmental obligations on federal agencies, but NEPA merely prohibits uninformed . . . agency action."[29] Indeed, although "one important ingredient of an EIS is the discussion of steps that can be taken to mitigate adverse environmental consequences" to "ensure that environmental consequences have been fairly evaluated," there is no "substantive requirement that a complete mitigation plan be actually formulated and adopted . . . ."[30]

In addition, it is well-established that NEPA requires that an EIS discuss only a project's "reasonably foreseeable impacts."[31] "NEPA also does not call for certainty or precision, but an *estimate* of anticipated (not unduly speculative) impacts."[32] This concept has been described by the courts as a "rule of reason."[33] Thus, while NEPA requires Federal agencies to take a "hard

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[26] Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 349 (1989) (emphasis added).

[27] Id. at 350 (citing Strycker's Bay Neighborhood Council, Inc. v. Karlen, 444 U.S. 223, 227-28 (1980) (per curium) and Vermont Yankee Nuclear Power Corp. v. Natural Res. Def. Council, Inc., 435 U.S. 519, 558 (1978)).

[28] Robertson, 490 U.S. at 350.

[29] Id. at 351 (footnote omitted).

[30] Id. at 351-52 (footnote omitted).

[31] Private Fuel Storage, CLI-02-25, 56 NRC at 348 (footnote omitted); Wyoming Outdoor Council v. U.S. Forest Serv., 165 F.3d 43, 49 (D.C. Cir. 1999).

[32] Louisiana Energy Servs. (National Enrichment Facility), CLI-05-20, 62 NRC 523, 536 (2005) (emphasis in original).

[33] Private Fuel Storage, CLI-02-25, 56 NRC at 347; Davis v. Latschar, 202 F.3d 359, 368 (D.C. Cir. 2000); San Luis Obispo Mothers for Peace v. NRC, 751 F.2d 1287, 1300-01 (D.C. Cir. 1984), vacated on other grounds, 760 F.2d 1320 (D.C. Cir. 1985), cert. denied, 479 U.S. 923 (1986).

look" at the environmental impacts of a proposed action,[34] that requirement is subject to a rule of reason such that the consideration of environmental impacts "need not address every impact that could possibly result, but rather only those that are reasonably foreseeable or have some likelihood of occurring."[35]

The likelihood that the event in question will occur is the important issue for NEPA purposes.[36] If a contention claims that an EIS is inadequate in some respect, "the 'rule of reason' by which NEPA is to be interpreted provides that agencies need not consider 'remote and speculative' risks or 'events whose probabilities they believe to be inconsequentially small.'"[37]

B. The FEIS Is Not a Research Project.

Moreover, an EIS is not intended to be a research document.[38] Although "there 'will always be more data that could be gathered,'" agencies "'must have some discretion to draw the line and move forward with decisionmaking.'"[39] NEPA does not require the use of the "best scientific methodology" nor does it demand virtually infinite study and resources.[40] It also does

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[34] See Louisiana Energy Services, L.P. (Claiborne Enrichment Center), CLI-98-3, 47 NRC 77, 87-88 (1998).

[35] Southern Nuclear Operating Co. (Early Site Permit for Vogtle ESP Site), LBP-09-7, 69 NRC 613, 631 (2009) (citing Long Island Lighting Co. (Shoreham Nuclear Power Station), ALAB-156, 6 AEC 831, 836 (1973)).

[36] Vermont Yankee Nuclear Power Corp. (Vermont Yankee Nuclear Power Station), CLI-90-4, 31 NRC 333, 334-35 (1990).

[37] Vermont Yankee Nuclear Power Corp. (Vermont Yankee Nuclear Power Station), ALAB-919, 30 NRC 29, 44 (1989) (citation omitted).

[38] Entergy Nuclear Generation Co. (Pilgrim Nuclear Power Station), CLI-10-22, 72 NRC 202, 208 (2010).

[39] Entergy Nuclear Generation Co. (Pilgrim Nuclear Power Station), CLI-10-11, 71 NRC 287, 315 (2010) (footnote omitted).

[40] Id. at 315.

not require a "worst case" analysis.[41] Rather, "NEPA 'should be construed in the light of reason.'"[42]

C. Levels of Significance

The NRC has established three levels of "significance" for disclosing in an EIS the level of environmental impacts of a proposed action.[43] They are:

- SMALL – Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
- MODERATE – Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.
- LARGE – Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.[44]

V. Summary of Argument

Contention 2.1 alleges that the FEIS fails because it does not adequately address the potential environmental impacts of deep-well injection if heptachlor, toluene, ethylbenzene, or tetrachloroethylene in certain concentrations were to migrate from the Boulder Zone to the Upper Floridan Aquifer. This is incorrect. FPL and its expert witnesses will show that the FEIS fully and comprehensively addresses, and correctly characterizes as small, the environmental impacts of the wastewater injection proposed for Turkey Point Units 6 & 7.

The FEIS is the product of years of study by the NRC Staff and the United States Army Corps of Engineers. That study included an extensive, independent evaluation and analysis of,

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[41] Vermont Yankee, CLI-90-4, 31 NRC at 334; Vermont Yankee, ALAB-919, 30 NRC at 51.
[42] Entergy Nuclear Generation Co. (Pilgrim Nuclear Power Station), CLI-10-11, 71 NRC at 315 (footnote omitted).
[43] NRC-008A (FEIS) at 1-4 to 1-5.
[44] NRC-008A (FEIS) at 1-4 to 1-5.

among other things: the Turkey Point 6 & 7 COL application, including the Environmental Report ("ER"); FPL's responses to requests for additional information from the NRC Staff; interactions with State and Federal agencies; the results of the public scoping process including review of written comments by the public on the DEIS; the FDEP regulations applicable to deep-well injection under the Underground Injection Control Program and local permits; published studies relating to deep well injection in South Florida; modeling performed by FPL; modeling performed by the NRC Staff; and FPL's Report on the Construction and Testing of Class V Exploratory Well EW-1. Accordingly, the FEIS took a "hard look" at the reasonably foreseeable impacts of deep-well injection at the Turkey Point site. The FEIS, therefore, satisfies NEPA's "rule of reason."

The allegation in Contention 2.1 that the FEIS does not adequately address the potential adverse impact of deep-well injection if the four chemicals were to migrate from the Boulder Zone to the Upper Floridan Aquifer is baseless. As FPL's experts testify, the FEIS review team correctly concluded that "significant upwelling of injected wastewater is not likely at the Turkey Point site and that, if upwelling did occur it would not noticeably impact overlying USDW aquifers."[45] As FPL's experts also testify, the FEIS correctly determined the environmental impact of injected wastewater from Turkey Point will be "small."[46]

Hydrogeological and groundwater modeling performed by FPL's witness Dr. Maliva shows that it is highly unlikely that wastewater will migrate through a 1,465 foot confining unit from the Boulder Zone to the Upper Floridan Aquifer, the USDW, and any potable drinking

[45] NRC-008A (FEIS) at 5-21.
[46] NRC-008A (FEIS) at 5-155.

water source.[47] In Dr. Maliva's professional opinion "deep well injection is the safest way to dispose of wastewater in South Florida."[48] In fact, "[s]ince wastewater injection began in South Florida in 1943, there has been no suggestion that *any* water injected into the Boulder Zone has ever migrated upward and actually entered a potable water supply well or a surface environment."[49] There is no evidence to show that Turkey Point will be any different, much less that migration into a potable water supply is reasonably foreseeable in this case.

Without the ability to migrate upwards, the only remaining way for the wastewater to enter the Upper Floridan Aquifer or USDW is through a leak in the injection well. However, as Mr. McNabb and the FEIS conclude, modern well construction techniques prevent such direct leaks, and it is highly unlikely that wastewater will enter the UFA or USDW through such a route.[50] Indeed, even if the wastewater were to migrate or leak, FPL has in place state-required methods for detecting migrations or leaks, and the FDEP and FPL would take corrective actions to mitigate the overall impact.[51]

Furthermore, even if all of these layers of protection failed and the wastewater entered the UFA or USDW, Contention 2.1 is still without merit. As, Dr. Teaf testifies, the four chemicals at issue in Contention 2.1 are in such small concentrations (below Federal drinking

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[47] See FPL-003 (Maliva) at ¶ 76.
[48] FPL-003 (Maliva) at ¶ 16.
[49] FPL-003 (Maliva) at ¶ 15.
[50] See, e.g., FPL-002 (McNabb) at ¶¶ 40-41; NRC-008A (FEIS) at 5-22.
[51] See, e.g., FPL-002 (McNabb) at ¶¶ 44-52; NRC-008A (FEIS) at 5-26.

water standards) that they pose no threat to the environment.[52] Indeed, Dr. Teaf concludes that their impact, if any, would be small, even if they were directly injected into drinking water.[53]

For these reasons, the Board should find that the FEIS satisfies the Commission's regulations and NEPA with respect to Contention 2.1. As the FEIS concludes, the Turkey Point 6 & 7 COL should be issued as proposed.[54]

VI. Statement of Position

A. Wastewater Deep-Well Injection at Turkey Point

Turkey Point Units 6 & 7 are designed to primarily[55] use reclaimed wastewater obtained from the South District Plant. This water would normally be disposed of through deep-well injection at the South District Plant.[56] Instead, FPL plans to redirect the water to Turkey Point.[57]

At the South District Plant, the wastewater undergoes treatment with disinfection.[58] The wastewater will then be further treated at Turkey Point to reduce or eliminate certain constituents

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[52] FPL-004 (Teaf) at ¶ 15.

[53] FPL-004 (Teaf) at ¶ 15.

[54] NRC-008A (FEIS) at iii.

[55] The Units do have the ability to use radial collector wells, if reclaimed wastewater becomes unavailable, but FPL expects that there will be a sufficient supply of wastewater available to minimize radial collector well usage. FPL-001 (Jacobs) at ¶ 8.

[56] FPL-001 (Jacobs) at ¶ 17.

[57] See FPL-001 (Jacobs) at ¶ 11.

[58] FPL-001 (Jacobs) at ¶ 9. Due to the lack of other options for wastewater disposal in Florida, the EPA allows for water treatment (pretreatment, secondary treatment, and high-level disinfection) to be used as an alternative that is "as effective as confinement of fluids in protecting USDWs from contaminants in wastewater." NRC-008A (FEIS) at 5-20 to 21 (citing EPA, Fact Sheet: EPA Provides a Regulatory Alternative for Class I Municipal Disposal Wells in Specific Counties in Florida, EPA 815-F-05-033 (2005) (ML16266A249)). As noted in the FEIS, "after additional treatment, 'the movement of fluids into the USDWs, whether known or suspected, should not endanger the USDWs because the quality of the wastewater has been treated to a level that is no longer a threat to USDWs.'" NRC-008A (FEIS) at 5-21 (citing EPA, Protecting Drinking Water Through Underground Injection Control, EPA 816-K-10-004 (2012) (ML16278A744)). The wastewater at the South District Plant receives this "additional treatment." See NRC-008A (FEIS) at 5-21.

from the waste stream.[59] Following treatment at both sites, the wastewater will be stored in Turkey Point's makeup water reservoir and undergo further treatment.[60] It will then be used in FPL's circulating cooling system, and eventually discharged through deep-well injection in the Boulder Zone at the Turkey Point site. [61] For purposes of Contention 2.1, Table 3-5 of the FEIS contains a reliable, conservative, and sufficiently accurate statement of the four chemicals at issue and their concentrations that will be discharged to the deep-injection wells.[62]

B. Explanation of Contention 2.1

As noted above, Contention 2.1 alleges that:

> The DEIS is deficient in concluding that the environmental impacts from FPL's proposed deep injection wells will be 'small.' The chemicals ethylbenzene, heptachlor, tetrachloroethylene, and toluene in the wastewater injections at concentrations listed in DEIS Table 3-5 may adversely impact the groundwater should they migrate from the Boulder Zone to the Upper Floridan Aquifer.

This contention raises two related issues. First: whether the wastewater, and the four chemicals, will migrate into the Upper Floridan Aquifer, including the USDW. Second: whether the four chemicals at the concentrations listed in FEIS Table 3-5 will adversely impact the groundwater should they migrate.

The discussion immediately below in Section VI.C sets forth FPL's position that it is highly unlikely the wastewater will enter the UFA and USDW, either through upward migration or a well leak. Section VI.D addresses how FPL would identify and respond to the highly unlikely upward migration or a well leak, reducing any potential impact on the USDW. Section

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[59] FPL-001 (Jacobs) at ¶ 11.
[60] FPL-001 (Jacobs) at ¶¶ 12-13.
[61] FPL-001 (Jacobs) at ¶¶ 10, 16.
[62] Turkey Point, LBP-16-3, 83 NRC at 179 (2016).

VI.E addresses how, even if the wastewater were to somehow enter the USDW, the environmental impact would be small, if any, as the wastewater would not enter into an actual potable drinking water source. Finally, Section VI.F explains that even if the wastewater were to enter a potable drinking water source, the impact would still be small, if any, because the chemical concentrations of the four chemicals are insignificant from a public health perspective and fall below Federal drinking water standards.

C. The FEIS Adequately Addresses the Likelihood that the Injectate Will Migrate from the Boulder Zone to the Upper Floridan Aquifer.

1. Modeling Conducted by FPL and the NRC Staff Supports a Finding that there Will Be No Migration of Wastewater from Turkey Point into the Upper Floridan Aquifer.

As acknowledged by the FEIS, the hydrogeological data taken from FPL's exploratory well EW-1 and modeling conducted by FPL and the NRC Staff support a finding that there is an adequate confining unit at the Turkey Point site.[63]

Figure 1 below shows the geological units in the vicinity of Turkey Point, based on information from EW-1. Specifically, South Florida contains two aquifer systems: the Biscayne Aquifer and the Floridan Aquifer System, which are separated by the Intermediate Confining Unit. The Biscayne Aquifer extends from land surface to about 140 feet below land surface,[64] and is the primary water source for the Miami-Fort Lauderdale-Palm Beach Metropolitan area.[65] The Intermediate Confining Unit is immediately below the Biscayne Aquifer, and consists of

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[63] The FEIS review team "evaluated local and regional site studies and modeling of the [South District Plant] site, modeling conducted at the Turkey Point site by FPL, and independent confirmatory modeling by the review team," (NRC-008A (FEIS) at 5-26), and determined that "[s]ite data indicates that substantial fracturing of the confining layers is not evident at the Turkey Point site," (NRC-008A (FEIS) at 5-22), and "that upwelling to the Upper Floridan [A]quifer is not likely at the site." NRC-008A (FEIS) at 5-28.

[64] See NRC-008A (FEIS) at 2-53.

[65] FPL-003 (Maliva) at ¶ 25.

approximately 800 feet of clay-rich strata, which keeps the Biscayne Aquifer and Floridan Aquifer System from being hydraulically connected in the relevant area.[66] Therefore, water quality changes in the Floridan Aquifer System will not impact the Biscayne Aquifer freshwater resources.[67]

The Floridan Aquifer System consists of the Upper Floridan Aquifer, the Middle Confining Unit, and the Lower Floridan Aquifer.[68] The Upper Floridan Aquifer contains brackish water that requires advanced treatment before potable use.[69] At the bottom of the Upper Floridan Aquifer is the base of the USDW,[70] at a depth of approximately 1,450 feet at EW-1.[71]

The Middle Confining Unit separates the Upper Florida Aquifer from the Lower Floridan Aquifer.[72] The confinement of liquid wastes injected into the Lower Floridan Aquifer is collectively provided by all strata between the base of the Upper Floridan Aquifer and the Lower Floridan Aquifer, that is, in the Middle Confining Unit.[73] At Turkey Point, this confining strata is approximately 1,465 feet thick (from the base of the Upper Floridan Aquifer at a depth of 1,450 feet to the top of the Lower Floridan Aquifer at a depth of 2,915 feet).[74] The Middle Confining Unit contains saline water and is not part of the USDW.[75]

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[66] FPL-003 (Maliva) at ¶ 26; see NRC-008A (FEIS) at 2-47 to 48.
[67] FPL-003 (Maliva) at ¶ 26.
[68] FPL-003 (Maliva) at ¶ 27; NRC-008A (FEIS) at 2-53.
[69] FPL-003 (Maliva) at ¶ 28; see NRC-008A (FEIS) at 2-54.
[70] The USDW is defined by the Code of Federal Regulations as water having less than 10,000 mg/L total dissolved solids. See 40 C.F.R. § 144.3.
[71] FPL-003 (Maliva) at ¶ 28; see NRC-008A (FEIS) at 2-54.
[72] FPL-003 (Maliva) at ¶ 31.
[73] FPL-003 (Maliva) at ¶ 31; FPL-002 (McNabb) at ¶ 26.
[74] FPL-003 (Maliva) at ¶ 31; FPL-002 (McNabb) at ¶ 26.
[75] FPL-003 (Maliva) at ¶ 29.

Below the Middle Confining Unit is the Lower Floridan Aquifer, which also contains saline water and is not part of the USDW.[76] Part of the Lower Floridan Aquifer is an extremely high transmissivity interval known as the "Boulder Zone."[77] The Boulder Zone is the intended injection zone at Turkey Point Units 6 and 7,[78] as it is used in all deep (Class I) injection wells in South Florida.[79] The Boulder Zone occurs at a depth of 3,030 feet in well EW-1.[80]

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[76] FPL-003 (Maliva) at ¶ 29.
[77] FPL-003 (Maliva) at ¶ 29; see NRC-008A (FEIS) at 2-54.
[78] NRC-008A (FEIS) at 2-54
[79] FPL-003 (Maliva) at ¶ 30.
[80] NRC-008A (FEIS) at 2-55.

HYDRO-GEOLOGIC UNIT	TOP DEPTH (ft)
Biscayne Aquifer	0 - 3
Intermediate Confining Unit	140
Upper Floridan Aquifer (USDW)	1010
Middle Floridan Confining Unit	1450
APPZ (?)	(1700)
Middle Floridan Confining Unit	1930
Lower Floridan Aquifer	2915
Boulder Zone	3030

APPZ (?) denotes uncertainty

Figure 1. Hydrogeology of Turkey Point Site[81]

[81] This graph is excerpted from NRC-008A (FEIS) Fig. 2-19 at 2-48.

Data taken from well EW-1 support a substantive finding of adequate confinement at the Turkey Point site.[82] First, the EW-1 data display characteristics that are clearly indicative of effective vertical confinement, particularly the presence of thick intervals of unfractured rock with low vertical hydraulic conductivities.[83] Dr. Maliva and Mr. McNabb agree that the cuttings, geophysical logs, cores and packer tests from EW-1 *all* indicate that a layer of effective confinement exists.[84] In particular, the borehole geophysical log (in this case the sonic log) contains strong evidence that there is no fracturing in the confining strata at EW-1.[85] The log's data show that the cumulative strata between the base of the USDW and the injection zone "have characteristics indicative of effective vertical confinement."[86] The unfractured rock seen in well EW-1 has proven highly effective in preventing vertical migration of injected wastewater into USDWs at other deep-injection wells in South Florida, and the presence of this rock along with the sonic log is sufficient to indicate adequate confinement.[87]

Groundwater model simulations further confirm what the hydrogeological data show: that significant upward migration into a USDW at the Turkey Point site is highly unlikely.[88] These simulations, created by Dr. Maliva, used a variety of conservative assumptions to provide reasonable assurance that the proposed injection will not cause adverse impacts.[89] Importantly, Dr. Maliva concludes: "the results of all my simulations indicate that the top of the injected

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[82] FPL-003 (Maliva) at ¶ 22; FPL-002 (McNabb) at ¶ 8.

[83] FPL-003 (Maliva) at ¶ 13. While Mr. Quarles claims that the EW-1 data show a lack of confinement, both Dr. Maliva and Mr. McNabb explain how this is the result of limitations in drilling and collecting data. See, e.g., FPL-003 (Maliva) at ¶¶ 22-24; FPL-002 (McNabb) at ¶¶ 35-38.

[84] FPL-003 (Maliva) at ¶ 22; FPL-002 (McNabb) at ¶ 31.

[85] FPL-003 (Maliva) at ¶ 36.

[86] FPL-003 (Maliva) at ¶ 36.

[87] See FPL-003 (Maliva) at ¶¶ 33-36.

[88] FPL-003 (Maliva) at ¶¶ 32, 37-45.

[89] FPL-003 (Maliva) at ¶¶ 41-43.

wastewater will be located *at least* over 1,000 feet below the base of the USDW at the Turkey Point site after a hundred years."[90]

In addition to Dr. Maliva's modeling, the NRC Staff also independently performed a separate confirmatory analysis and determined that upward migration would likely be even less than Dr. Maliva's analysis indicates.[91] Results of the NRC Staff's scenario "confirmed the FPL result that the injectate would move less than 300 ft upward into the [Middle Confining Unit] over a 100 yr period."[92] Ultimately, the Staff concluded that "upwelling to the Upper Floridan [A]quifer is not likely at the site."[93]

FPL's experts agree. As Mr. McNabb states, "[the well] construction technique, coupled with the demonstrated vertically extensive confinement at the site provides me with complete confidence that injected fluid will not migrate through the confinement zone."[94] And Dr. Maliva testifies:

> I find it highly unlikely that the injected wastewater, disposed via deep well injection at Turkey Point, might upwell into a USDW and enter into an actual potable water supply. My hydrogeological analysis and groundwater model both demonstrate that there is a very low probability that wastewater will migrate into a USDW.[95]

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[90] FPL-003 (Maliva) at ¶ 45.
[91] NRC-008A (FEIS) at 5-27.
[92] NRC-008C (FEIS) at G-50.
[93] NRC-008A (FEIS) at 5-28.
[94] FPL-002 (McNabb) at ¶ 41.
[95] FPL-003 (Maliva) at ¶ 76.

In fact, Dr. Maliva adds:

> In my professional opinion, it would be nearly impossible for the injected wastewater to enter the public drinking supply and have any impact on public health.[96]

Accordingly, based on substantial geological data and sophisticated groundwater modeling, both Dr. Maliva and Mr. McNabb agree with the FEIS that "significant upwelling of injected wastewater is not likely at the Turkey Point site."[97]

Joint Intervenors have argued in this proceeding that data from one exploratory well (EW-1) are not sufficient to establish confinement.[98] But an FEIS is not a research project. As stated above, the NRC Staff "must have some discretion to draw the line and move forward with decisionmaking."[99] Moreover, the drilling of only one exploratory well is consistent with FDEP requirements and industry standards. In fact, as Dr. Maliva points out, more than one exploratory well has *never* been drilled for any similar well system in the State of Florida.[100]

In addition, Florida geology does not vary significantly over short distances.[101] For that reason, as Mr. McNabb testifies, "[t]he design of multi-well injection well systems in South Florida is always based on the geology of the first well that is constructed at the site."[102] Nevertheless, FPL will obtain more information, because "the FDEP does not rely on testing from one injection well to demonstrate confinement for an entire multi-well injection well

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[96] FPL-003 (Maliva) at ¶ 76.
[97] FPL-003 (Maliva) at ¶ 78; FPL-002 (McNabb) at ¶ 56 (citing NRC-008A (FEIS) at 5-21).
[98] See Quarles Third Affidavit at ¶ 24 (Feb. 3, 2016).
[99] Pilgrim, CLI-10-11, 71 NRC at 315 (footnote omitted).
[100] FPL-003 (Maliva) at ¶¶ 19-20.
[101] FPL-002 (McNabb) at ¶ 33.
[102] FPL-002 (McNabb) at ¶ 34.

system."[103] Prior to permitting each injection well, FPL must "demonstrate the presence of a confining zone for each individual injection well."[104] Therefore, "each of the 12 proposed injection wells that Turkey Point wants to construct at the site must undergo a suite of testing similar to that performed for EW-1 (collection of drill cutting and rock core samples, performance of geophysical logging and packer testing) to demonstrate the presence or absence of a confining zone."[105] This provides added assurance of adequate confinement.

2. Local and Regional Site Studies and Modeling of the South District Plant Supports a Finding that there Will Be No Migration into the Upper Floridan Aquifer at the Turkey Point Site.

Joint Intervenors' witness Mr. Quarles has argued in this proceeding that recent local studies and prior experiences at the South District Plant cast doubt on the adequacy of the Middle Confining Unit below Turkey Point.[106] He is incorrect.[107] As the FEIS and Dr. Maliva both point out, regional and local studies and findings from the South District Plant generally *support* a finding of adequate confinement at Turkey Point, and demonstrate that injected wastewater from Turkey Point will remain below the Upper Floridan Aquifer.[108] Mr. Quarles' descriptions of the studies contain "misstatements and exaggerations."[109]

First, regional and local studies support the use of deep-well injection. While the USEPA Risk Report from 2003 previously cited by Joint Intervenors identifies some leaks from deep-

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[103] FPL-002 (McNabb) at ¶ 34.

[104] FPL-002 (McNabb) at ¶ 34.

[105] FPL-002 (McNabb) at ¶ 34.

[106] See Quarles Third Affidavit at ¶¶ 25-38 (Feb. 3, 2016); Quarles Second Affidavit at ¶¶ 16-30 (Feb. 17, 2012).

[107] It should be noted that the accuracy of Mr. Quarles' sworn statements have been called into question in the past. See Chevron Corp. v. Donziger, 833 F.3d 74, 96 (2d Cir. 2016). See also Quarles First Affidavit at CV p. 2 (noting participation in Aguida v. ChevronTexaco).

[108] See NRC-008A (FEIS) at 5-23; FPL-003 (Maliva) at ¶ 10.

[109] FPL-003 (Maliva) at ¶ 77.

well injection into the USDWs,[110] Dr. Maliva notes that the Report also specifically concluded that "there is 'low or no risk' for municipal wastewater disposal in South Florida, considering the quality of the injected water, contaminant attenuation processes underground after injection, and the lack of potential pathways to the public water and environment."[111]

Joint Intervenors have argued that other local studies[112] establish a lack of confinement by showing that there are ancient faults or ancient karst collapse structures that would cause wastewater to flow vertically upward at the Turkey Point site.[113] The studies that Joint Intervenors cite, however, do not support their position. As Dr. Maliva states, while "Cunningham et al. (2012) and Cunningham (2015) *speculated* that [such] structural features could be hydraulically active, [they] provided no evidence to that effect and did not collect any data with respect to the hydraulic properties of the features detected."[114] That is, Cunningham never directly investigated the hydraulic properties of the faults or other structural features detected and never provided any evidence that the features could lead to the upward migration of groundwater.[115] In fact, the data indicates that ancient structural features such as small faults do not have a significant impact on the vertical flow of groundwater in the Floridan Aquifer System of South Florida.[116] Thus, contrary to claims by the Joint Intervenors, there is no actual evidence

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[110] Mr. Quarles has claimed that the EPA Risk Report determined that "18 deep well injection well sites in Florida have already contaminated USDWs." Quarles First Affidavit at ¶ 17 (Jan. 23, 2012). This is plainly false, as addressed by Dr. Maliva in his testimony. FPL-003 (Maliva) at ¶ 68.

[111] FPL-003 (Maliva) at ¶ 69 (citing FPL-027 at 300).

[112] Mr. Quarles also has claimed that a report by Reese and Richardson (FPL-024) indicates that confinement remains "uncertain." Quarles Third Affidavit at ¶ 29 (Feb. 3, 2016). In some areas of Florida confinement "remains uncertain," but not at the Turkey Point site. FPL-003 (Maliva) at ¶¶ 70-71.

[113] See Quarles Third Affidavit at ¶ 31 (Feb. 3, 2016).

[114] FPL-003 (Maliva) at ¶ 72 (internal citations omitted).

[115] See FPL-003 (Maliva) at ¶ 72.

[116] FPL-003 (Maliva) at ¶ 73.

of faults at the Turkey Point site that would allow for the rapid upward migration of water through the confining unit.

Mr. Quarles nevertheless has argued that FPL should use a "subsurface investigation similar to what Cunningham performed" (e.g. a seismic reflection survey) to identify any such faults at the Turkey Point site.[117] But, as Dr. Maliva testifies, this would be useless for the purpose of evaluating confinement at the site.[118] While faults can be identified using a seismic reflection survey, such a survey provides no information on the hydraulic conductivity of the fault.[119] The presence of a fault by itself is indeterminate: the fault may have no impact on groundwater flow.[120] As Dr. Maliva suggests, rather than focusing on the presence of potentially irrelevant faults, confinement analyses should focus on the identification of fractured and unfractured intervals, exactly as was done for EW-1.[121] Mr. Quarles' speculative and unsupported theories are not an appropriate area for further investigation under NEPA's "rule of reason."

Mr. Quarles also has claimed that prior migration into the Upper Floridan Aquifer at the South District Plant portends similar issues at Turkey Point.[122] As an initial matter, there has been no leakage of wastewater into the Upper Floridan Aquifer at the South District Plant.[123] Mr. Quarles' allegations that the wastewater at the South District Plant entered the Upper

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[117] Quarles Third Affidavit at ¶ 38 (Feb. 3, 2016).
[118] FPL-003 (Maliva) at ¶ 74.
[119] FPL-003 (Maliva) at ¶ 74.
[120] See FPL-003 (Maliva) at ¶ 73.
[121] FPL-003 (Maliva) at ¶ 75.
[122] See Quarles Second Affidavit at ¶¶ 11-15 (Feb. 17, 2012).
[123] See FPL-003 (Maliva) at ¶ 67.

Floridan Aquifer are wrong.[124] Contrary to Mr. Quarles' assertions, the Avon Park Permeable Zone (into which wastewater migrated at the South District Plant) is not within the Upper Floridan Aquifer.[125]

Mr. Quarles has relied on a 2001 definition of aquifer depths from the Idaho National Engineering and Environmental Laboratory ("INEEL") (Starr et al. 2001) to assert that this Avon Park Permeable Zone is in the Upper Floridan Aquifer. However, the INEEL hydrostratigraphic interpretations are inconsistent with now widely-accepted interpretations by experts very familiar with Florida hydrogeology.[126] According to Dr. Maliva, "the U.S. Geological Survey clearly describes that the Avon Park Permeable Zone is located in the Middle Confining Unit, below the Upper Floridan Aquifer."[127] Thus, "any wastewater that has migrated into the Avon Park Permeable Zone is still located in the Middle Confining Unit, not the Upper Floridan Aquifer."[128]

Joint Intervenors are also incorrect when they link the upward migration at the South District Plant to the presence of "large joints."[129] As Dr. Maliva points out, Walsh and Prince (cited by Mr. Quarles) stated that "*no fracturing of the confining strata at either the NDWWTP or the [South District Plant] has been reported*."[130] In fact, as Dr. Maliva also notes,

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[124] Id.

[125] Id.

[126] FPL-003 (Maliva) at ¶ 67.

[127] Id. (internal citations omitted). As Dr. Maliva testifies,

> The USGS, in what is perhaps now the definitive reference on the hydrostratigraphy of South Florida, specifically states that: "The middle confining unit of the Floridan aquifer system underlies the Upper Floridan aquifer, and in most of the study area, is divided into upper (MC1) and lower (MC2) parts that are separated by the Avon Park permeable zone." FPL-024 at 049.

FPL-003 (Maliva) at ¶ 67.

[128] FPL-003 (Maliva) at ¶ 67.

[129] See Quarles First Affidavit at ¶¶ 13, 24 (Jan. 23, 2012).

[130] FPL-003 (Maliva) at ¶ 65 (citing FPL-028 at 013).

> [t]here is no study of which I am aware that has provided evidence demonstrating that upwards migration at the South District Plant was caused by adverse hydrogeological conditions (e.g., fracturing in the Middle Confining Unit) or provided evidence indicating that fractures or joints were the likely cause of vertical migration.[131]

While upward movement was identified at the South District Plant, this is believed to be the result of well construction issues.[132] The South District Plant injection wells were drilled using older, now obsolete, procedures, which sometimes accidentally created an extra borehole that would act as a direct conduit for vertical flow bypassing the confining layer.[133] As Mr. McNabb testifies, newer well construction methods require that the pilot hole be backplugged with cement, preventing the creation of an extra borehole and eliminating the subsequent risk of vertical flow.[134] And, in any event, the different geologies at the South District Plant and the Turkey Point injection well site make a comparison between the two irrelevant.[135]

Aside from well construction issues, there is also no support for the claim that there are large underground vertical joints creating actual vertical flow pathways through the Middle Confining Unit anywhere in Miami-Dade County.[136] Research indicates that upward migration tends to result from pervasive fracturing of confining strata, not large joints, and such pervasive fracturing would be easily identifiable in the borehole geophysical logs of EW-1 where it is not present.[137]

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[131] FPL-003 (Maliva) at ¶ 66.
[132] See NRC-008A (FEIS) at 5-24 to 25; FPL-003 (Maliva) at ¶¶ 57-58.
[133] FPL-003 (Maliva) at ¶ 58; FPL-002 (McNabb) at ¶ 40.
[134] FPL-002 (McNabb) at ¶ 41; FPL-003 (Maliva) at ¶ 58; see NRC-008A (FEIS) at 5-40.
[135] See FPL-003 (Maliva) at ¶ 59.
[136] FPL-003 (Maliva) at ¶ 62.
[137] FPL-003 (Maliva) at ¶ 64.

D. Impacts from the Four Chemicals also Will Be, at Most, Small, Due to State-Required Monitoring and Mitigation.

Even in the highly unlikely event that upward migration or well leaks of the wastewater might occur, the environmental impacts from deep-well injection would still be, at most, small, because FPL will implement a comprehensive program to detect leaks or upward migration in accordance with FDEP requirements. As the FEIS notes, the "monitoring requirements of the FDEP UIC program are also designed to detect for leaks before significant releases to upper aquifers may occur."[138] According to the FEIS, "UIC permits issued by FDEP require institutional controls and monitoring programs to detect upward migration of injected wastewater. Detection of contaminants at monitoring wells completed in the confining zone or in the Upper Floridan Aquifer would require remedial action."[139] This comprehensive program includes:

- Sampling from dual-zone monitoring wells. FPL will take water samples (on a weekly basis during the first six months to two years of operation and monthly thereafter) from "dual-zone monitor wells"[140] near the base of the USDW and near the top of the confining unit.[141] These samples will be analyzed for numerous parameters meant to detect any changes in the water that would indicate that the injectate has entered the base of the USDW or the top of the confining unit.[142]

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[138] NRC-008A (FEIS) at 5-40.

[139] NRC-008A (FEIS) at 5-41 (citation omitted).

[140] Dual-zone monitor wells are monitoring wells that collect samples at two different depths.

[141] FPL-002 (McNabb) at ¶ 44. While it is not a part of Contention 2.1, Joint Intervenors' expert Mr. Quarles claims that the Biscayne Aquifer should include monitoring wells "in the event of a breach of the Upper Confining Unit." Quarles Third Affidavit at ¶ 48 (Feb. 3, 2016). But Mr. Quarles fails to explain how the injected wastewater might migrate upwards through approximately 2900 feet of subsurface geology to the Biscayne Aquifer. On the contrary, Dr. Maliva sees "no plausible scenario for injected wastewater from Turkey Point to migrate from the Boulder Zone, through the Floridan Aquifer System, and then through the Intermediate Confining Unit into the Biscayne Aquifer." FPL-003 (Maliva) at ¶ 53. A leak is also "inconceivable in an appropriately constructed well." FPL-003 (Maliva) at ¶ 54.

[142] FPL-002 (McNabb) at ¶ 44.

- Continuous water level monitoring of dual-zone monitoring wells. FPL will have continuous water level monitoring in the upper and lower monitoring intervals of each dual-zone monitor well, allowing for the detection of conditions that may be related to upward migration or leaks of injected fluid.[143]

- Continuous pressure monitoring of wells. FPL will continuously monitor the injection wells for leaks by monitoring the pressure of the sealed annular space between the final casing and the injection tubing.[144] If this pressure changes at any time, indicating a leak in the well, it would be detected immediately.[145]

- Mechanical integrity testing of wells. Each injection well will undergo mechanical integrity testing a minimum of every five years, including: a video survey of the injection tubing and injection zone; a pressure test where the annular space between the final casing and the fiberglass reinforced plastic injection tubing is pressurized, typically to approximately 150 psi; and performance of a high-resolution temperature log and radioactive tracer survey on the well.[146]

If any of these methods were to indicate anomalous conditions, FPL and its regulators would be alerted to closely look at the monitoring data to determine if any leaks or migration were present.[147]

These dual-zone monitoring wells will be located in the position best suited to identify leaks or upward migration. As Mr. McNabb testifies, "state regulations dictate that the dual-zone monitor wells will be located near the injection wells for a reason—because injectate does not migrate far from the well."[148] "As the fluid moves laterally away from the point of injection, the injection pressure very quickly dissipates, reducing the likelihood of upward migration."[149]

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[143] FPL-002 (McNabb) at ¶ 44.
[144] FPL-002 (McNabb) at ¶ 45.
[145] FPL-002 (McNabb) at ¶ 47.
[146] FPL-002 (McNabb) at ¶ 45.
[147] FPL-002 (McNabb) at ¶ 46.
[148] FPL-002 (McNabb) at ¶ 48.
[149] FPL-002 (McNabb) at ¶ 48.

If a leak or upward migration were detected, FPL and the FDEP "would work together to remedy the cause."[150] Such a remedy may include "performing additional mechanical integrity or other tests on the injection wells; deepening the injection wells and installing a deeper injection casing; increasing the density of the injected wastestream to equal or exceed the density of the Boulder Zone water; or removing one or more injection wells from service."[151] However, as Mr. McNabb points out, it would be premature to decide on a specific remedy at this stage, as the remedy needs to be tailored to address the cause of the high unlikely leak or migration.[152]

E. Even If It Were to Enter the UFA, the Injectate Will Not Enter a Drinking Water Source.

As described above, and as set forth in the FEIS and the Testimony of Dr. Maliva and Mr. McNabb, it is not reasonably foreseeable that wastewater from Turkey Point would migrate upward from the Boulder Zone, through 1,465 feet of confinement, and into the Upper Floridan Aquifer or a USDW without detection. However, as Dr. Maliva also concludes, even if this highly unlikely series of events were to occur, "it would not result in the contamination of anyone's potable water."[153] As the FEIS states, the "injected wastewater is not expected to migrate far beyond the site in the Boulder Zone."[154] So realistically, "there is no potable water supply wellfield close enough to Turkey Point to be contaminated by the injected water."[155]

The only plausible avenue for human or ecological exposure in Miami-Dade County is through public supply wells and aquifer storage and recovery wells in the Upper Floridan

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[150] FPL-002 (McNabb) at ¶ 50.
[151] FPL-002 (McNabb) at ¶ 50.
[152] FPL-002 (McNabb) at ¶ 52.
[153] FPL-003 (Maliva) at ¶ 46.
[154] NRC-008A (FEIS) at 5-28.
[155] FPL-003 (Maliva) at ¶ 47.

Aquifer.[156] These wells are not everywhere, and not all water in the Upper Floridan Aquifer is used as drinking water, regardless of its designation as a USDW.[157] In fact, most water in the USDW is *not* being used as drinking water and will not be so used in the future, particularly near Turkey Point where the closest drinking water well is 11 miles to the west.[158] It is also "inconceivable that potable water supply wells would ever be installed close enough to Turkey Point to result in the contamination of potable drinking water because FPL owns a large portion of that area, and the distance of Turkey Point from existing and planned water distribution infrastructure is significant."[159]

To enter a potable water supply from the Upper Floridan Aquifer, the wastewater would have to either 1) move horizontally 11 miles through the Boulder Zone to an area below the water supply wellfield, then migrate upward through the confining unit; 2) migrate upward through the confining unit at Turkey Point, then move horizontally 11 miles to an area below the water supply wellfield; or 3) experience some other combination of significant horizontal movement and significant upward migration. None of these scenarios is reasonably foreseeable.[160]

Assuming horizontal migration occurs first, "it would take centuries" for the wastewater to move the 11 miles west from the Turkey Point site through the Boulder Zone before moving upward to the closest drinking water wellfield.[161] As the FEIS notes, "the naturally-occurring

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[156] FPL-003 (Maliva) at ¶ 14.
[157] See FPL-003 (Maliva) at 46.
[158] FPL-003 (Maliva) at ¶ 47.
[159] FPL-003 (Maliva) at ¶ 52.
[160] See FPL-003 (Maliva) at ¶¶ 46 to 52.
[161] FPL-003 (Maliva) at ¶ 51.

hydraulic gradient in the Boulder Zone is small and water flows slowly to the west."[162] As Dr. Maliva testifies, the groundwater flow in the Boulder Zone likely "occurs at an extremely slow rate, less than 60 feet per year or 1.1 miles per century."[163] After such migration, which of course would include dilution and dispersion, the wastewater would still have to travel upwards through the confining unit to reach the wellfield. This simply is not reasonably foreseeable.[164]

Finally, assuming vertical migration occurred first, or assuming initial migration slightly westward in the Boulder Zone and then upward into the Upper Floridan Aquifer, the wastewater would face an even greater hurdle to reaching the closest drinking water wellfield. The groundwater flow direction in the Upper Floridan Aquifer System is towards the southeast,[165] moving any wastewater that might reach the Upper Floridan Aquifer *away* from the public water supply wellfield 11 miles west, and "away from all known and planned future potable public water supply wellfields."[166]

In short, given geologic confinement, geographic separation, and divergent groundwater flow direction, "[n]o plausible pathway exists for significant human or ecological exposure to the wastewater injected into the Boulder Zone at the Turkey Point site, and therefore the public health is protected."[167]

While Joint Intervenors claim that the impact of wastewater injection will be greater than small, they have not advanced a single supportable scientific analysis whereby the public water

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[162] NRC-008A (FEIS) at 5-22.
[163] FPL-003 (Maliva) at ¶ 51.
[164] FPL-003 (Maliva) at ¶ 51.
[165] FPL-003 (Maliva) at ¶ 49
[166] FPL-003 (Maliva) at ¶ 47.
[167] FPL-003 (Maliva) at ¶ 10.

supply will be contaminated by the injected wastewater from Turkey Point. They have not addressed, for example, the speed of groundwater flow in the Boulder Zone, the distance of travel through the confining unit, the groundwater flow direction in the Upper Floridan Aquifer, the distance to drinking water wells, or the likelihood of dilution and dispersion. Nor could they. Considering all of those factors, there is no plausible, much less reasonably foreseeable, scenario where drinking water will be contaminated. Accordingly, there is simply no basis for Joint Intervenors' claim that environmental impacts from the four chemicals would be anything greater than small.

F. The Environmental Impacts of the Constituents at Issue in Contention 2.1 Will Be Small, Regardless of the Extent of Migration.

Finally, even if the wastewater were to somehow enter a public water supply, the impact, if any, from the four chemicals would still be no greater than small, given the concentrations at issue in this case. As Dr. Teaf, a leading expert in the field of toxicology with over 30 years of experience performing chemical risk assessments, concludes, the reclaimed wastewater, including the chemicals in the concentrations at issue, "will have no detectable impact on sources of drinking water or the UFA with regard to human health …."[168] According to Dr. Teaf, "it is entirely unfounded for Joint Intervenors to contend that the FEIS was deficient because it concluded that the environmental impacts from these chemicals in the Turkey Point wastewater will be 'small.'"[169] This is largely because the chemical concentrations at issue are so incredibly small, from a toxicological perspective.[170]

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[168] FPL-005 (Teaf) at ¶ 15.
[169] FPL-005 (Teaf) at ¶ 15.
[170] See FPL-005 (Teaf) at ¶ 56.

The chemicals and the concentrations at issue in this proceeding are set forth in FEIS Table 3-5, and reproduced in Table 1 below. The Federal (USEPA) drinking water maximum contaminant levels ("MCLs") for each of those chemicals are set forth in the last column.

Table 1. Chemical Concentrations in Table 3-5 Versus Federal Standards [171]

Constituent	**FEIS Table 3-5 Concentration (mg/L)**	**USEPA MCL (mg/L)**
Heptachlor	0.000023	0.0004
Ethylbenzene	Below MDL[172]	0.7
Toluene	0.00174	1
Tetrachloroethylene	0.00359	0.005

As Table 1 shows, the concentrations at issue in this proceeding for each of the four chemicals are well below the Federal standards for drinking water in all cases. As Dr. Teaf explains, "[c]oncentrations equal to or less than [the federal drinking water] standards are considered safe for consumption in drinking water."[173] Accordingly,

> it is not reasonable to expect a detectable influence on the local drinking water supply from the four chemicals of interest, given the concentrations at issue [in Contention 2.1]. Indeed, even in the case of sporadic, occasional, or nominal values in excess of a drinking water standard (which my experience gives me no reason to expect here), a conclusion of a health hazard to the population is not warranted.[174]

[171] FPL-005 (Teaf) at Table 1.

[172] The measurements for ethylbenzene were below the method detection limit (MDL), i.e. the concentrations were so small that they could not be measured reliably. FPL-005 (Teaf) at n.3.

[173] FPL-005 (Teaf) at ¶ 20.

[174] FPL-005 (Teaf) at ¶ 32.

Put simply, because the Table 3-5 concentrations are all below federal drinking water standards, the four chemicals "would not pose a health risk to the public even if directly injected into [the] drinking water."[175]

Mr. Quarles has attempted to contradict the federal drinking water standards by referencing a list of harmful effects supposedly derived from ATSDR Tox FAQs documents. According to Mr. Quarles:

> [T]he [four] constituents estimated by FP&L to be in the wastewater are harmful to humans at minute concentrations, as described below. *See* ATSDR Tox FAQs for … heptachlor, ethylbenzene, toluene, and tetrachloroethylene. . . . .
>
> - Heptachlor – possible human carcinogen, and immune and nervous system effects.
> - Ethylbenzene – possible human carcinogen and kidney damage.
> - Toluene – nausea and effects on the nervous system.
> - Tetrachloroethylene – probable human carcinogen, nausea, liver damage, impaired heart function, and death.[176]

However, the referenced "Tox FAQs" and a further review of the scholarly literature reveal that Mr. Quarles' assertions are unsupported. On the contrary, Dr. Teaf identified the following impacts from heptachlor, ethylbenzene, toluene, and tetrachloroethylene:

- Heptachlor – As the Tox FAQs notes, there is no reliable information on the health effects of heptachlor in humans. In animal studies, no adverse effects have been observed at doses *more than 49,500 times* greater than that associated with

[175] FPL-005 (Teaf) at ¶ 33.

[176] Quarles First Affidavit at ¶ 31 (Jan. 23, 2012) (references to selenium and thallium omitted as moot).

the maximum concentration listed in Table 3-5, and therefore no such effects would be caused in humans. [177]

- Ethylbenzene – As the Tox FAQs notes, there are no studies involving the ingestion of ethylbenzene at low concentrations in humans, and "the available studies involving ingestion of ethylbenzene in animals were either of poor quality or were not considered relevant to humans."[178] While acute inhalation at high exposures (greater than 1,000 parts per million) may cause eye irritation, burning, and tearing, this is not a risk in this case, as ethylbenzene was not detected in any of the wastewater samples analyzed.[179]

- Toluene – In animal studies, no adverse effects have been observed at doses *more than 87,000 times* greater than the dose associated with the maximum concentration listed in Table 3-5.[180]

- Tetrachloroethylene – There are no studies involving the ingestion of tetrachloroethylene at low concentrations in humans. Some negative effects have been observed at doses *2,800 times* the maximum concentration listed in Table 3-5, but health effects observed at such high doses would not translate into similar, or indeed any, effects from the low doses set forth in Table 3-5.[181]

Finally, Mr. Quarles has claimed that the four chemicals are unsafe in "minute concentrations."[182] As Dr. Teaf points out, that statement is "inaccurate and misinformed," contrary to the entire concept of federal drinking water standards, and demonstrates Mr. Quarles' lack of experience and training in the fields of toxicology and health impacts.[183] It indicates "a fundamental misunderstanding and/or ignorance of the effects caused by these substances, and

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[177] FPL-005 (Teaf) at ¶ 19. Dr. Teaf also notes that the chemical breakdown product of heptachlor (heptachlor epoxide) would be too small to have any health effect on humans as the worst case concentration is "10 times less than the USEPA and the FDEP drinking water standard for heptachlor epoxide." FPL-005 (Teaf) at ¶ 42.

[178] FPL-005 (Teaf) at ¶ 22.

[179] FPL-005 (Teaf) at ¶ 22.

[180] FPL-005 (Teaf) at ¶ 25.

[181] FPL-005 (Teaf) at ¶ 28. Dr. Teaf also notes that the chemical breakdown products of tetrachloroethylene would be too small to have any health effect on humans. FPL-005 (Teaf) at ¶ 51.

[182] Quarles First Affidavit at ¶ 31 (Jan. 23, 2012).

[183] FPL-005 (Teaf) at ¶ 40.

the doses at which potential effects may, or may not, occur."[184] In addition, while the EPA may have established Maximum Contaminant Level Goals (MCLGs) of zero for both heptachlor and tetrachloroethylene, as its name suggests this is a non-enforceable goal representing a "highly conservative" value that the EPA recognizes often cannot be met due to technological limitations.[185] As Dr. Teaf testifies, "[b]ecause MCLGs include a large margin of safety, detection of a chemical above the MCLG, but below the MCL, does not indicate a human health risk."[186]

Thus, as Dr. Teaf concludes, the concentrations of heptachlor, ethylbenzene, toluene, and tetrachloroethylene listed in FEIS Table 3-5 will have no detectable impact on human health, even if directly consumed in drinking water.[187] In fact, Dr. Teaf testifies that characterizing the potential impact from the four chemicals as small "greatly overstates the case. The available information supports a conclusion that the influence, if any, will be undetectable."[188]

VII. Conclusion

For the reasons set forth above, consistent with its obligations under NEPA, the FEIS fully and comprehensively addresses, and correctly characterizes as "small," the reasonably foreseeable environmental impacts of the wastewater injection proposed for Turkey Point Units 6 & 7.

Hydrogeological data, groundwater modeling, technical literature, and the expert opinions of geologists with decades of training and practical experience studying and licensing

[184] FPL-005 (Teaf) at ¶ 55.
[185] FPL-005 (Teaf) at ¶ 20.
[186] FPL-005 (Teaf) at ¶ 20.
[187] FPL-005 (Teaf) at ¶ 15.
[188] FPL-005 (Teaf) at ¶ 57.

underground injection systems in southeastern Florida all demonstrate that it is highly unlikely that wastewater will migrate through the 1,465 foot confining unit from the Boulder Zone to the Upper Floridan Aquifer, the USDW, or any potable drinking water source. Additionally, the evidence shows that leaks will be prevented through modern well construction techniques. And even if the wastewater were to migrate or leak, as the FEIS and FPL's expert witness point out, FPL has in place state-required methods for detecting migrations or leaks, and the FDEP and FPL would take corrective actions to mitigate the overall impact.

Furthermore, even if all of these layers of protection somehow failed and the wastewater entered the UFA or USDW, Contention 2.1 is still without merit because the four chemicals at issue are present in the wastewater in such small concentrations that they pose no threat to human health or to the environment. Indeed, Dr. Teaf (who has more than three decades of experience as a toxicologist evaluating health impacts from chemical constituents) concludes that their impact would be small, if any, even if they were to enter drinking water directly.

For these reasons, the Board should find that the FEIS satisfies the Commission's regulations and NEPA with respect to Contention 2.1.

Respectfully submitted,

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