THIRD AFFIDAVIT OF MARK A. QUARLES

BEFORE ME, the undersigned authority, personally came and appeared, Mark A. Quarles, who, after being duly sworn, did depose and say:

Qualifications

1. My name is Mark A. Quarles. I am an expert in the field of investigating planned and accidental releases of environmental pollutants to the environment and evaluating the risks associated with those releases.

2. I have specific education and experience performing environmental investigations in fractured sedimentary bedrock such as limestone and have specific education and experience in karst geologic bedrock conditions.

3. I have prepared two previous affidavits in response to the 1.) Environmental Report, Turkey Point Plant, Units 6 and 7, Revision 3 (ER) prepared by Florida Power & Light Company (FP&L) (referred to hereinafter as the "First Affidavit", January 23, 2012) and 2.) Florida Power & Light Company's Response to Joint Intervenor's Motion to Amend Contention 2.1, February 10, 2012 prepared by Florida Power & Light Company (referred to hereinafter as the "Second Affidavit", February 17, 2012) relative to the potential for wastewater injection operations to contaminate the groundwater and drinking water aquifers.

4. Those previous two affidavits provided technical research that supported the expert opinions and conclusions in general, that:
   1) Deep well municipal wastewater injection at the Miami-Dade South District Wastewater Treatment Plant (SDWWTP) – the proposed source of the reclaimed water to be used at the Turkey Point site approximately 10 miles away - had already caused contamination of groundwater and an underground source of drinking water (USDW). Governmental agency response actions after the contamination had been identified concluded that previously unidentified, discrete vertical fractures in the underlying bedrock and / or injection well failure were likely contributing factors to that contamination and that the middle confining unit that was assumed to prevent upward migration of wastewater was not sufficiently impermeable.
   2) No sufficiently detailed subsurface investigation had ever been performed at the Turkey Point site to determine deep and widespread geologic conditions to identify discrete bedrock pathways that allow vertical migration of injected wastewater or to support the existence of adequate confining layers to protect USDWs.
   3) Deep well wastewater injection operations permitted by the Florida Department of Environmental Protection (FDEP) at numerous locations across the state had already contaminated USDWs, according to the Environmental Protection Agency (EPA).
   4) FP&L's conclusion that the proposed Turkey Point deep well injection of millions of gallons of municipal wastewater every day would be SMALL, is unjustified.

5. I have reviewed Statement of Material Facts As To Which No Genuine Issue Exists, In Support of Florida Power & Light Company's Motion for Summary Disposition of Joint Intervenors' Amended Contention 2.1 and its ten (10) supporting List of Exhibits in Attachment 1 (referred to hereinafter as "SOMF").

6. FP&L has concluded in their previous ER and the Draft Environmental Impact Statement (DEIS) that the impact would be "SMALL" because "(1) the injectate will be confined within the Boulder Zone; (2) the injection wells design and testing methods are highly regulated to prevent leaks; and (3.) the state of Florida requires that the injection wells be monitored to ensure they are functioning properly during operation."

7. This Third Affidavit addresses technical information contained in the SOMF and contains my expert opinions, which I hold to a reasonable degree of scientific certainty. My opinions are based on my application of professional judgment and expertise to sufficient facts or data, consisting specifically of documents related to this matter. These are facts and data typically and reasonably relied upon by experts in my field.

8. In my expert opinion, FP&L has still not adequately analyzed and discussed the Turkey Point site-specific conditions, the risks associated with wastewater injection activities, and the potential of wastewater chemical constituents to contaminate USDWs. FP&L's determination of minimal impact and harm potential continues to rely upon incomplete, inaccurate, and unsupported data.

Summary of Opinions

FP&L still has not demonstrated that an adequate geologic confining layer with sufficient aerial extent, thickness, or lithological and hydraulic conditions exists on the Turkey Point site to prevent upward migration of injected municipal wastewater (i.e. partially treated sewage) into USDWs.

9. FP&L installed a single well ("EW-1") to "evaluate the site hydrogeology at Turkey Point and confirm the presence of an injection zone and appropriate confining intervals." (SOMF at #51). After construction and successful testing of that initial well, FP&L expects in the future to install a site-wide injection system of up to 13 deep wells to inject millions of gallons of municipal wastewater into the subsurface. McNabb at 2. That wastewater is naturally more buoyant than salty groundwater that is present at the anticipated injection depth. As such, the wastewater will have a natural tendency rise.

10. FP&L concluded in the SOMF that based upon information collected from the single well EW-1 that "confinement" existed from depths between 1,930 and 2,915 feet below ground surface; such results were "consistent with a regional study of the Floridan Aquifer", and that the "Boulder Zone is an adequate injection zone." SOMF at #59, #60, #61.

11. The Nuclear Regulatory Commission (NRC) DEIS review team reportedly agreed with the FP&L conclusion that adequate confinement of wastewater existed. That opinion was based upon their review of the single well onsite (EW-1) and other "regional" studies. SOMF at #63.

12. Well EW-1 was constructed to a depth of 3,230 feet below pad level and with a 24-inch diameter steel casing installed to a depth of 2,985 feet. McNabb at 2. The geologic bedrock type and the presence of aquifers and confining layers was determined in part, by interpreting pulverized drill cuttings that were brought to the land surface mud rotary and reverse-air system drilling methods. McNabb at 5. Other methods McNabb used to characterize the bedrock included water samples, aquifer hydraulic testing, geophysical logs to determine casing depths, and bedrock core samples at very select intervals.

13. Pulverized drilling cuttings that are inspected on the ground surface from deep drilling depths do not provide adequate information to determine bedrock conditions such as the presence of voids, fractures, faults, hydraulic capacity, or the confining nature of the bedrock. As such, any determinations of those cuttings would be a qualitative, general evaluation only.

14. McNabb only collected ten (10) bedrock core samples that varied between 2 and 14 feet long from the entire 3,230-foot deep well, and those samples were randomly collected from 1,721.5 to 2,679 feet below pad level.

15. Given the number of cores and lengths of each, the core sampling program only included 122 feet of the entire 3,230-foot deep well (approximately 4 percent of the total depth). As a result, bedrock conditions reported by McNabb for the remaining 96 percent of the boring were generalized.

16. Based in part on the 122 feet of bedrock core data, McNabb concluded that a 650-foot section of the Avon Park Formation (from 1,930 to 2,580 feet below pad level) was "the primary confinement below the base of the lower most USDW and prevents fluids of differing quality from migrating between more permeable zones above and below this confining interval." McNabb at 15.

17. McNabb used the combined results of the bedrock core samples and data collected during formation straddle packer tests to conclude that the "primary confining unit between the USDW and the injection zone" was deeper than originally estimated – a 985-foot section of the Avon Park Formation between 1,930 and 2,915 feet below pad level. McNabb at 25. Of the 122 feet of bedrock coring program, 109 feet was collected from the Avon Park Formation confinement unit, as determined by McNabb. McNabb at 13.

18. McNabb analyzed bedrock core samples from the collected 122 feet to determine how much of the boring interval actually contained bedrock – a measurement that can also be used to determine the amount of air or water-filled voids in the bedrock. The measurement is called the "percent recovery." McNabb at 13. The low percent recoveries of those core samples reported by McNabb are suggestive of voids in the

bedrock – characteristics that are not favorable for bedrock to be considered a "confining unit." As an example, for the interval specifically within the McNabb-designated "primary confinement unit" (1,930 to 2,915 feet deep), the recoveries ranged from 8 to 92.9 percent – with an average of approximately 54 percent recovery. McNabb at 13. The 8 percent recovery of one interval means that voids or very soft or fractured bedrock were present for more than 90 percent (9 feet of a 10-foot core) of the bedrock core sample.

19. McNabb used measurements for porosity as another laboratory method to determine what amount voids existed within a specific portion of a bedrock core sample. That measurement of porosity is expressed as "percent porosity." Porosity measurements collected by McNabb during the construction of EW-1 ranged from 27.5 to 43.4 percent and averaged 37 percent. McNabb at 19. These measurements confirm that voids were in fact present in the bedrock core samples. Voids up to 43.4 percent of the entire bedrock core section exist, and some core samples could not even be tested because "some of the core samples did not contain enough intact pieces to perform each of the laboratory analyses." McNabb at 18 and 19.

20. McNabb also performed straddle packer testing to "to evaluate the confining nature of the strata above the injection zone and below the base of the lowermost USDS." McNabb at 20. Those packer tests were performed by inflating two balloon-like packers to isolate a section of the boring; filling that interval with water; pumping that interval; and recording any water level changes within the interval and above the packer. Although 19 packer tests were attempted, only 10 produced any numeric results because of leaky aquifer conditions. Most significantly, 8 of the 13 tests that were attempted within the McNabb-designated "confinement unit" (1,930 to 2,915 feet) actually failed and were "terminated due to packers not isolating test interval." McNabb at 21. As a result, 62 percent of those packer tests failed to provide numeric information to support a "confinement unit" claim.

21. McNabb concluded that the "only way" for a packer test to fail is by the packer not sealing against the wall of the geologic strata, thus allowing leakage. McNabb at 19 and 20. This conclusion fails to recognize that the bedrock strata within the packer and more importantly above / below the packers could also be hydraulically connected through voids and fractures in the bedrock – such as the conditions that were demonstrated by low bedrock "percent recovery" tests and also by bedrock "percent porosity" results.

22. McNabb concluded that the primary confinement unit had "no indication of vertically extensive or significant fracturing." McNabb at 24. This conclusion is not supported by well-specific data - as indicated by the presence of voids in the bedrock that resulted in relatively high porosities, low bedrock core recoveries, and failed bedrock straddle packer tests. The results of all three of those test suggest significant fractures and substantial weathering that may not be capable of preventing substantial vertical and horizontal migration of injected wastewater.

23. Vertical hydraulic conductivity measurements provided by McNabb are not representative of vertical groundwater flow rates along fractures and faults that have cracked the vertical bedrock layers and extend upward towards USDWs. McNabb at 19. Actual groundwater flow rates would be expected to be much higher.

24. In summary, the geologic and hydrogeologic data collected by McNabb from the single well EW-1 do not support the conclusion that a confining layer of sufficient thickness, lithological characteristics, and hydraulic characteristics exists to prevent vertical migration of wastewater injected into the Boulder Zone from migrating into USDWs. Further, the data collected from the single well should not be used to assume that a confining layer with sufficient aerial extent exists to prevent horizontal and vertical migration of injected wastewater into USDWs. Vertical migration can happen by first migrating horizontally until vertical pathways are encountered to allow the more buoyant municipal wastewater that is injected under higher pressures to rise.

A recent 2012 report completed by the United States Geologic Survey (USGS) casts doubt about the conclusions made by FP&L in the SOMF and the DEIS related to their opinion that adequate confining layers exist to prevent vertical migration of wastewater into USDWs. In fact, the recent study concluded that breaches of confining layers beneath the Upper Floridan aquifer in the Turkey Point area already exist.

25. The DEIS concluded that "enhanced vertical flow through the confining units to the Upper Floridan aquifer is extremely unlikely" based upon the results of the single well EW-1, "which did not reveal the presence of enhanced vertical flow paths from construction or natural vertical pathways, as well as a lack of indicating "karst collapse structures." SOMF at #70 and #71.

26. The NRC DEIS review team reportedly completed an independent review of groundwater data for the Turkey Point site and compared the results to "multiple studies of the region." Those studies referenced the Groundwater Atlas of the United States (1990) and the *Synthesis of the Hydrogeologic Framework of the Floridan Aquifer System and Delineation of the Major Avon Park Permeable Zone in Central and Southern Florida.* Reese and Richardson and SOMF at # 63.

27. McNabb designated the confinement unit needed to protect USDWs from the wastewater injection to be positioned within the "Middle Floridan Confinement Unit" - also known as the "Middle Floridan Aquifer." SOMF at #49 and #57. As such, the confining unit is also located within an aquifer.

28. The Reese and Richardson study that FP&L relied upon in the DEIS was co-authored in 2008 by scientists from the USGS and the South Florida Water Management District.

29. The Reese and Richardson report concluded that the degree of confinement provided by confining units below the Upper Floridan Aquifer is "uncertain" – thereby contradicting the degree of confidence shared by FP&L and the NRC DEIS review team that an

adequate confining layer exists. Further, the authors concluded that additional data and studies are in fact needed to provide more certainty about the degree of confinement between the Upper and Lower portions of the Floridan Aquifer. Reese and Richardson at 2.

30. A more recent (2012) and a more Turkey Point area-specific report by the USGS – a report that was not relied upon by FP&L or the NRC DEIS review team – actually collected data very near the Turkey Point site. The study was completed because of an "immediate need" to supplement the 2008 Reese and Richardson study because of the practice of deep well injection of municipal wastewater and the threat to USDWs. Cunningham at 1. The purpose of that study was to evaluate geologic formations in the Biscayne Bay and its shoreline and to determine whether or not those formations are true confining layers that can protect USDWs – specifically analyzing bedrock characteristics that can "act as vertical passageways for upward fresh water migration." Cunningham at 1 and 2. Data from 2007 through 2011 was used to provide a "new perspective" of subsurface geologic details for the Biscayne Bay adjacent to the Turkey Point site. That study collected 130 miles (210 kilometers) of near-surface, high frequency, marine seismic reflection data that were interpretable to a depth of 2,396 feet below ground surface. Cunningham at 1 and 2. A diagram of the seismic profiles from that report is as follows:

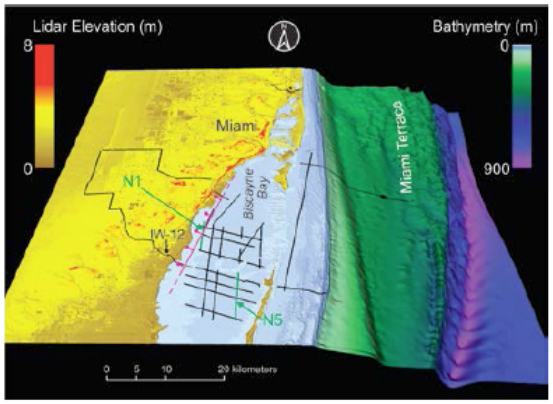

Figure 1: Map of Lidar land elevations and bathymetry showing locations of marine seismic-reflection profiles (black lines) acquired on peninsular and offshore southeastern Florida during 2007-2011. A normal fault (Figure 2) that intersects five profiles is shown as red line.

31. The Cunningham study concluded that two different bedrock structural systems – tectonic faults and karst collapse structures – both breach bedrock confining layers in the Floridan Aquifer system. Cunningham at 1. One such breach is a fault that runs along the shoreline of the Biscayne Bay (noted in red in the illustration above). The Turkey Point site is along the shoreline of Biscayne Bay. Most importantly as it relates to the proposed deep well injection at the Turkey Point site, the report concluded "both structural systems may serve as pathways for vertical groundwater flow across relatively low-permeability carbonate strata that separate zones of regionally extensive high-permeability rocks in the Floridan aquifer system." Cunningham at 4.

32. The Cunningham study concluded that two types of tectonic faults – normal and reverse – exist and that both types of faults "cut across the Upper Floridan aquifer" – as illustrated below with the up-and-down arrow along the near vertical faults shown in the bedrock. Cunningham at 3. The location of these faults; how they breach previously-assumed bedrock confining layers; and how wastewater that is injected deep into the bedrock can migrate upward to USDWs, are illustrated on these diagrams from that report:

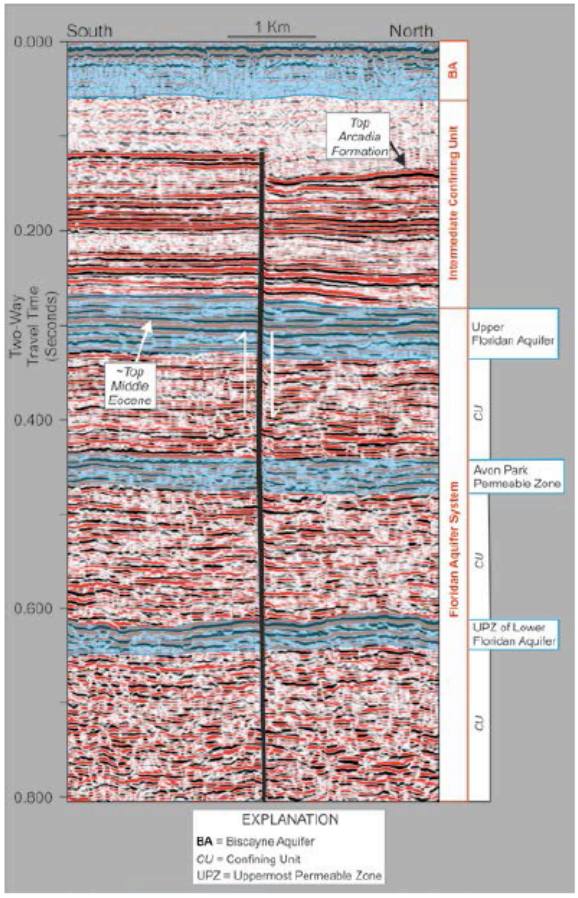

Figure 2: Seismic-reflection profile N1 from Biscayne Bay (Figure 1) shows a nearly vertical normal tectonic fault. The structure is visible on five different seismic profiles indicating length of its trace is at least 16 km. Hydrostratigraphy from onshore is projected onto profile. Onshore, the Upper Floridan aquifer and Avon Park permeable zone are protected underground sources of drinking water onshore.

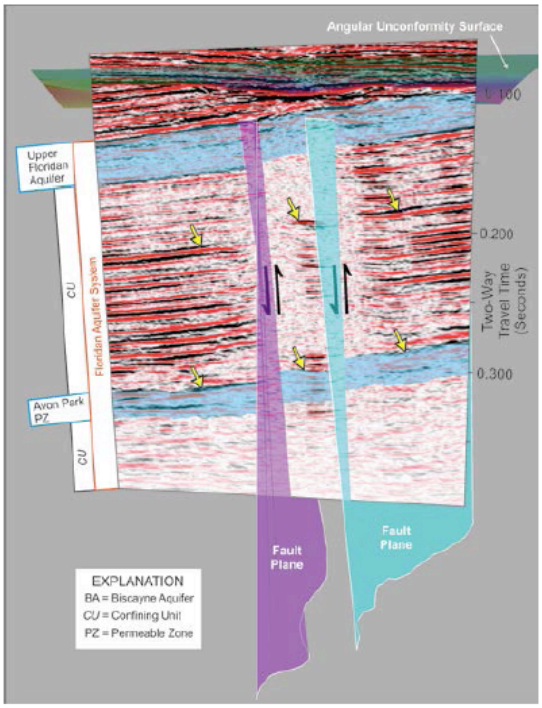

Figure 3: Geomodel based on 20 seismic-reflection profiles. Shows single seismic-reflection profile acquired from above the Miami Terrace (Figure 1), two reverse fault planes (purple and cyan colored) breaching reflections equivalent to middle Eocene carbonate strata of the Floridan aquifer system, mapped angular unconformity surface, and hydrostratigraphy from onshore projected onto profile. Three fault planes are not shown, so as to best show offset on the two principal reverse faults. Yellow arrows point to two seismic-reflections with clear structural offset between fault blocks. Reflections below the angular unconformity image carbonate strata equivalent to part of the Floridan aquifer system present onshore. Onshore, the Upper Floridan aquifer and Avon Park permeable zone are protected underground sources of drinking water.

33. The Cunningham report concluded that "though the hydraulic properties of the normal and reverse faults are not known, they have the potential to act as passageways for the upward migration of buoyant wastewater injected into the lower part of the Floridan aquifer system" and that "this migration upward could extend into permeable zones that occur within the USDW of the upper part of the Floridan aquifer system – Upper Floridan aquifer and Avon Park permeable zone." Cunningham at 2 and 3.

34. The Cunningham report also concluded that karst collapse structures exist in Biscyane Bay; these structures are also common beneath dry land peninsular Florida; these features also create breaches in confining layers; and such collapse features can result in upward migration of injected wastewater. Cunningham at 1, 3, and 4. Deformation in the bedrock can create substantial horizontal and vertical fracures in the bedrock – conditions that can become preferential contaminate transport pathways. An illustration of a mapped karst collapse structure from the Biscayne Bay is as follows:

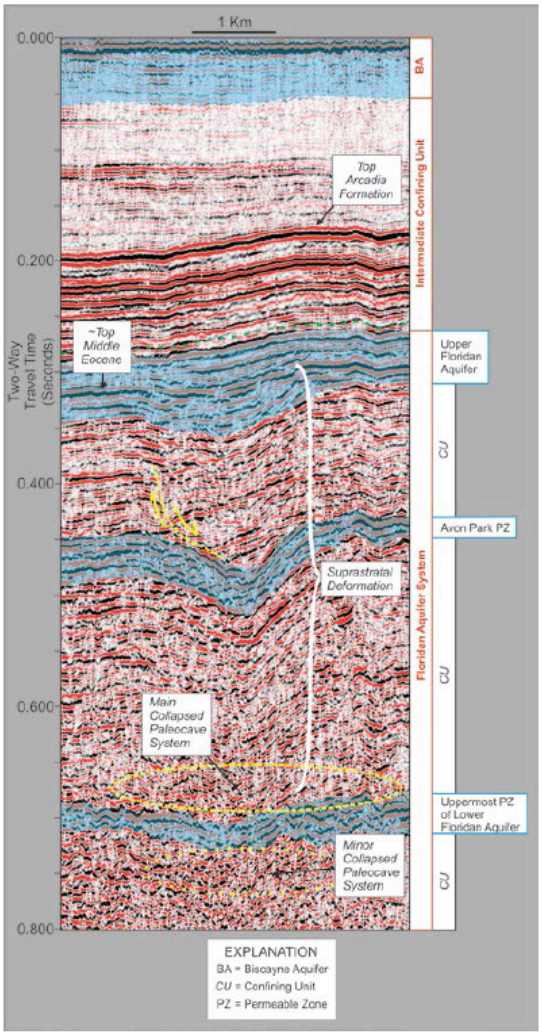

Figure 4: Seismic-reflection profile N5 from Biscayne Bay (Figure 1) shows a very broad collapse structure within the middle Eocene carbonate strata of the Floridan aquifer system. The strucutre is up to about 3.2 km wide. Hydrostratigraphy from onshore is projected onto profile. Onshore, the Upper Floridan aquifer and Avon Park permeable zone are protected underground sources of drinking water.

35. Contrary to the Cunningham report that identified multiple vertical bedrock flow pathways, FP&L concluded in the DEIS that "enhanced vertical flow" of wastewater through confining units is "unlikely" based upon the data collected by McNabb during

drilling well EW-1 and the results of "regional" studies. SOMF at #63, #65, #66, #70 and #71.

36. Vertical flow pathways such as faults or similar bedrock fractures might only be a few inches to a few feet wide, and the likelihood that a randomly located single boring can intercept a fault is unlikely.

37. Given the conclusions of the Cunningham report and the fact that this information was apparently not considered in the ER or the DEIS, FP&L and the NRC DEIS review team both relied on outdated and inaccurate information to conclude that adequate confining layers exist at the Turkey Point site. Their reliance on "regional" Floridan aquifer studies – as opposed to site-specific and near-site studies - underscores the inadequacy of their investigation to determine that the environmental impact from deep well injection of municipal wastewater will be "SMALL" and that enhanced vertical flow of wastewater across confining layers is "extremely unlikely."

38. A thorough, Turkey Point-specific subsurface investigation similar to what Cunningham performed is needed to fully determine the confining nature of the bedrock beneath and adjacent to the Turkey Point site and the associated risks to USDWs before FP&L's application for wastewater can be possibly considered further by the FDEP.

FP&L plan to rely on injection well construction details and a groundwater monitoring system after injection has already begun to provide an "early warning system" for release detection fails to recognize that permitted injection wells have already failed in Florida; USDWs have already been similarly contaminated; upward migration of wastewater into UDSWs can happen rapidly; and that properly investigating and remediating contaminated aquifers may last for decades.

39. The USGS has concluded that wastewater injection wells can fail and result in vertical migration of wastewater. Cunningham at 1. As a result, even a wastewater injection well application that is reviewed and approved by the FDEP and constructed to FDEP standards can fail.

40. The First Affidavit and the Second Affidavit provided the results of an EPA risk assessment that determined there were already 18 documented instances where deep well injection of wastewater had already contaminated a USDW.

41. The Second Affidavit provided the results of several studies performed at the nearby Miami-Dade South District Wastewater Treatment Plant in response to upward migration of wastewater into the Upper Floridan Aquifer. Those studies concluded that contamination began immediately upon injection and contamination was widespread. The conditions at that treatment plant and other injection sites in terms of lessons learned regarding the root cause of the contamination; investigations performed to determine the nature and extent of contamination; and remedial strategies for the future should have been prominently evaluated in the ER and the DEIS.

42. A groundwater monitoring program to monitor for contamination in USDWs usually consists of quarterly (every 3 months) or semi-annual (every 6 months) sampling frequencies. Such sampling frequencies do not provide an "early warning" for vertical migration of wastewater along vertical pathways such as faults, fractures, and well failures - because according to the USGS, migration along those pathways can occur in a matter of days. As such, widespread contamination could exist and not be monitored until significant contamination had already occurred between sampling events.

43. Well EW-1 was constructed with five strings of steel casings (24", 34", 44", 54", and 64"). Only the annulus between the 24-inch steel casing and the 18-inch injection tubing was pressure-tested by McNabb to look for leaks following construction. There is no indication that a formation pressure test was ever conducted to monitor for leakage between the concrete that is in contact with bedrock formations and all outer steel casings. Buoyant municipal wastewater can migrate up the borehole outside of steel protective casings. Formation pressure tests and cement bond logs of each well casing string (24", 34", 44", 54", and 64") should have been completed to document cement coverage and seal.

44. The FDEP requirement that mechanical integrity testing be performed on injection wells a minimum every five (5) years fails to recognize that a well can fail at any time during that 5-year period. As a result, the multiple seals between the bedrock and well casings of five diameters can fail at any time due to the repeated stresses and strains from the high-pressure injections and buoyant wastewater during that 5-year period. Only through groundwater monitoring and the identification of contamination in the upper monitoring wells during periodic sampling events, will FP&L know that the well has failed.

45. The DEIS review team's conclusion that the impacts of upward migration of wastewater that would occur before detection would be "minor" fails to recognize the widespread contamination that can and has occurred – as documented at the nearby Miami-Dade South District Wastewater Treatment Plant and the City of Sunrise. SOMF at #68, #69, and #90.

46. Although the FDEP regulations require a "remedial action" if injected wastewater contaminates a USDW, the DEIS did not specify if any similar remedial actions have ever been required for documented cases where municipal wastewater has contaminated a USDW. FP&L briefly cited related USDW contamination cases at the South District and Sunrise locations; however, neither the McNabb study nor the DEIS discussed the nature and extent of that contamination and how those similar examples differ from the proposed Turkey Point site to support their determinations of "minor", "small", and "unlikely." Investigating and remediating deeply contaminated USDWs can be a very long and costly process. FP&L should have discussed similarly impacted sites, investigative responses, corrective measures, and all associated costs in the DEIS in order to support their conclusions of minimal impact. Important information necessary to fully "evaluate" the impact from that contamination should have included such information as the investigation scope and scale that was needed to define the nature and extent of the

contamination; the impact to the wastewater treatment plant and its program to inject municipal wastewater; the cost and economic impact of the contamination; and the cost to modify treatment and effluent distribution methods.

47. FP&L intends to use a "dual-zone" groundwater monitoring well to determine if injected wastewater is migrating from the injection well EW-1. SOMF at #83. That single well (called "DZMW-1") was drilled 75 feet horizontally from well EW-1, and monitors groundwater from an interval between 1,450 to 1,490 feet and 1,860 to 1,905 feet below pad level, respectively. McNabb DZMW Report at 2 and 8. That well – given its very close proximity to the injection well – may not provide an early indication of groundwater contamination that first migrates horizontally within the Boulder Zone and then migrates vertically across bedrock features such as discrete fractures and faults.

48. The dual-zone monitoring well system does not include any monitoring wells to provide an indication of contamination in the Biscayne Aquifer, in the event of a breach of the Upper Confining Unit. This Biscayne Aquifer is the shallowest aquifer in the Turkey Point area and extends to approximately 140 feet below ground surface. McNabb at 15 and Figure 6. As such, any leakage into the Biscayne Aquifer would not be detected.

FP&L incorrectly concluded that heptachlor was last used in the United States 30 years ago.

49. FP&L concluded that heptachlor – a constituent in chlordane, a powerful insecticide – has not been used in the United States for almost 30 years. SOMF at #27. That conclusion is not accurate according to the EPA. In fact, commercial use of heptachlor is still permitted for fire ant control in power transformers. Further, homeowners can still use existing stocks of heptachlor-containing products for termite control. EPA at 1.

FP&L incorrectly implies that heptachlor and volatile organic compounds can be properly treated at industrial points of origin and at the wastewater treatment plant, and that monitoring programs in the future should detect these constituents before being discharged to the Turkey Point site.

50. FP&L concluded that the South District Wastewater Treatment Plant has the capacity to effectively treat the domestic and industrial wastewater that it receives, and constituents such as heptachlor, toluene, ethylbenzene, and tetrachloroethylene (and therefore similar volatile organic compounds) are effectively treated at the South District Plant. SOMF at #33. Analytical results of samples of treated wastewater (collected from 2007 to 2011) that FP&L intended to be representative for the future, showed that the wastewater contained heptachlor, toluene, ethylbenzene, and tetrachloroethylene. Samples of treated effluent more recently collected by FP&L in April 2013 from both the East Grab and West Grab effluent locations at the South District Plant both contained other volatile organic compounds not previously reported by FP&L - 1,4-dichlorobenzene and chloroform. Laboratory Results at 11 and 13. 1,4-Dichlorobenzene is a constituent that is commonly found in air fresheners, mothballs, and toilet deodorizers. ATSDR Tox FAQ at 1.

51. The mere presence of heptachlor and volatile organic compounds in wastewater samples of treated effluents indicates that the South District Plant is not always capable of removing those chemicals and that the wastewater flow is variable.

52. FP&L concluded that daily monitoring for "conventional pollutants" at the South District Plant would reveal if the wastewater treatment plant is operating properly. SOMF at #34. This conclusion implies that a sampling program will be in-place to detect heptachlor and other volatile organic compounds. "Conventional pollutants" that are typically monitored at such plants only include analytical tests such as biological oxygen demand (BOD), pH, total suspended solids (TSS), and oil and grease - tests methods that are not a direct measure of constituents such as heptachlor and volatile organic compounds.

53. The mere presence of heptachlor and volatile organic compounds in past sampling events indicates that the treatment plant is not always capable of treating all contaminants. Further, owners and operators of municipal wastewater treatment plants are not typically required to even routinely test for constituents such as heptachlor and volatile organic compounds. Lastly, it is unclear if wastewater from the South District Plant will even be tested for such constituents as heptachlor and volatile organic compounds prior to being discharged to the Turkey Point facility.

Sources:

1. Agency for Toxic Substances and Disease Registry, ATSDR ToxFAQ Dichlorobenzenes, August 2006.
2. Hazard Summary Heptachlor, EPA Technology Transfer Network, created in April 1992 and revised in January 2000, Available at http://www3.epa.gov/airtoxics/hlthef/heptachl.html.
3. Laboratory Results for Work Order 13D0159, FPL Central Laboratory, April 2013 Sampling Results.
4. *Near-Surface, Marine Seismic-Reflection Data Define Potential Hydrogeologic Confinement Bypass in the Carbonate Floridan Aquifer System, Southeastern Florida*, Kevin Cunningham (USGS), Cameron Walker (Walker Marine Geophysical Company), and Richard Westcott (USGS), Society of Exploration Geophysics Annual Meeting, 2012.
5. *Report on the Construction and Testing of Class V Exploratory Well EW-1*, Turkey Point Units 6 and 7, for Florida Power and Light, Volume 1, McNabb Hydrogeologic Consulting, Inc., September 2012.
6. *Report on the Construction and Testing of Dual-Zone Monitor Well DZMW-1,* Turkey Point Units 6 and 7, for Florida Power and Light, McNabb Hydrogeologic Consulting, Inc., September 2012.
7. *Synthesis of the Hydrogeologic Framework of the Floridan Aquifer System and Delineation of the Major Avon Park Permeable Zone in Central and Southern Florida*, Ronald Reese (USGS Florida Integrated Science Center) and Emily Richardson (South Florida Water Management District, Scientific Investigations Report 2007-5207, 2008.

Dated: February 2, 2016

MARK A. QUARLES

SWORN TO AND ASCRIBED
BEFORE ME, THIS 2 DAY
OF February, 2016.

NOTARY PUBLIC

COURTNEY SMITH
STATE OF TENNESSEE NOTARY PUBLIC
COUNTY OF DAVIDSON