UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
Progress Energy Florida, Inc.	)	Docket Nos. 52-029-COL
Levy Nuclear Plant, Units 1 and 2	)	52-029-COL

AFFIDAVIT OF SYDNEY T. BACCHUS
IN SUPPORT OF JOINT INTERVENERS' RESPONSES TO
ENVIRONMENTAL IMPACTS OF PROPOSED LEVY NUCLEAR PLANT UNITS 1 AND 2

Under penalty of perjury, I, Sydney T. Bacchus, Ph. D., declare as follows:

A. EDUCATION, RESEARCH, AND PROFESSIONAL WORK EXPERIENCE

1. **Name -** My name is Sydney Bacchus and I am a third-generation Floridian. I was a full-time Florida resident for approximately 40 years and a part-time Florida resident for approximately the past decade, while completing my doctoral degree. My business address is P. O. Box 174, Athens, Georgia 30603.

2. **Advanced degrees -** I received a Bachelor of Science degree (1972) and a Master of Science degree (1977) from Florida State University (Department of Biological Sciences). My Masters research involved evaluating the changes in wetland and aquatic plant community composition in response to changing salinity regimes and changes in hydroperiod. Hydroperiod components include: a) the depth or stage of fluctuating ground and surface water; b) the duration of the water level at a given depth and stage; and c) the periodicity and seasonality of the water level fluctuations. My minor field of study was chemistry.

3. **Multidisciplinary doctoral degree –** I have a multidisciplinary doctoral degree in the fields of Hydrology, Ecology and Plant Pathology and Physiology. In fulfillment of my Ph. D. I completed graduate-level (predoctoral) courses in Hydrology, Hydrogeology, Geochemistry and Water Quality at the University of South Florida, then transferred to the University of Georgia (Athens) to complete more extensive graduate-level courses (e.g., Soil Physics, Geophysics, Forest Hydrology, Forest Pathology, Tree Physiology and various aspects of Ecology) for a multidisciplinary doctoral degree program in Hydroecology. Hydroecology is a multidisciplinary field that combines both physical and life sciences. It is the study of the interaction between living organisms and the water-related aspects (both quantity and quality) of their environment.

4. **Research focus -** The focus of my doctoral research was adverse environmental impacts (aka effects) associated with anthropogenic (man-induced) groundwater alterations. I received my Doctorate degree from the University of Georgia (Institute of Ecology) in 1999, after successfully defending my Dissertation titled, "New Approaches for Determining Sustainable Yield from the Regional Karst Aquifer of the Southeastern Coastal Plain." My research was conducted through representative subregions of the regional Floridan aquifer system. That regional aquifer system extends throughout the entire State of Florida and the coastal plains portions of Georgia, South Carolina and Alabama.

5. **Grants -** During my doctoral program, I received several grants from state agencies in Florida and federal agencies that supported my doctoral research. One of my grants from United States Geological Survey (USGS) supported geophysical research to evaluate the degree of connection between the Floridan aquifer and depressional wetlands throughout Florida and south Georgia. Other grants supported a controlled experiment, observing responses of native tree species to prolonged water stress and fungal pathogens. Those grants are listed in my

Curriculum Vitae (CV) and incorporated into my affidavit. See Bacchus Exhibit A.

6. **Published literature -** I am familiar with the body of published literature relevant to my multidisciplinary area of expertise. Specifically, these include the fields of Hydrology, Hydrogeology, Submarine Groundwater Discharge, Geochemistry, Water Quality, Geophysics, Forest Hydrology, Forest Pathology, Tree Physiology and various aspects of Ecology, including freshwater, estuarine and marine ecosystems as they relate to Florida's wetlands, other special aquatic sites and native wildlife habitat. I have authored or co-authored approximately 40 refereed (peer-reviewed) papers in those fields, specifically regarding groundwater/surfacewater interactions, karst aquifers, and flood plains/wetlands (aka special aquatic sites). My publications have been based on research I have conducted in wetlands (special aquatic sites) and other ecosystems, including marine, estuarine, and freshwater aquatic ecosystems throughout Florida. I also have served as a peer reviewer for manuscripts (related to the fields referenced above) that have been submitted to professional journals for publication. A list of my relevant peer-reviewed publications, awards and recognition of my work in the fields described above, as well as a description of my professional experience and affiliations with professional societies and other organizations, are provided in my CV (Bacchus Exhibit A).

B. CONTENTION 4 AS ADMITTED BY THE BOARD

1. **Admitted contention -** In its Memorandum and Order of July 8, 2009 (Bacchus Exhibit B), the Board admitted Contention 4 related to the proposed Levy Nuclear Plant Units 1 and 2 ("LNP") site in part as follows:

> Progress Energy Florida (PEF's) Environmental Report fails to comply with 10 C.F.R. Part 51 because it fails to adequately address, and inappropriately characterizes as SMALL, certain direct, indirect, and cumulative impacts, on-site and off-site, of constructing and operating the proposed [Levy] facility.
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> A. Impacts to wetlands, floodplains, special aquatic sites, and other waters, associated with dewatering specifically:
>
> 1. Impacts resulting from active and passive dewatering;
> 2. Impacts resulting from the connection of the site to the underlying Floridan aquifer system;
> 3. Impacts on Outstanding Florida Waters such as the Withlacoochee and Waccasassa Rivers;
> 4. Impacts on water quality and the aquatic environment due to alterations and increases in nutrient concentrations caused by the removal of water; and
> 5. Impacts on water quality and the aquatic environment due to increased nutrient resulting from destructive wildfires resulting from dewatering.
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> B. Impacts to wetlands, floodplains, special aquatic sites, and other waters, associated with salt drift and salt deposition resulting from cooling waters (that use salt water) being situated in an inland, freshwater wetland area of the Levy site.
>
> C. As a result of the omissions and inadequacies described above, the Environmental
> Report also failed to adequately identify, and inappropriately characterizes as SMALL, the proposed project's zone of:
>
> 1. Environmental impacts,
> 2. Impact on Federally listed species,
> 3. Irreversible and irretrievable environmental impacts, and
> 4. Appropriate mitigation measure.

2. **Impacts to estuarine ecosystems excluded by misconstrued contention –** Neither the original Contention 4 submitted by the Intervenors, nor Contention 4 as admitted by the Board constricted the adverse impacts of the proposed LNP to "the aquifer system underlying the project area, the Withlacoochee and Waccasassa rivers, and the freshwater wetlands in the area of the project site." The fact that adverse impacts to other ecosystems, including estuarine ecosystems, of the proposed LNP were not addressed, assessed or even acknowledged in PEF's application and subsequent documents or the Draft Environmental Impacts Statement for Combined Licenses for Levy Nuclear Plant Units 1 and 2 published August 2010 (DEIS) does not mean that impacts to those additional ecosystems, including estuarine ecosystems, and associated threatened and endangered species would not occur. (See US Nuclear Regulatory Commission and US Army Corps of Engineers, 2010). Examples of only some of the grave inadequacies of PEF's application, supporting documents and the DEIS in addressing the environmental impacts of the proposed LNP are provided below.

C. FAILURE TO IDENTIFY/EVALUATE AFFECTED AREA OF THE PROPOSED LNP

1. **Failure to identify the affected area –** Neither PEF nor the DEIS identified the "affected area" of the proposed LNP, although the DEIS identifies a 20-mile "geographic area of interest." See Section H. (Cumulative Effects) in my affidavit, below. Documents submitted by PEF and the DEIS implied that the affected area was confined to the property boundaries of the proposed LNP site, as supported by the inferences that adverse impacts from groundwater pumping had been eliminated by PEF's revised plan to move the locations of the groundwater wells "offsite" to property adjacent to the proposed LNP site, then failing to address the adverse impacts of groundwater withdrawals at the newly proposed location.

2. **Failure to acknowledge karst and other characteristics of proposed LNP site and vicinity identified in FSAR Chapter 2 –** Neither the DEIS nor PEF appear to acknowledge the karst and other characteristics of the vicinity of the proposed LNP, as described in Chapter 2 - Site Characteristics LNP Units 1 and 2, COL Application, Part 2, Final Safety Analysis Report (FSAR). For example affidavit statements by Griffin and Howroyd attached to PEF's recent Motion for Summary Disposition and Motion to Moot conflict with and contradict the extensive description of conditions on and surrounding the proposed LNP site, including the site of the proposed Tarmac Kings Road mine where the rock/aggregate presumably would be mined to provide the fill and raw materials for the extensive volume of concrete required to construct the proposed LNP. Chapter 2 of FSAR includes detailed descriptions and discussion of karst conditions, including sinkholes and faults that will magnify both the extent and magnitude of direct, indirect and cumulative adverse environmental impacts from the proposed LNP that PEF and the DEIS claim would be "small" or would not occur. For example, see the discussion of karst and sinkholes from FSAR 2.5-61 through 2.5-64, 2.5-75 and 2.5-76, 2.5-184; the excerpts from FSAR Chapter 2 included herein as Bacchus Exhibit C-1 and as follows:

> A series of wetlands exist on-site, mainly associated with existing cypress tree growth areas. These wetlands and cypress "domes" provide preferential recharge to both the surficial and Floridan aquifers, and may be associated with increased karst feature development in the Avon Park Formation limestones… FSAR p. 2.4-66
>
> Water table data collected in 2007 indicates that the water table ranges in depth at LNP 1 and LNP 2 areas from less than 0.3 m (1 ft.) below ground surface during rainy periods to approximately 1.5 m (5 ft.) bgs during drier periods. FSAR 2.4-67

> The second case examines the Lower Withlacoochee River, although there are no identified users of this surface water. The focus of this evaluation is groundwater that moves downgradient from LNP 1 and 2 and resurfaces within the Lower Withlacoochee River, a distance of approximately 7 km (4.3 mi.). The Lower Withlacoochee River flows to the Gulf of Mexico with freshwater supplied from the Inglis Bypass Channel. Minimum flow into the Lower Withlacoochee River from the Inglis Bypass Channel is 22.4 m3/s (790 cfs) based on monthly averages from 1990 – 2006 (Reference 2.4.13-201). FSAR 2.4-79
>
> The only geologic hazard identified in the LNP site area is potential surface deformation related to carbonate dissolution and collapse or subsidence related to the occurrence of karst FSAR 2-5-4

It is my professional opinion that the descriptions of the karst characteristics and other descriptions of the proposed LNP site and vicinity support my conclusion that the wetlands on and surrounding the proposed LNP site are critical for maintaining the chemical, physical and biological integrity of the nation's waters, which is the intent of the Clean Water Act (CWA), 33 U.S.C. Section 1251. Furthermore, it is my professional opinion that construction and operation of the proposed LNP and associated required mining would be contrary to the public interest and the comprehensive effort by Congress to restore and maintain the chemical, physical and biological integrity of the nation's waters, as required by the CWA.

3. **Multiple areas of impact –** The DEIS and PEF documents provided various maps illustrating the area of the affected environment ranged beyond the property boundaries to the Cross-Florida Barge Canal, Gulf of Mexico to a 5-mile, 6-mile, 10-mile and 20-mile radius from the proposed site, as well as to 3 sub-basins, multiple watersheds and multiple counties extending both east and south of the proposed LNP. Examples of these telescoping affected areas associated with the proposed LNP are shown in the maps referenced in Bacchus composite Exhibit C, incorporated herein. In addition to the maps included in FSAR, Chapter 2, various areas of adverse environmental impacts, including impacts to surface water, ground water, terrestrial and estuarine ecosystems and areas potentially affected by aerial deposition of contaminant are shown in the following maps included in Bacchus composite Exhibit C:

2. Proposed LNP Affected Environment offsite facilities DEIS Fig 2-3
3. Proposed LNP Operational Impacts springs Gulf DEIS Fig 5-3
4. Proposed LNP Affected Environment Model Grid DEIS Fig 2-12
5. Proposed LNP Affected Environment transmission footprint DEIS Fig 3-4
6. Proposed LNP Affected Environment regional transmission corridors substations DEIS Fig 2-5
7. Proposed LNP Topographic map 5 mile PEF Environmental Report Fig 2.7-23 7/30/08
8. Proposed LNP Affected Environment 6-mile Land Use Site and Vicinity DEIS Fig 2-2
9. Proposed LNP Affected Environment 6-mile DEIS Fig 2-4
10. Proposed LNP 10-mile Griffin affidavit dewatering Fig 1
11. Proposed LNP Affected Environment 20-mile natural resources DEIS Fig 2-17
12. Proposed LNP Affected Environment sub-basins DEIS Fig 2-8
13. Proposed LNP Affected Environment multibasin watersheds DEIS Fig 2-7

4. **Insufficient information to determine full area of impact –** Obviously the area of impact or affected area from the proposed LNP must encompass at least the subregion where the proposed transmission lines and substations would be constructed and operated. The full area of impact of construction and operation of the proposed LNP cannot be determined at this time based on the information provided by PEF or the DEIS because those documents failed to include a scientifically based analysis of all of the adverse direct, indirect and cumulative impacts. A brief synopsis of only some of the adverse direct, indirect and cumulative impacts to the environment that were not addressed in PEF's application, supporting documents and the DEIS but would occur if the proposed LNP was constructed and operated are described briefly below.

D. ADVERSE ENVIRONMENTAL IMPACTS FROM ALTERED WATER QUANTITY AND QUALITY FROM THE PROPOSED LNP

1. **Minimum flows and levels for surface waters and the aquifer system in Levy County not established and segmentation of hydroperiod components unjustified –** Florida law requires that the water management districts, including the Southwest Florida Water Management District (SWFWMD), establish minimum flows and levels for surface and ground waters to ensure that environmental harm does not occur from proposed alterations of natural flows and levels (Bacchus Exhibit D-1). The SWFWMD has failed to establish those required minimum flows and levels for Levy County in the vicinity of the proposed LNP and associatedTarmac mine. In fact, the SWFWMD has not even proposed establishing those levels (Bacchus Exhibit D-2 and D-3). Therefore, there is no scientific basis for claims by PEF and the DEIS that alterations to flows and levels of surface and ground waters that would result from the proposed LNP and associated Tarmac mine would be "small." Just as segmentation of integral project components such as mined aggregate required to construct the proposed LNP is unjustified, segmentation of hydroperiod components is unjustified. Alterations of the natural hydroperiod and subsequent adverse environmental impacts that would result from the construction and operation of the proposed LNP occur from the combined direct, indirect and cumulative impacts of [3]passive dewatering[2] and mechanical extractions of ground and surface waters. Therefore, there is no scientific basis for segmenting adverse environmental impacts due to [3]passive dewatering[2] from those due to other alterations of the natural hydroperiod such as mechanical extractions of ground and surface waters. Thus, segmenting adverse environmental impacts from passive and active dewatering associated with the proposed LNP is arbitrary and capricious.

2. **Arbitrary segmentation of adverse "passive dewatering" impacts from stormwater ponds –** A copy of an affidavit dated August 17, 2010 by Mitchell L. Griffin, principal technologist for CH2M Hill, Inc., was attached as support for PEF's October 4, 2010 "Motion for Summary Disposition of Contention 4 (Environmental Impacts of Dewatering and Salt Drift) with regard to Salt Drift and Passive Dewatering" (Motion for Summary Disposition). Paragraph 8 of that affidavit includes the following statement:

> No passive dewatering is included in the Levy Project. The Levy Project has been designed to specifically exclude passive dewatering features.

Passive dewatering is inherent in the proposed LNP design. In addition to the stormwater ponds, the below-ground excavation of the nuclear islands also will result in both mechanical and passive dewatering. Additionally, those areas where the water normally would have flowed through as historic overland flow will be inaccessible after construction of the proposed LNP, resulting in another form of passive dewatering. Further, the proposed below ground "footings" will act as immense plugs blocking down-gradient flow of ground water, while the above- ground structures will be huge obstructions to the historic overland flow. Anywhere that water would have gone prior to the Levy construction will be dewatered. No scientific documentation is presented by Griffin or the DEIS as support for that statement. In fact, Griffin's affidavit artificially and arbitrarily segments and compartmentalizes adverse impacts that would occur during construction and operation from passive (nonmechanical) "dewatering" associated with proposed "features" such as the LNP stormwater ponds. Griffin's affidavit and the DEIS also failed to address "passive dewatering" that would occur from any of the other "features" resulting directly, indirectly or cumulatively from the construction or operation of the proposed LNP. In fact, Griffin's following statement (¶ 23) suggests that he is unaware that ecosystems are composed of living organisms for which "long-term average" availability of water has no relevance:

> Direct precipitation on the ponds will offset evaporation over a long-term average by 3 to 7 inches.

Long-term averages ar purely mathematical calculations with little or no relevance to living ecosystems. Such averages are irrelevant to living organisms struggling for survival under periods of droughts with man-induced hydroperiod alterations. Under the guise of "long-term average," the wetlands and other ecosystems affected by salt drift could die from the combined impacts of drift and dewatering, while the long-term average rainfall remained theoretically adequate. As stated in my affidavit, there is no expectation that the rainfall averages of the past will project into the future. Examples of such activities that have been segmented and dewatering impacts ignored by both PEF and the DEIS are provided in the following paragraphs.

3. **"Passive dewatering" impacts from subsidence/collapse resulting from stormwater ponds and other proposed LNP construction/operation activities –** There is no evidence that the models or other information relied on by PEF or the DEIS accounted for the magnitude or extent to which characteristic karst features such as sinkholes and fractures increase the adverse environmental impacts of anthropogenic water quantity and water quality alterations such as those that would occur from the proposed LNP. Furthermore, there is no evidence that PEF or the DEIS has identified the location of fracture networks and associated karst features in the affected area of the proposed LNP. Examples of both passive dewatering and adverse water quality impacts that would occur at the proposed LNP site and off-site affect area are provided below:

a. **Sinkholes/subsidence/collapse caused by stormwater ponds –** On March 11, 2009, I submitted an affidavit regarding adverse environmental impacts that would occur if the proposed Suncoast Parkway ("Parkway") was constructed within the same Water Management District area as this proposed LNP site. Relevant excerpts from my 1999 affidavit include the following:

> …the roadway and facilities, in addition to the vehicles using the roadway would add a significant **additional weight load to the aquifer**. This, in turn, will increase the potential for new sinkhole development and reactivation of relict sinkholes … This also will result in more extensive, irreversible damage to the regional aquifer…

Similar statements were included in the SWFWMD Water Resources Assessment Project (WRAP) released in March 1966, as follows [emphasis added]:

> … increased effects by man have been documented to cause some increased level of sinkhole occurrence. **<u>The cause of this increase can generally be attributed to loading of the surficial deposits with retention ponds, buildings, changes in drainage patterns, heavy traffic, vibration, or lowering of the ground-water levels by pumping</u>** (Sinclair and others, 1985). Usually all of the conditions occur simultaneously in rapidly growing urban areas. Collapses resulting from these effects have been termed **induced sinkholes** (Newton, 1976).

The Parkway and associated stormwater ponds, similar to those for the proposed LNP, were constructed. My prediction, however, proved to be overly conservative. Before construction was complete and the Parkway was open for transportation, large sinkholes opened in the bottom of Parkway stormwater ponds, contaminating nearby residential wells, as described in the following St. Pete Times article dated August 26, 2001:

> BROOKSVILLE -- As if sinkholes weren't bad enough. Residents in one Hernando County neighborhood have contaminated water after a large sinkhole opened up in the bottom of a Suncoast Parkway retention pond last month. Residents in some areas are being told to avoid drinking, cooking with or bathing in water from wells that may have been tainted by fecal coliform after surface water poured into the sinkholes. The construction of the parkway and the sinkhole are probably -- though not definitely -- related, said John Parker of the Southwest Florida Water Management District. The retention pond is on the west

> side of the parkway, about 3 miles north of State Road 50 and about 8 miles south of the Citrus County line.
>
> http://www.sptimes.com/News/082601/news_pf/TampaBay/Metro_review.shtml

A subsequent paper by Heung and Gobin (2010) provided the following additional information regarding subsidence/collapse that resulted from the Parkway project:

> Suncoast Parkway construction, in west-central Florida. These sinkholes occurred where limestone bedrock was excavated. The excavation revealed numerous preexisting solution pipe features in the limestone that were in-filled with clean fine sand. These features were pre-existing sinkholes and served as conduits to recharge the aquifer. The sinkholes that occurred during construction were re-openings of these pre-existing sinkholes. It is also believed that the bedrock excavation had altered the pathways of groundwater recharge at the overburden soil and bedrock interface. Specifically, the bedrock excavation directed larger volume of surface runoff into some pre-existing sinkholes, which previously did not experience large water recharge in recent geological history. The concentration of runoff destabilized the in-filled fine sand and caused the sinkholes to re-open during construction.

Similar relict (pre-existing) sinkholes occur throughout the vicinity of the proposed LNP. It is my professional opinion that similar subsidence/collapse events and subsequent "passive dewatering" of the aquifer system will occur if the stormwater ponds for the proposed LNP are constructed and become operational.

b. **Sinkholes/subsidence/collapse caused by dewatering associated with 100-foot deep excavations** – During construction of the proposed LNP, two 100-foot deep pits would be excavated into the aquifer system, where the water table lies at or near the surface. Neither PEF's ER nor the DEIS provided detailed information regarding the exact surface area of this proposed excavations, although drawings suggest that each 100-foot deep excavation would cover approximately 1 acre. A photograph of a similar excavation for a nuclear facility under construction in Georgia from the MIT Technology Review publication is included as Bacchus Exhibit D-4 to provide an approximate scale of the depth of the proposed LNP excavation. Note the near-microscopic size of the large earth-moving equipment in comparison to the giant hole that has been excavated. Although these 100-foot deep excavations are proposed to be mechanically dewatered, then filled, it is my professional opinion that the proposed excavations also will result in passive dewatering of on-site and off-site wetlands and other waters of the U.S. and sinkholes/subsidence/collapse events similar to the ones described above at the Parkway. Additionally, the DEIS suggests that water from these excavated pits would be pumped to temporary ponds. It is my professional opinion that those temporary ponds will result in additional passive dewatering. It also is my professional opinion that those proposed actions would result in both significant adverse water quantity (e.g., hydroperiod) and water quality impacts, altering the chemical, physical and biological integrity of the nation's waters. These adverse environmental impacts also not addressed by PEF or the DEIS.

c. **Sinkholes/subsidence/collapse caused by dewatering associated with mines in vicinity, similar to 100-foot deep excavations**–The 100-foot excavations at the proposed LNP site would be similar to, but deeper than existing and proposed mine pits in the immediate vicinity of the proposed LNP. The Florida Department of Environmental Protections (FDEP) "Notice of Intent to Issue" for the proposed Tarmac mine dated June 18, 2010 is attached as an example of one of these mines (Bacchus Exhibit D-5).

4. **Failure to consider "passive" dewatering associated with excavation of cooling tower canal, ditches and swales** – Neither the DEIS nor PEF, including the affidavit submitted by Griffin addressed the adverse direct, indirect and cumulative impacts of "passive" dewatering of the canal permitted by FDEP on March 11, 2009 for the proposed LNP cooling towers and incorporated herein as Bacchus Exhibit D-6. Additionally, neither PEF, nor the DEIS

acknowledged the fact that the ditches and swales that would be excavated throughout the proposed LNP site and vicinity also would result in passive dewatering, in addition to pirating historic overland flow that is essential for maintaining surrounding ecosystems. It is my professional opinion that the excavation of that canal and the proposed ditches and swales would result in adverse direct, indirect and cumulative environmental impacts including, but not limited to the cessation of fresh groundwater discharge to the CFBC and adverse impacts to the manatees and other federally listed species.

5. **Failure to consider adverse environmental impacts of re-filling the 100-foot deep excavations to construct the "nuclear islands"** – Neither the DEIS nor PEF addressed the adverse direct, indirect and cumulative impacts of refilling the giant 100-foot deep hole that would be excavated for the proposed LNP "nuclear islands." The DEIS (p. 4-10) includes the following statement:

> PEF has not made a final determination regarding the source of the fill material for the LNP site. To provide additional context for the potential impacts of fill mining, the review team considered the impacts if the proposed Tarmac King Road Limestone Mine provided the source of fill.

That proposed Tarmac Kings Road Mine (aka Tarmac America, LLC) would be located due west of the proposed LNP. Both the location and timing of that proposed mine suggests that it represents an integral part of the proposed LNP as an immediate-vicinity source of aggregate as raw material for the total volume cement/concrete and rock that would be required to construct the proposed LNP. Based on the DEIS statement above, the DEIS currently in progress for the Tarmac mine should have incorporated, in full, into this DEIS for the proposed LNP. Instead, the EIS process for the proposed Tarmac mine has been segmented as an independent activity. Therefore, a Supplemental DEIS is required to combine the entire pending DEIS/EIS for the proposed Tarmac mine with this DEIS for the proposed LNP.

6. **Proposed LNP stormwater ponds to be excavated below the natural groundwater level** – Paragraph 8 of Griffin's affidavit also includes the following statement:

> The new facilities at the Levy site are being built above ground and the drainage facilities are designed to detain stormwater, releasing it in a controlled manner on-site to the natural landscape. Therefore, they will not dewater the site.

That statement is a blatant contradiction to the following statement from paragraph 9 of Griffin's affidavit (which is consistent with statements in the DEIS): [emphasis added]

> These ponds are called "wet ponds" because **the pond bottoms will be below the natural groundwater level**, so there will always be some open water in the ponds.

In fact, "wet ponds" acquired that name because they are stormwater ponds that are excavated into the upper layer of the aquifer system, also known as the "surficial aquifer" or "water table." The fact that the same paragraph of Griffin's affidavit suggests that these "wet ponds" will be surrounded by "raised dikes" to "keep the collected storm water staged above ground level" is of no consequence when there is no rain to produce "stormwater." Paragraphs 13-17 of Griffin's affidavit also claim:

> The Levy Project is expected to comply with Florida requirements that ensure that stormwater is collected and treated without reducing recharge to the aquifer.

During my 40+ years conducting site surveys and research throughout Florida for state, regional and federal regulatory agencies, universities and private companies, I have observed hundreds of "wet ponds" both before and after excavation – including those surrounded by "raised dikes." All were permitted to "comply with Florida requirements" but all resulted in the death of surrounding native vegetation that remained after excavation of those "wet ponds" and invasion by nuisance species due to "passive dewatering." This occurs because during periods without rain, water from the exposed aquifer system evaporates, drawing down the aquifer. This process is explained in greater detail in my 2006 peer-reviewed publication titled, "Nonmechanical dewatering of the

regional Floridan aquifer system" attached as Bacchus Exhibit D-7 and in Swancar et al., 2000. It is my professional opinion that the so-called "above ground" stormwater ponds that would be excavated "**below the natural groundwater level"** for the proposed LNP will dewater the aquifer system and result in "large" irreversible adverse environmental impacts directly, indirectly and cumulatively.

7. **Dewatering from proposed LNP stormwater ponds** –Griffin's affidavit (¶ 22) also includes the following statement:

> The stormwater ponds will be a source of recharge for the near-surface aquifer rather than a source of indirect dewatering.

See my response to Griffin's claims above. Obviously during periods without rain there will be no "stormwater" for recharge and evaporative loss will dewater the aquifer system.

8. **Evaporation from proposed LNP stormwater ponds will exceed precipitation during periods of low rainfall** –Griffin's affidavit (¶ 23) also includes the following statements:

> The average annual lake evaporation near the Levy site is about 46 to 50 inches per year, and the **annual precipitation is about 53 inches per year**. [emphasis added]
>
> Direct precipitation on the ponds will offset evaporation over a long-term average by 3 to 7 inches.
>
> The stormwater ponds will occupy approximately 105 acres, and 5 inches of excess rainfall (precipitation minus evaporation, mid-point of the above the range) would provide an additional 43.8 acre-feet of water per year over these ponds, which will be available for percolation to recharge the aquifer.

Griffin failed to indicate how or where those evaporation rates were determined, but presumably it was determined by pan evaporation. Research conducted by the US Geological Survey (Swancar et al., 2000) concluded that pan evaporation data were artificially lower than actual evaporation measured from larger surfaces of water. Finally, even if the evaporation values provided above by Griffin were blindly accepted as accurate, the rainfall data for Levy County provided by SWFWMD reveals that annual rainfall was **less than 53 inches per year for 45 years** and **less than 50 inches per year for 34 years** during the period of record, providing additional support that the proposed LNP "wet ponds" will dewater the aquifer system. Clearly there is no scientific basis for his second and third statements above. See also the findings of GCRP (DEIS, p. 7-12, Line 19) that predicted both a decrease in future precipitation and aquifer levels in Florida.

9. **Connection from on-site to off-site surface waters -** Griffin's affidavit (¶¶ 31-33) also includes the following statement:

> Because there is no direct connection from on-site to off-site surface waters, impact to the Withlacoochee or Waccasassa Rivers is precluded.

In U.S. v. Banks (873 F.Supp. 650), incorporated herein as Bacchus Exhibit D-8, the federal courts established that wetlands connected to navigable waters primarily by ground water rather than surface water are regulated under the CWA as "adjacent wetlands." More specifically, U.S. v. Banks found:

> …**no hydrological connection to other waters is required** for a wetland to be considered to be adjacent. (¶ 15.) [emphasis added]
>
> More importantly, however, in this case, the government established that such a connection exits through ground water …Such **a hydrological connection to neighboring navigable waters primarily consisting of ground water rather than surface water**, except in times of storms, such as hurricanes, therefore further supports a finding of adjacency. (¶ 15.) [emphasis added]

> A finding of adjacency may be bolstered by a showing of ecological links with neighboring navigable waters, such as serving as wetland habitat for wading and non-wading birds, reptiles and fish as well as by testimony regarding the **performance of water quality filtering functions**. (¶ 16.)

It is my professional opinion that the wetlands on and surrounding the proposed LNP site are, at the least, "adjacent wetlands" which meet the criteria above from U.S. v. Banks (Bacchus Exhibit D-8). Furthermore, it is my professional opinion that the wetlands on and surrounding the proposed LNP site are critical for maintaining the chemical, physical and biological integrity of the nation's waters, which is the intent of the CWA, 33 U.S.C. Section 1251, "a comprehensive effort by Congress to restore and maintain the chemical, physical and biological integrity of the nation's waters." Specifically, those wetlands are essential for maintaining the chemical, physical and biological integrity of Withlacoochee and Waccasassa Rivers and other waters within the affected area. My conclusions are supported by my peer-reviewed publications provided in the list of references in my final Exhibit, and in addition to my personal knowledge of the vicinity of the proposed LNP site spanning more than 40 years. Furthermore, there is no scientific basis for assertions that there will be no off-site impacts from stormwater that is captured on the proposed LNP site. "Stormwater" simply is an engineering term for what was "overland flow" or the natural sheetflow of water to surrounding wetland and upland ecosystems and surface waters prior to development of a site. Therefore, the mere fact that the proposed LNP project proposes to capture this natural overland flow and detain it on sight, where pollutants will be added is an admission that off-site impacts will occur. Furthermore, there is a direct connection, in that water withdrawn from the CFBC and groundwater wells adjacent to the CFBC for the proposed LNP would reduce fresh water that formerly flowed to the Gulf of Mexico and associate estuarine ecosystems. As clearly stated in the DEIS (p. 5-12, Line 3), The CFBC:

> would start to experience elevated salinity as a result of incoming tidal waters when the combined freshwater discharge from the Inglis Dam and spring inflow is smaller than 1073 cfs, which would occur approximately 89 percent of the time.

Thus, the proposed LNP would directly affect the flow of water from the Old Withlacoochee to the Gulf of Mexico, a rather large surface water within the affected area of the proposed LNP.

10. **Hydrologic model files not produced and re-calibrated model not reviewed by state regulatory agencies** – The Environmental Report dated July 28, 2008 produced by PEF and the DEIS published August 2010 both rely on results from PEF's re-calibrated hydrologic model. Results of the original hydrologic model disclosed by PEF in November 2009 were not acceptable to the Nuclear Regulatory Commission ("NRC" or "Commission") staff and PEF was directed to re-calibrate the model to satisfy the concerns of NRC staff. The re-calibrated model was disclosed by PEF on or about March 18, 2010. Both hydrologic models purportedly were created by CH2M Hill, Inc., but none of the model files were produced by PEF. In fact, PEF refused to produce those model files, despite repeated requests for those files by the Intervenors. Model files are essential for a comprehensive review and evaluation. Examples of why model files are essential include the following:

- To do a thorough assessment of the model structure
  - number and thicknesses of layers
  - where the layers are thicker or thinner
  - Grid size
- For a thorough assessment of a model's hydraulic parameters
  - Storage values and variations
  - Hydraulic conductivity values and variations
- For a thorough assessment of the model's boundaries
  - What the model domain is
- For a thorough assessment of the model's boundary conditions

    - What boundary condition types and values are used at the model borders
    - What boundary condition types and values are used internally in the model
- In order to assess how they approximated the intricate surface water/groundwater interaction that dominates water movement in Florida, and how they approximated the critical role of the surface water and unsaturated zone in this interaction with a model that only simulates flow in the saturated zone
    - If transient simulations were run, we need to evaluate how they realistically vary overland flow to the wetlands and other surface water bodies with a program that only considers the saturated zone
- In order to evaluate whether or not any transient simulations were run
    - Evaluation of how they varied precipitation, ET, runoff to the wetlands, and streamflow over time
- For a thorough analysis of how they concluded that the on-site stormwater ponds would create an equivalent hydrologic environment as the natural wetlands currently on and/or surrounding the site

Therefore, no determination can be made regarding the extent to which PEF's hydrologic model evaluated the combined direct, indirect and cumulative impacts of all hydrologic alterations to ground and surface waters associated with construction and operation of the proposed LNP. Furthermore, on November 5, 2010, Intervenors confirmed in an email response from Paul Williams, hydrologic model reviewer for SWFWMD (the agency conducting the hydrologic model reviews for Florida's site certification of power plants, that PEF's re-calibrated hydrologic model had not been evaluated since Florida issued the certification to PEF. Therefore, none of the additional adverse impacts identified by the re-calibrated hydrologic model have been evaluated by the state. Following are the relevant excerpts from that email, incorporated herein as Bacchus Exhibit D-9, with the Intervenors' question first, followed by Williams' response:

> What is the name of the primary reviewer of the LNP? When was the groundwater model last reviewed?
>
> Robert Jaques was the initial primary reviewer. . I believe that both Robert Jaques and I reviewed the most recent modeling in August thru October 2008.

11. **Saltwater from Cross Florida Barge Canal used for proposed cooling towers -** A copy of an affidavit dated August 17, 2010 by George C. Howroyd, vice president of CH2M Hill, Inc. ("Howroyd affidavit"), also was attached as support for PEF's Motion for Summary Disposition. In that affidavit, Howroyd states that the source of cooling water that will be used in the Levy cooling towers will be saltwater pumped from the Cross Florida Barge Canal ("CFBC"). See Howroyd Affidavit at ¶ 9.

12. **Freshwater from Lake Rousseau "leakage" and springs ignored** – Howroyd's statement referenced above appears to ignore the current conditions in the CFBC in the vicinity of the proposed intake (DEIS Fig 2-3, Bacchus Exhibit C-2 and DEIS Fig 5-3, Bacchus Exhibit C-3), specifically freshwater entering the CFBC as "leakage" from Lake Rousseau and "springs" from the large excavated canal intended to form the CFBC before that ill-fated project was halted. Howroyd's statement appears to simply reflect what the final condition of that water would be if the proposed LNP was allowed to be constructed and to operate, withdrawing large volumes of water from the CFBC. Although I concur that the CFBC will become saline if the proposed LNP withdrawals occur, Howroyd's statement reflects the post-LNP conditions rather than the existing conditions. Evidence of this fact is found in the DEIS, which states:

> During operation of LNP units, the CFBC would start to experience elevated salinity as a result of incoming tidal waters when the combined freshwater discharge from the Inglis Dam and spring inflow is smaller than 1073 cfs, which would occur approximately 89 percent of the time. (DEIS p. 5-12, Line 3)

13. **Ignored impacts of proposed CFBC cooling-tower withdrawals and excavations on manatees –** A summary of the "potential operational impacts on Federally threatened and

endangered species" was provided on DEIS page 5-56. Segmenting operational impacts of the proposed LNP from construction impacts of the proposed LNP ignores the combined adverse impacts of both phases. The DEIS failed to evaluate the combined adverse operational and construction impacts of the proposed LNP. In fact, the DEIS failed to even evaluate the adverse construction impacts independent of the combined construction and operational effects. For example, the 100-foot deep excavations into the aquifer would extend to approximately the same depth at the Vogtle nuclear facility under construction in Georgia. See Bacchus Exhibit D-4. Those 100-foot deep excavations would result in both water quantity and water quality impacts to the CFBC and the federally endangered manatee that use that area. Furthermore, PEF and the DEIS also failed to consider adverse water quantity and water quality impacts on the manatee and other federally listed species of excavation of the cooling tower canal that FDEP permited on March 11, 2009. See Bacchus Exhibit D-6. Despite the irreversible impacts of dewatering from these excavations for the proposed LNP, the DEIS considered only impacts of alterations of water temperature and manatees that "may become entrapped" as adverse impacts to manatees from the proposed LNP.

14. **Ignored estuarine ecosystem impacts of proposed CFBC cooling-tower withdrawals -** Although the DEIS acknowledged the increase in salinity that would occur in the CFBC solely from the proposed operation of LNP units, neither PEF nor the DEIS assessed or evaluated the adverse impacts of decreased freshwater discharges to the Gulf of Mexico from the construction and operation of the proposed LNP. Those decreased freshwater discharges would occur from altered groundwater discharges to the Gulf of Mexico as well as from decreased surfacewater discharges to the Gulf of Mexico. Although the hydrologic model files for the proposed LNP were not produced, there is no evidence that the "recalibrated" hydrologic model accounted for all of the alterations in water quantity and specifically hydroperiod alterations from the direct, indirect and cumulative impacts of the proposed LNP.

15. **Ignored water quantity and quality impacts of proposed LNP on federally listed species -**Based on the gross inadequacies described above, the following conclusions in the DEIS lack any scientific basis and thus are arbitrary and capricious and the proposed LNP would result in unpermitted takings of undetermined numbers of individuals of federally listed sea turtles, sawfish, and manatees.

> Therefore, operation of LNP may affect, but is not likely to adversely affect, juvenile, subadult, and adult sea turtles, sawfish, or manatees. [sic]
>
> Based on this review, the staff concludes that the impacts on aquatic Federally listed threatened and endangered species from operation of proposed LNP Units 1 and 2 would be minimal and mitigation would not be warranted. (DEIS p. 5-56)

16. **Ignored adverse environmental impacts from both the increased magnitude and extent of catastrophic wildfires in the affected vicinity due to water quantity and quality impacts from the proposed LNP and the proposed cessation of essential wildfires/prescribed burns -** Paragraph 36 of Howroyd's affidavit states [emphasis added]:

> The **LNP project site** consists of approximately 3,105 contiguous acres that have been used for more than 50 years for forestry and silvaculture purposes. During this time, the site has been unoccupied, with no structures on the property, and without day-to-day onsite management and oversight. When the LNP is constructed and operational, **the site** will become actively managed by numerous onsite personnel who will be responsible for the routine surveillance, security, and safety of the site. **Based on my experience with large industrial facilities**, including those with large tracts of company-owned and actively managed lands, it is my opinion that **there would be an effective decrease in the number and duration of wildfires** on the site when compared to its present configuration and use. **Air emissions from wildfires on the property** are expected to decrease

because the potential for wildfires will be routinely monitored, and there will be additional resources in the vicinity of the site to minimize the potential for and to **put out any wildfires that do occur**.

The preceding statement illustrates Howroyd's lack of understanding of the environmental impacts associated with the proposed LNP, more specifically catastrophic wildfires, at multiple levels. This observation is not meant to be a reflection on Howroyd's competence as a Mechanical Engineer whose experience is related to "large industrial facilities" (as stated above), but merely recognition that expertise in the essential requirements of southeastern coastal plain ecosystems is not within the purview of mechanical engineering. The lack of understanding inherent in Howroyd's preceding statement is summarized as follows:

a. **Adverse impacts beyond the "LNP project site," off-site and throughout the "affected area" -** The first level of misunderstanding apparent in Howroyd's preceding statement is that the adverse environmental impacts of the proposed LNP, including catastrophic wildfires, will **not** be confined to the "LNP project site," as indicated in his statement above. One of the most obvious examples is the relocation of the four proposed wells for withdrawals of approximately 5.8 million gallons per day (MGD) of ground water for the proposed LNP. No site-specific data are required to establish base-line or pre-pumping conditions for even a minimum period of a year prior initiation of the groundwater withdrawals or any other hydroperiod alterations associated with the proposed LNP. In the original application to NRC and state regulatory agencies, the location of the proposed wells was within the proposed LNP site. In the DEIS those proposed wells have been relocated adjacent to and south of the proposed LNP site (Bacchus Exhibits C-2 and C-4). It is my professional opinion that the relocation of these proposed wells will not reduce the off-site adverse environmental impacts of the proposed LNP project. In fact, the new proposed location of those wells will increase the speed with which the springs discharging to the CFBC will cease to flow and the speed with which adverse impacts to the endangered manatees will be initiated. Neither the DEIS nor PEF conducted a comprehensive cumulative impacts assessment to determine "affected area" of the proposed LNP. It is my professional opinion that the "affected area" where adverse environmental impacts would occur, including catastrophic wildfires, will extend for many miles beyond the "LNP project site," via surfacewaters, fractures, relict and present-day sinkholes and other karst features. Further, it is my professional opinion that the "affected area" where the adverse environmental impacts of the proposed LNP would occur include, but are not limited to the following State Forests, Outstanding Florida Waters (OFW) and Shellfish Harvesting Areas (SHA) and other public lands and waters:

Levy Blue Spring and associated wetlands and uplands
Withlacoochee River (OFW) and associated wetlands and uplands
Waccasassa River (OFW) and associated wetlands and uplands
Waccasassa Bay (SHA) and associated wetlands and uplands
Gulf Hammock
Big Bend Seagrasses Aquatic Preserve (SHA)
Waccasassa Bay Preserve State Park
Goethe State Forest
Big King Spring and associated wetlands and uplands
Little King Spring and associated wetlands and uplands
Turtle Creek and associated wetlands and uplands
Spring Run Creek and associated wetlands and uplands
Smith Creek and associated wetlands and uplands
Demory Creek and associated wetlands and uplands
Tomes Creek and associated wetlands and uplands
Ten Mile Creek and associated wetlands and uplands
Withlacoochee Bay (SHA) and associated wetlands and uplands

b. **Proposed decrease/cessation of essential wildfires/prescribed burns –** On a second level of misunderstanding, Howroyd's statement above proposes a decrease or total cessation of wildfires as a management component for the proposed LNP. Wildfires not only are beneficial for the natural ecosystems within the "affected area" of the proposed LNP, those fires and prescribed burns intended to simulate those wildfires are essential to the maintenance of those natural ecosystems. Therefore, the "management" proposed by Howroyd in his statement above represents yet another adverse environmental impact of the proposed LNP. The DEIS (p. 5-28) further suggests that the proposed "wetland mitigation plan" (Entrix, 2010) for the proposed LNP proposes "controlled burns" to "reduce fuel loads in upland and wetland areas on and around the LNP site." and that "rapid fire response would be expected" if "wildfires unexpectedly occur around the LNP project" for "offsite fire-proctection resources. In reality, similar attempts by federal, state and private control-burn/wildfire experts have been unable to achieve those same goals due to hydroperiod alterations. Therefore, it is my professional opinion that those claims have no scientific basis and will be impossible to achieve. Neither the DEIS nor PEF evaluated the adverse environmental impacts of decreasing or "putting out" wildfires that are beneficial and essential to the ecosystems surrounding the proposed LNP site and the inability for such beneficial fires to continue.

c. **Uncontrollable catastrophic wildfires –** On a third level of misunderstanding, Howroyd's statement above fails to acknowledge the fact that catastrophic wildfires that result from groundwater alterations in Florida are uncontrollable and cannot be "managed" even by the professionals who are trained in prescribed burns and fire management. Therefore, not only will these catastrophic wildfires result in irreversible adverse environmental damage to the ecosystems and areas listed in "a." above, and increased air pollution, they will result in loss of public and private property and lives. The cause and ramifications of the catastrophic wildfires in Florida, like those that would occur if the proposed LNP is constructed and operated, are described in more detail in my 2007 peer-reviewed publication titled, "More inconvenient truths: Wildfires and wetlands, SWANCC and Rapanos." (Bacchus Exhibit D-10).

17. **Supplemental DEIS required based on unavailable hydrologic model files and other data related to adverse water quantity and quality impacts -** Clearly a supplemental DEIS is required to provide the Intervenors and remaining public an opportunity to submit meaningful comments regarding the environmental impacts of the proposed LNP, based solely on the on unavailable hydrologic model files and other data related to adverse water quantity and quality impacts of the proposed LNP to determine the full magnitude and extent of the adverse environmental impacts. Furthermore, the DEIS failed to include detailed proposed conditions and monitoring requirements for construction and operation of the proposed LNP and associated mining operations to permit public comment. See also Section H. (Cumulative Effects) in my affidavit, below.

E. FAILURE TO ADEQUATELY ASSESS ADVERSE ENVIRONMENTAL IMPACTS FROM AERIAL DEPOSITION OF SALT AND OTHER CONTAMINANTS FROM THE PROPOSED LNP

1. **No scientific basis for conclusion that quantity of "drift" from proposed LNP cooling towers is "very small" –** It is my professional opinion that there is no scientific basis for conclusions by PEF and the DEIS that the quantity and adverse environmental impacts from cooling tower drift from the proposed LNP would be "very small" or "small." Additionally it is my professional opinion that the quantity and adverse environmental impacts from salt and other contaminants in cooling tower drift from the proposed LNP would be large and irreversible and would result in large-scale death of forests and other native vegetation for many miles beyond the site boundaries of the proposed LNP, similar to the death and destruction of native vegetation that has occurred in the vicinity of the Crystal River nuclear facility in adjacent Citrus County. My conclusions are supported in part by more than 40 years of experience with these types of native species and ecosystems in addition to my educational background, research and personal

knowledge of Levy and Citrus Counties. A synopsis of support for my conclusions is provided below. The following misleading statement was included in ¶ 10 of the affidavit dated August 17, 2010 by Howroyd, attached as support for PEF's Motion for Summary Disposition [emphasis added]:

> Cooling towers of the type being proposed for the Levy Project emit water vapor (as a result of the heat rejection process) as well as a **very small quantity of what is often referred to as "drift."** Cooling tower drift consists of water droplets that are entrained into the air stream exiting the cooling tower.

This statement implies that only a "very small quantity" of "drift" will be emitted from the proposed LNP cooling towers is a blatant contradiction to the BACT Determinations document contained in Section 4. Appendix D (p. D-1) of the "Conditions of Certification" issued by the FDEP (Bacchus Exhibit E-1**).** That document states, in relevant part [emphasis added]:

> Based on the application, future PM emissions are estimated to be **514 tons/year** …**PM emissions will exceed the significant emission rate of 25 tons/year…**

The DEIS (p. 5-80) also acknowledges that these emissions would represent a "major source of emissions" ranging from 115.7-154.26 lb/hr of PM emissions. Therefore, there is no scientific basis for this statement inferring that the proposed LNP cooling towers would emit "a very small quantity of what is often referred to as 'drift.'" Neither Howroyd's affidavit nor the DEIS produced any studies that sampled/measured drift from relevant cooling towers.

2. **Quantifying "drift" –** Scientific methodology for quantifying "drift" such as salt emissions from power plant cooling towers has been available at least since 1979. Moser (1979) described scientific methodology for collecting and quantifying airborne salt droplets and particles, via impingement and sedimentation and included the following statements relevant to the proposed LNP:

> Once aloft, salt particles and droplets may come in contact with vegetation by sedimentation, impingement, or in rainfall. Impingement of windborne particles is by far the major means by which salt accumulates n the aerial portions of plants in coastal areas. Accumulation of salt by impingement also sill most likely represent the greatest threat to vegetation growing in the wake of drift from salt-water cooling towers. (p. 1002)

3. **Importance of site-specific measurements of air concentration, vertical deposition and sedimentation –** Neither PEF nor the DEIS appears to have even a single year of air concentration and vertical deposition data or sedimentation measurements from a comparable site as support for allegations that drift from the proposed LNP cooling towers would not result in significant adverse environmental impacts. Moser (1979) described the importance of site-specific measurements of air concentration, vertical deposition and sedimentation as follows:

> Salt will accumulate rapidly on vegetation under windy conditions. This accumulation by impingement may be several times that which accumulates by simple sedimentation. For this reason measurements of air concentration and vertical deposition are as significant as sedimentation measurements when assessing potential effects on vegetation. This is particularly true under windy conditions. (p. 1006)

4. **Cumulative impacts of salt drift from proposed LNP cooling towers and airborne coastal salt not quantified or assessed** – Not only did PEF and the DEIS fail to quantify salt drift that would occur from the proposed LNP cooling towers using comparable existing cooling towers, neither PEF nor the DEIS quantified or assessed the combined and cumulative impacts of salt drift from operating cooling towers similar to the proposed LNP cooling towers combined with naturally occurring airborne salt deposition from the coast in the vicinity of the proposed LNP site. Dispersal of airborne salt is not consistent from day to day or even within the same season. For example, during two consecutive days of onshore winds in the summer (June), Moser (1979) documented salt deposition levels three times higher than any other measurements during the summer, which killed plant tissue.

5. **Failure to identify, quantify and assess all components in "drift" from proposed LNP cooling towers** – Neither PEF nor the DEIS identified, quantified or assessed all of the components that would occur in "drift" from proposed LNP cooling towers. For example, Howroyd's Affidavit (¶ 16) confirms that the entrained water droplets will contain both suspended and dissolved solids, including both salts and inert solids. Although I would agree that part of the percentage of the drift will be made up of components other than salt particles, PEF's implications that effects of salt drift will be minimal or small by purporting that only a fraction of the drift solids is salt have no scientific basis. Additionally, implications by PEF and the DEIS that all drift is only salt also have no scientific basis.

6. **Examples of other components in "drift" from proposed LNP cooling towers** –Chemicals intentionally added to the cooling tower water, such as anti-scaling chemicals, represent one category of chemicals capable of increasing the damage to surrounding ecosystems and wildlife inhabitants. Examples of another category of contaminants capable of increasing the damage to both plants and animals in surrounding ecosystems include contaminants in stormwater from the proposed LNP, such as petro-chemicals and toxic algae. Petro-chemicals and toxic algae both commonly occur in stormwater ponds such as the ones that would be constructed for the proposed LNP. In addition to surface water and ground water, stormwater is proposed to be used as a source of water for the cooling towers (Griffin affidavit ¶ 24). In addition to introducing additional contaminants to the airborne drift from the cooling towers, diverting stormwater to the cooling towers would dewater the stormwater ponds excavated into the aquifer system resulting in dewatering of the aquifer system from this on-site action.

7. **Cumulative impacts of salt and other airborne contaminants in drift from proposed LNP cooling towers not quantified or assessed** – Because PEF and the DEIS failed to identify and quantify and all of the components that would occur in "drift" from the proposed LNP cooling towers using comparable existing cooling towers, the cumulative impacts solely from contaminants in that drift cannot be determined.

8. **Influence of relative humidity on chloride absorption by plants -** Under controlled experimental growth-chamber conditions Moser (1979) evaluated the influence of relative humidity of 60% and 80% on salt uptake by test plants. His experiment revealed that higher levels of chloride were absorbed by plants maintained under high humidity. Neither PEF nor the DEIS evaluated or addressed the impact of relative humidity on chloride absorption by plants by conducting comparable experiments on native plant species representative of the ecosystems within the impact area (also undetermined) of the proposed LNP. Moser (1979) concluded:

> The relative humidity variable is important in evaluating the potential effects of salt drift. Uptake brought about by high humidity conditions (Fig 9) must be taken into account. Conditions of relative humidity in areas surrounding cooling towers will certainly play a role in potential effects of salt drift.

9. **Acute and chronic effects of salt deposition and other airborne contaminants from the proposed LNP cooling towers –** The DEIS and PEF also failed to quantify and address the distinction between acute and chronic effects that would result from drift from the proposed LNP cooling towers. Moser (1979) described typical acute toxicity symptoms of "foliar necrosis, shoot tip dieback, and "molded" growth habit and indicated that this type of injury appears to be associated with occasional periods of high winds for 24 to 48 hours. Moser (1979) concluded that chronic effects of long-term exposure to lower levels are not known, but that:

> it will be important to know what the highest short-term salt deposition rate and air concentration level will be in addition to long-term levels, when assessing potential effects on vegetation.

10. **Mis-statements and arbitrary terms –** In addition to the scientific inadequacies I have addressed in my affidavit, PEF's Motion for Summary Disposition includes

mis-statements of what was included in their expert affidavits. For example, that motion implied that ¶ 11 of Howroyd's affidavit included the following statement related to maximum operation water flow rate:

> Based on the maximum operation water flow rate of 531,000 gpm in each cooling tower and the limitation under the Conditions of Certification ("COC"), up to 2.66 gallons per minute (gpm) of entrained water droplets or "drift" could be emitted by each cooling tower during normal maximum operation.

In reality, the statement in Howroyd's affidavit (¶9) was as follows:

> The two banks of cooling towers will each circulate up to 531,000 gallons per minute (gpm) during normal maximum operation, **with a capacity of up to 600,000 gpm** for **short periods of time**. [emphasis added]

Clearly 531,000 gpm (referenced in the COC) is not the same as 600,000 gpm, raising questions regarding the alleged 2.66 gpm of "drift" allegedly limited by the COC. Additional problems arise in evaluating the impacts because there is no definition for "short periods of time." Does this mean 5 minutes? 5 days? 5 weeks? 5 months? Obviously the period of time is critical in determining the volume of "drift" that would be produced.

11. **Conditions are not physical constraints or barriers –** It is important to note that conditions of certification, like any other conditions upon which form the basis regulatory authorization, are not physical constraints or barriers. The BP Gulf Coast disaster is a recent reminder of how such conditions fail to provide any real-life constraints once a project has been initiated. Furthermore, those conditions are linked to the state's authorization and are not subject to federal requirements such as NEPA, the Clean Water Act and the Endangered Species Acts. For example, in Calvert Cliffs' Coord. Com. v. United States A. E. Com'n, 449 F.2d 1109 (D.C. Cir., 1971), one of the very first NEPA cases, regarding NEPA requirements, the court ruled:

> Certification by another agency that its own environmental standards are satisfied involves an entirely different kind of judgment. Such agencies, without overall responsibility for the particular federal action in question, attend only to one aspect of the problem: the magnitude of certain environmental costs. They simply determine whether those costs exceed an allowable amount. Their certification does not mean that they found no environmental damage whatever. In fact, there may be significant environmental damage (e. g., water pollution), but not quite enough to violate applicable (e. g., water quality) standards. Certifying agencies do not attempt to weigh that damage against the opposing benefits. Thus the balancing analysis remains to be done. It may be that the environmental costs, though passing prescribed standards, are nonetheless great enough to outweigh the particular economic and technical benefits involved in the planned action. The only agency in a position to make such a judgment is the agency with overall responsibility for the proposed federal action — the agency to which NEPA is specifically directed.

12. **Unavailable data for dispersion modeling of salt drift –** Paragraphs 18-19 of Howroyd's affidavit in PEF's Motion for Summary Disposition included the following statement regarding Dispersion modeling of salt drift:

> Dispersion modeling of salt drift emissions from the Levy cooling towers was performed using the American Meteorological Society/Environmental Protection Agency Regulatory Model ("AERMOD") dispersion model, using as input to the model the design parameters of the Levy cooling towers and five years of hourly meteorological data.

The referenced model may have been used, but it is impossible to confirm that results of the modeling are valid or indicative of a thorough accurate assessment of salt drift impacts because there is no indication that it was reviewed and the input data for the model is suspect.

13. **Inappropriate data used for dispersion model –** As indicated above and as was the case for the hydrologic model, neither PEF nor the DEIS produced the model files for the AERMOD dispersion model used as the basis of conclusions regarding the environmental impacts of salt drift from the cooling towers of the proposed LNP. In addition to that deficiency, the five years of weather data referenced in Howroyd's Affidavit (¶¶ 18-19) cannot be justified because the DEIS (2-176, Line 34) states there is only wind data from 2007-2009 at the actual proposed LNP site. Therefore, it appears that the data use in the dispersion model actually is from Tampa or Gainesville based on additional statements in the DEIS (2-175, Line 33). The wind data from Tampa is different than the proposed LNP site, resulting in essentially irrelevant salt drift assessment using AERMOD model. The following information provided to me in an email on November 9, 2010 from NRC LNP Project Director Douglas Bruner, verified that the source of climatography data for the Tampa site was the Tampa International Airport (Bacchus Exhibit E-2, p. 3 bold text):

> RESPONSE to 2 and 3 (Larry Berg):
> The Local Climatology Data (or LCD) is published by the National Climatic Data Center (NCDC) and can be obtained via the internet or the mail. The web address for NCDC is www.ncdc.noaa.gov. The LCD may also be available in some libraries. This document is not generally a day-by-day account of local weather, rather it is a compilation of a number of different climate statistics. That said, graphics with daily temperature, daily precipitation, and atmospheric pressure are included. The document also includes monthly average precipitation along with the number of days per month with precipitation greater than 0.01" and 1.00". These statistics are generated from the last 30 years of data collected at that specific site. For the LNP EIS I used the Local Climatology Data Annual Summary with Comparative Data for Tampa, FL (KTPA).

The proposed LNP site is approximately 100 miles north of the Tampa site. The Tampa site is surrounded by a bay, but the proposed LNP site is an inland site in proximity to the Gulf coast. A significant portion of the highly developed metropolitan area surrounding the Tampa site is paved with large structures (impermeable surfaces). Conversely the vicinity of the proposed LNP site predominantly is rural, undeveloped area where a significant portion of the surroundings is vegetation primarily composed of native species. Therefore, there is no scientific basis for presuming that climatography data such as wind and rainfall data from a highly developed metropolitan area approximately 100 miles from the proposed LNP site (or any highly developed area) could be used to evaluate the environmental impacts of any aspect involving drift from the proposed LNP cooling towers. In fact, the body of scientific literature clearly refutes such a presumption.

14. **Discrepancies in maximum predicted off-site deposition rates and directions** – Additional discrepancies were noted for maximum predicted off-site deposition rates. For example, Howroyd's Affidavit (¶¶ 20-21) in support of PEF's Motion for Summary Disposition states:

> The dispersion modeling demonstrates that the maximum predicted off-site deposition rate is **6.81 kilograms/hectare/month (kg/ha/mo)** of total solids at the nearest site boundary. The dispersion modeling also demonstrates that the off-site deposition rate would decrease significantly with increasing distance from the plant. [emphasis added]

That deposition rate is not consistent with the following statements in the DEIS (p. 2-176, line 35-36) that the maximum predicted off-site deposition is **6.83 (kg/ha/mo)**. [emphasis added] Both fail to identify the precise area/extent of the off-site deposition. Furthermore, the DEIS states that the prevailing winds at Levy are from the **east-northeast** and from the **west**. If, indeed the DEIS is correct then logically the offsite deposition from the towers would not be due west (closer to the coast) but southwest, and east (away from the coast), presumably increasing the extent and

magnitude of adverse environmental impacts from drift if the proposed LNP was constructed and became operational. The problems described above, related to the dispersion model suggest that the data from the Tampa site may have been used to obfuscate the full magnitude and extant of adverse environmental impacts of drift from the proposed LNP.

15. **Unsupported predictions on-site deposition of salt and "solids"** – The same arguments described above apply to the following statements in the same affidavit by Howroyd (¶¶ 23 and 25, respectively), including the lack of scientific support:

> The dispersion modeling demonstrates that the maximum potential on-site deposition of solids is 10.75 kg/ha/mo.
>
> …no onsite impacts to vegetative communities, including wetlands…

In the actual Motion for Summary Disposition, PEF misconstrues Howroyd's second statement above (¶ 25) as follows:

> The maximum predicted worst-case on-site salt deposition is within the range of 10 to 20kg/ha/mo where at, most, only minor and infrequent leaf damage would be expected.

Howroyd's statement misleads the reader into believing that entire trees and other plants cannot suffer fatal impacts if observed leaf damage is "minor and infrequent." Clearly that is not the case. Death of trees and other native vegetation can and would occur, with "minor" leaf damage if the proposed LNP is constructed and becomes operational due to toxicity of salt and other contaminants in the root zone particularly during rainy periods when salt build-up on leaves from drift deposition will not occur. Entire forests of trees could be killed from root damage by salt deposition contaminating the aquifer, without "leaf damage" detectible during visual inspections. Furthermore, Howroyd's statements are based on the unsupported assumption that native plant communities in the vicinity of the proposed LNP are not more sensitive to airborne deposition than corn. Those statements also fail to consider all of the components of cumulative impacts addressed in my affidavit and assumes that there will be frequent rainfall (Howroyd Affidavitat, ¶ 25). The heart of Contention 4 is that damages from individual causes will be compounded because of the interaction between the myriad adverse effects of constructing and operating the proposed LNP. Those compounded – cumulative – impacts will result in environmental damage in more complex ways and in greater magnitude than myopic evaluations of individual components can reveal. There was no consideration in Howroyd's affidavit or by PEF, or in the DEIS of how plants and animals subjected to a reduced availability of uncontaminated fresh water resulting from passive and active dewatering, particularly during drought conditions, or other periods of limited rainfall, will be affected by the additional stressor of salt drift. In fact, both PEF and the DEIS consistently look at each impact as a discrete problems. Clearly a more holistic approach is required for compliance with NEPA regarding cumulative impacts.

16. **Inappropriate threshold salt deposition rate used**– Howroyd's Affidavit (¶ 22) in support of PEF's Motion for Summary Disposition also addresses the threshold salt deposition rate as follows:

> The threshold salt deposition rate used to identify a potential impact to vegetation off-site at Levy is 10 kg/ha/mo.

This threshold for potential impact was derived from an agricultural crop, specifically corn, which is intensely irrigated. There are no cornfields in the vicinity of the proposed LNP, as noted by PEF. Therefore, that threshold is an inappropriate level for adverse impacts to native vegetation and ecosystems in the vicinity of the proposed LNP, which must survive without agricultural irrigation. Neither PEF nor the DEIS provided any scientific support for using a threshold salt deposition rate based on corn. Indeed, there is none. In fact, PEF includes the following response to a Staff Request for Additional Information, regarding the arbitrary and capricious nature of that threshold:

> Long-term effects of salt drift on terrestrial habitats are not well documented,

> with only a limited number of studies reported in the public domain. Precipitation, humidity, species composition and photoperiod are known to influence salt tolerance, and extrapolating experimental salt deposition effects on vegetation to natural conditions is somewhat speculative due to the complexities of a natural habitat response.

17. **Cumulative impacts on a temporal scale** – The threshold referenced above also fails to address 60 years of salt drift and airborne deposition of other compound from the proposed LNP cooling towers. Likewise, the threshold also fails to account for drought conditions on the historic scale or an increase in frequency and intensity of future droughts due to climate disruption. Furthermore, that threshold also fails to account for cumulative temporal impacts of salt drift combined with hydroperiod alterations from passive and active dewatering and surfacewater withdrawals, combined with other consequences inherent in PEF's plans for the proposed LNP.

18. **Inadequate and unsupported attempts to quantify damage to vegetation from airborne deposition** – Howroyd's Affidavit (¶ 29) in support of PEF's Motion for Summary Disposition provides conflicting statements in an attempt to quantify damage to vegetation from airborne deposition from the proposed LNP cooling towers, as follows:

> Evaluating the potential for adverse impacts from salt deposition to on-site freshwater wetlands is based on the impact to vegetation. Minor and infrequent leaf damage does not noticeably alter adversely wetland vegetation.
>
> These results are not inconsistent with the possibility of some isolated damage to vegetation at onsite locations.

The second statement contradicts "minor and infrequent leaf damage." Furthermore, neither statement quantifies the damage that would occur.

19. **Misleading statements regarding the evaluations and reports from CREC regarding salt deposition** – Howroyd's Affidavit (¶ 28) in support of PEF's Motion for Summary Disposition included the following statement regarding the evaluations and reports regarding salt drift at the Crystal River Energy Complex (CREC) in adjoining Citrus County:

> A fourteen year study of the potential impacts of salt deposition from saltwater-based cooling towers at the Crystal River Energy Complex ("CREC") showed that salt drift and salt deposition at that facility did not have any discernible impact on vegetation other than minor and infrequent leaf damage.

Although the study may have continued for 14 years, only one control site was monitored in that study. Based on my personal knowledge and review of documents and photographs of the CREC vicinity, much of the native vegetation, including native trees at the "control" site reported in the CREC salt drift report is dead or exhibiting signs of severe stress. In fact, the final report for that study has numerous references to dead vegetation, including the following:

> "moderately high density of dead or heavily stressed trees" (Aerial Study p. 5)
>
> "Heavily Stressed and Dead Cabbage Palm and Red Cedar" (Figures 5a and b)
>
> "ranges from only scattered dead or stressed trees to very heavy loss of the woody species," (p. 20)

Therefore, vegetation damage at CREC is far greater than "minor and infrequent leaf damage" described in Howroyd's affidavit. Note that red cedar is an extremely salt tolerant species. Additionally, the vegetation at CREC was evaluated only for mechanical draft cooling tower impacts for one year. Such a short-term evaluation of leaf damage could not evaluate chronic effects of airborne deposition from cooling towers.

20. **Inaccurate statements regarding the evaluations and reports from CREC regarding salt deposition** – Howroyd's Affidavit (¶ 28) in support of PEF's Motion for Summary Disposition also included the following statement regarding the evaluations and reports

regarding salt drift at CREC:

> The CREC is located approximately 15.5 km south of the Levy Project site, with vegetation similar to that at the Levy Project site.

The CREC is **NOT** located south of the proposed LNP site, but south**west** of the proposed LNP site and on the coast. More specifically, the proposed LNP site is located approximately 7 miles from the Gulf of Mexico, while CREC essentially is on the Gulf. The importance of this distinction is manifest in the fact that vegetation at CREC is **NOT** "similar to that at the Levy Project site" as Howroyd claims in his affidavit. Beyond the fact that much of the vegetation at the CREC site is dead (which is not the case at the proposed LNP site) and the fact that the Final EIS for CREC (p. 2-20) states: "The applicant has not supplied a detailed analysis of the biotic makeup of the main community types found at the site," examples of ways to conclude that the vegetation at the two sites are not similar include the following:

a. my personal knowledge of the CREC site and vicinity spanning back to before that power plant was constructed and I testified as an expert witness for the predecessor agency of FDEP (Florida Department of Environmental Regulation) regarding the ecosystem impacts that would occur if the facility was constructed;

b. my personal knowledge of proposed LNP site and vicinity spanning a similar time frame;

c. the cover classification map for south Levy/north Citrus counties, based on SWFWMD 2006 Lev3, FLLUCSDESC and attached hereto as Bacchus Exhibit E-3**;**

d. The LNP DEIS, Table 2-5 which lists no areas of salt marshes, and 23.5 acres of freshwater marshes;

e. The CREC FEIS, while having no such list of vegetation cover refers to saltwater marshes numerous times, including CREC FEIS p.2-1, 2-9, 2-10, 2-18, 2-19, 2-21, 2-23, 2-25, 2-53, 2-56, 5-17, 5-18, 5-24, 5-26, 5-40, 5-42;

f. The LNP DEIS Table 2-5 which lists 402.6 acres of cypress swamp, while the CREC FEIS mentions cypress only once (p-21).

I also have personal knowledge that cypress are extremely sensitive to salt compared to coastal species of native trees such as red cedar. The fact that much of the native vegetation at CREC is dead or severely stressed is far more relevant to predicted impacts from the proposed LNP than modeling which failed to consider cumulative impacts of hydroperiod alterations/dewatering of the aquifer system from the proposed LNP and **additional cooling tower proposed for CREC** (DEIS 7-12, Line15) combined with the other factors referenced in my affidavit. Ironically, Chapter 7 of the DEIS attempted to address cumulative impacts of the proposed LNP, referencing the Crystal River Energy Complex (CREC).

21. **Misleading statements implying that rainfall miraculously eliminates adverse impacts of salt on vegetation** – Howroyd's Affidavit (¶¶ 25 and 26) in support of PEF's Motion for Summary Disposition also included the following statement suggesting that rainfall miraculously eliminates adverse impacts of salt on vegetation:

> Based on the analysis performed, including considering that frequent rainfall at Levy reduces the duration that vegetation is exposed to deposited salt, adverse impacts to vegetation from salt deposition are not expected and other adverse impacts to freshwater wetland areas of the Levy site are even less likely.

The DEIS repeats similar unsubstantiated claims on p. 5-23, as follows:

> Salt drift and deposition are not expected to impair freshwater ecosystems at the Levy site.

These statements ignore the following findings of the U.S. Global Change Research Program

(GCRP), ironically also included in the DEIS (p. 7-12, Line 19):

> While the GCRP has not incrementally forecasted the change in precipitation by decade to align with the licensing action, the projected change in precipitation from the "recent past" (1961–1979) to the period 2080 to 2099 is a decrease of between 20 to 25 percent in spring and an increase of between 15 to 20 percent in the fall (GCRP 2009). Declines in aquifer water levels may continue throughout Florida, as the aquifers are relied on in response to changes in precipitation and the growth in demand for freshwater (GCRP 2009).

Considering that declining rainfall and aquifer levels are predicted by GCRP, there is no scientific support for Howroyd's statement that "frequent rainfall at Levy" will reduce "the duration that vegetation is exposed to deposited salt." Furthermore, his statement and statements in the DEIS that salt is not expected to impair freshwater ecosystems completely ignores the fact that the rain simply will transfer the salt into the soil, where it will cause root damage and death, in addition to contaminating the freshwater aquifer system. See also related comments in my affidavit and Exhibits regarding adverse impacts from "drift" from the proposed LNP cooling towers and the failure of PEF and the DEIS to consider cumulative impacts.

22. **Site-specific rainfall data ignored** – The SWFWMD data base includes rainfall records beginning in 1915 for Levy County, where PEF proposes to construct and operate the LNP. No justification was provided by PEF or in the DEIS for why inappropriate data were used in the AERMOD dispersion model instead of the readily available site-specific data from the SWFWMD. Those data are free and available at the following url: http://www.swfwmd.state.fl.us/data/wmdbweb/rainfall_data_summaries.php

23. **Unsubstantiated statements regarding daily rainfall –** Even if rainfall data collected at the Tampa International Airport was presumed to be representative of rainfall occurring at the site of the proposed LNP – which it is not a valid presumption for evaluating environmental impacts of that proposed project – statements regarding daily rainfall based on those data were unsubstantiated. For example, at ¶ 16 of Griffin's affidavit includes the following statement:

> The small pipe at natural ground level in the spillway will be sized to restore the treatment volume in about 5 days; because it rains on average every 3 to 5 days in Florida. These three wet ponds are the best alternatives for treating the runoff from the LNP powerblock.

Based on the NOAA rainfall from the site reportedly used in PEF's AERMOD dispersion model (of which only limited access was provided) **no** rainfall occurred during the entire month of April in 1997 and rainfall was negligible in May 1979 and November 1988 (0.02 and 0.01 inches, respectively). See Bacchus Exhibit E-4 extracted from http://cdo.ncdc.noaa.gov/climatenormals/clim20/fl/088788.pdf Of greater importance is the fact that entire months with **no** rainfall also occurred in Chiefland. For example, October 2010 was reported by NOAA as the "top ten driest October" in the period of record at Chiefland. The period of record for Chiefland began in 1956. See Bacchus Exhibit E-5 extracted from http://www.srh.weather.gov/images/tbw/TopNews/PDF/Oct2010Rain_final.pdf Chiefland is a rural area in Levy County similar to and approximately 30 miles from the site where the proposed LNP would be constructed.

24. **Additional misleading statements regarding precipitation –** Additional equally misleading statements regarding rainfall are included in the DEIS, such as the following statement on DEIS p. 5-21:

> Precipitation in the region is particularly high during the summer months (4.3 – 9.8 in., June through September),…

I reviewed the wet-season (June-September) and dry-season (October-May) records through 2008 for Levy County from the SWFWMD's data base ("Rainfall Summary Data by County"). In nine of the most recent 40 years of record in Levy County **less** rainfall occurred

during the "wet" season than during the "dry" season for the same year. Of the remaining years "wet" season rainfall exceeded "dry" season rainfall by less than 3 inches for the same year. See http://www.swfwmd.state.fl.us/data/wmdbweb/rainfall_data_summaries.php

25. **Failure to address cumulative environmental effects of climate disruption on rainfall patterns combined with adverse impacts of "drift" –** The occurrence of less rainfall during the "wet" season than during the "dry" season in Levy County that I described above may be the result of climate disruption. Climate disruption has been well-documented by scientists world-wide and is known to be exacerbated by the loss of forest resources as well as from loss of organic soils. Neither PEF nor the DEIS evaluated the cumulative adverse impacts to the environment, such as the inland and freshwater ecosystems in the vicinity of the proposed LNP, of climate disruption on rainfall combined with salt drift. Large, rather than so-called "small" adverse impacts claimed by PEF and the DEIS would be expected from the abnormal "wet" season rainfall I described above as well as from rainfall abnormalities associated with increasing climate disruption. For example, salt drift during summer months with limited rainfall will result in severe acute damage to foliage of native vegetation. Periodic occurrences of high rainfall would flush accumulated salt and other airborne contaminants from the proposed cooling towers into the soil and shallow aquifer system resulting in severe chronic damage to the roots of native vegetation. Therefore, there is no scientific basis for claims by PEF and the DEIS that salt drift would not contribute to significant adverse environmental impacts in the vicinity of the proposed LNP. The question that remains to be answered is not IF the damage would occur, but rather WHERE the damage will occur. Clearly that question cannot be answered by the current model results considering the problems described above, including the failure to consider even the limited number of cumulative impacts described in my affidavit. See also Section H. (Cumulative Effects) in my affidavit, below.

26. **Supplemental DEIS is required based on unavailable and inappropriate data and unsubstantiated statements regarding rainfall –** Clearly a supplemental DEIS is required to provide the Intervenors and remaining public an opportunity to submit meaningful comments regarding the environmental impacts of the proposed LNP, based solely on the on unavailable and inappropriate data, including model files, and unsubstantiated statements regarding rainfall.

F. UNPERMITTED "TAKING" OF ENDANGERED AND THREATENED SPECIES

1. **Inadequate assessment of environmental impacts prevents determination of unpermitted "taking" -** Because PEF and the DEIS have failed to identify, describe and consider all of the direct, indirect and cumulative impacts associated with constructing and operating the proposed LNP, required to determine the "affected area" of the proposed project, the affected public and regulatory agencies have been precluded from providing meaningful comments regarding the unpermitted "taking" of federally listed endangered and threatened species. In fact, because of the gross inadequacies of the DEIS, agencies such as the U.S. Fish and Wildlife Service (USFWS) and the U.S. Environmental Protection Agency (USEPA) are incapable of determining the total number of individuals of federally listed species such as manatees, sea turtles that will be "taken" (killed) and other environmental effects as a result of the direct, indirect and cumulative impacts associated with constructing and operating the proposed LNP. See Section H. (Cumulative Effects) in my affidavit, below.

2. **Spring discharges along the CFBC –** Federally endangered manatees are marine mammals. Like all mammals, manatees must drink fresh water to survive. Fresh groundwater discharges as springs are critical sources of fresh water for survival of manatees. Bacchus Exhibit F-1 includes five photographs of freshwater springs discharging along the CFBC in the immediate vicinity of where the proposed LNP has relocated its groundwater withdrawal wells, where surfacewater withdrawals would occur and where the 100-foot deep pits and

stormwater ponds would be excavated. This exhibit was submitted to NRC on September 23, 2010 as part of the public comments on the DEIS. This exhibit and the attachments referenced in this exhibit describe additional information that PEF and the DEIS failed to consider regarding adverse environmental impacts that would occur from the proposed LNP. The attachments referenced in this exhibit should be part of the official public record for the DEIS and are incorporated herein by reference.

3. **Coastal spring discharges used as source of freshwater consumption by manatee –** I have observed the CFBC springs illustrated in the photographs referenced above on numerous occasions and have verified that those discharges are fresh water. I have observed manatee drinking water from springs similar to those CFBC springs shown in the photographs referenced above, including coastal springs with less flow than the springs discharging to the CFBC.

4. **Example of unpermitted "taking" of federally endangered manatees by proposed LNP –** In my professional opinion, the direct, indirect and cumulative impacts associated with constructing and operating the proposed LNP would terminate the flow of the springs discharging to the CFBC and other coastal springs in the vicinity of the proposed LNP. My opinion is based, in part, on my knowledge of the existing threats to the survival and recovery of manatees and other federally listed species including anthropogenic alterations of water quantity and quality such as those described in my peer-reviewed publication titled "species. Part I: Marine ecological disturbances" (Bacchus Exhibit F-2**).** Furthermore, it is my opinion that the cessation of flow of those springs discharging to the CFBC and other areas in the affected area of the proposed LNP would result in the unpermitted "taking" of an undetermined number of manatees. The unpermitted "taking" of manatee may not be confined to the CFBC manatee population described in the Recommended Order for Save the Manatee Club, Inc. Case No. 96-1723 and attached hereto as Bacchus Exhibit F-3. The unpermitted "taking" of manatee may include additional manatees in the coastal (estuarine) areas northwest and southwest of the proposed LNP.

G. AVOIDANCE - ALTERNATIVES NOT CONSIDERED OR INADEQUATELY ASSESSED

1. **Avoidance alternatives not considered or inadequately assessed** - The DEIS addressed Alternatives in the Abstract; Section 1.4 "Alternatives to the Proposed Actions;" Section 9.0 "Environmental Impacts of Alternatives;" Section 9.1 "No Action Alternative;" Section 9.2 "Energy Alternatives" but fails to address alternatives that would avoid **all** of the adverse environmental impacts described in my affidavits and exhibits, while still providing energy to customers at an affordable price. See Section H. (Cumulative Effects) in my affidavit, below. At least some of the alternatives that PEF and the DEIS failed to consider could provide energy at a far lower cost than the environmentally devastating proposed LNP and would eliminate the need for environmentally destructive and costly transmission corridors and substations linked to the proposed LNP and shown in Bacchus Exhibit G. Examples of the "avoidance" alternatives that the DEIS and PEF failed to consider include the following.

2. **Roof-top solar funded by PEF** - Neither the DEIS nor PEF took a hard look at roof-top solar funded by PEF would allow power to be produced in the metropolitan areas where it would be used, rather than in remote rural areas such as the proposed LNP site and then transferred, via transmission corridors and substations to other counties. This type of roof-top solar network is promoted by the Florida Solar Energy Center and the California Solar Energy Center. See Bacchus Exhibits G-1 and G-2 respectively for additional information regarding those alternatives for avoiding all of the adverse environmental impacts described in my affidavits and comments provided by others.

3. **Decoupling no-build alternative** – Additionally, the DEIS and PEF failed to take a hard look at the decoupling alternative voluntarily implemented by PEF as a substitute for constructing and operating the environmentally destructive proposed LNP. This alternative is described in Bacchus Exhibit G-3**.**

4. **Indirect future energy use reductions via increased efficiency and off-grid renewable options - no-build alternative –** Many alternatives for significant reductions of residential and commercial energy use have been developed, including off-grid options. Neither the DEIS nor PEF took a hard look at, or even considered an alternative where PEF would fund those options as a "no-build" alternative that would avoid all of the adverse environmental impacts described in my affidavits and comments provided by others.

H. NO BONA FIDE COMPREHENSIVE CUMULATIVE EFFECTS ANALYSIS CONDUCTED OR COMPLIANCE WITH OTHER NEPA AND FEDERAL REQUIREMENTS

1. **No comprehensive cumulative effects analysis conducted** – Neither the DEIS nor PEF conducted a bona fide comprehensive cumulative effects analysis that would occur, including the adverse environmental impacts described in my affidavits and exhibits, if the proposed LNP was constructed and operated compared to the cumulative impacts of readily available alternatives. In 1997, the Council on Environmental Quality released its findings regarding "Considering Cumulative Effects Under the National Environmental Policy Act. Executive Office of the President; What are Cumulative Impacts?" identifying how such an analysis is conducted. A synopsis of that extensive report is incorporated herein as Bacchus Exhibit H-1. The cumulative effects analysis also would need to include all of the adverse impacts referenced in this affidavit and related exhibits, my original affidavit dated February 6, 2009, regarding adverse environmental impacts and attached hereto as Bacchus Exhibit H-2 and my preliminary DEIS comment letter dated 10/26/10 on the proposed LNP and attached hereto as Bacchus Exhibit H-3.

2. **Comprehensive cumulative effects analysis requires establishment of the "area of impact"** – No scientifically based "area of impact" for the proposed LNP can be established until the cumulative effects analysis has been completed. The "area of impact" is dependant on the detailed cumulative effects analysis which would include, at the least, all of the areas of direct, indirect and cumulative impacts, identified in the various maps referenced above and incorporated herein as **Bacchus Exhibit ??.**

3. **Failure to comply with other NEPA and federal requirements** – In addition to the DEIS' failure to conduct a comprehensive cumulative impacts assessment, the DEIS fails to comply with a host of other federal requirements. Examples of these deficiencies are provided in my preliminary DEIS comment letter dated 10/26/10 on the proposed LNP and attached hereto as Bacchus Exhibit H-3.

4. **Supplemental DEIS required to address deficiencies in current DEIS** – Because of the gross inadequacies in the DEIS, a Supplemental DEIS is essential to provide meaningful comments from the public and sister regulatory agencies. For example, the USFWS cannot determine the comprehensive number of federally listed species and individuals of those species that will be "taken" if the proposed LNP is constructed and operated based on the information provided in the current DEIS. Similarly, organizations and individuals dedicated to protecting federally listed species, such as "Save the Manatee" would be unable to determine that a manatee population is threatened by the proposed LNP simply by reading the current DEIS. Therefore, a Supplemental DEIS is required.

I. MITIGATION

1. **Mitigation infers significant adverse environmental impacts -** The DEIS Abstract (paragraph 2) states:

> The EIS includes the review team's analysis that considers and weighs the environmental impacts of constructing and operating two new nuclear units at the LNP site and alternative sites, and mitigation measures available for reducing or avoiding adverse impacts.

If the adverse environmental impacts of the proposed LNP project truly were small, as PEF and the DEIS claim, then no mitigation would be required. In reality, a proposed mitigation plan that is approximately 1-inch thick was proposed and referenced in the DEIS, despite the fact that no copy of this proposed plan was incorporated as part of the DEIS. Therefore, the general public did not have access to the proposed mitigation plan to provide comments.

2. **Mitigation and review process fails to comply with NEPA and other federal requirements –** Neither the proposed mitigation plan nor the review process comply with NEPA and other federal requirements. Examples of deficiencies of the DEIS review process are summarized in Bacchus Exhibit H-3.

3. **Comprehensive cumulative impact analysis required prior to formulating mitigation plan –** A comprehensive cumulative impact analysis, including all of the impacts from the proposed Tarmac mine, is required prior to formulating mitigation plan for the proposed LNP project. It is my professional opinion that the proposed mitigation plan, which was not included in the DEIS, is not a scientifically viable plan, includes proposed action that will be scientifically impossible to implement and is otherwise grossly inadequate to compensate for the irreversible adverse environmental impacts of the proposed LNP singly, as well as the proposed LNP and proposed Tarmac mine projects

4. I declare under penalty of perjury that the factual statements above are true and correct, to the best of my knowledge, and the expressions of opinion stated above are based on my best professional judgment.

Executed in Accordance with 10 CFR §234d

Sydney T. Bacchus, Ph. D.
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SWORN TO AND SUBSCRIBED before me this 12 day of November 2010, by the affiant, SYDNEY T. BACCHUS, who is personally known to me or who has produced GPD 53001835 as identification.

TYLER JEFCOAT
Notary Public
Oconee County
State of Georgia
My Commission Expires May 18, 2014

NOTARY PUBLIC, State of Georgia
My commission expires: 5/18/14
Commission No.: