

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, 52-030-COL
)	
Levy County Nuclear Power Plant, Units 1 and 2))	December 20, 2012
)	

**INTERVENORS' PROPOSED REBUTTAL
FINDINGS OF FACT AND CONCLUSION OF LAW**

On December 5, 2012, the Ecology Party of Florida and Nuclear Information and Resource Service (“Intervenors”) submitted their Proposed Findings of Fact and Conclusions of Law Regarding Contention 4. Intervenors’ Proposed Findings of Fact and Conclusions of Law (“Int. PF”). Proposed findings of fact and conclusions of law also were submitted by the U.S. Nuclear Regulatory Commission (“NRC”) Staff and Progress Energy Florida (“PEF”) on December 5. NRC Staff Proposed Findings of Fact and Conclusions of Law Regarding Contention 4A (“Staff PF”); Progress Energy Florida Inc.’s Proposed Findings of Fact and Conclusions of Law (“PEF PF”). Intervenors hereby submit their rebuttal to the Staff’s and PEF’s proposed findings.

These proposed rebuttal findings will not repeat all of the evidence and conclusions that are thoroughly documented in Intervenors’ Proposed Findings of Fact and Conclusions of Law. Instead, the purpose of these rebuttal findings is to respond to new arguments about the evidence and its legal significance.

I. INTRODUCTION

As previously discussed (Int. PF at 2), the question at the heart of this case is whether the NRC Staff lawfully may rely on a promise to reduce potentially significant environmental

impacts to an insignificant level by monitoring their occurrence and attempting to swiftly prevent or mitigate them before those impacts become irreversible, when the NRC conceded that it has very little information about how, when or where those impacts will occur. Consistent with this conclusion, the NRC Staff's proposed findings confirm that the reason the Staff believes that the environmental impacts of the proposed Levy Nuclear Plant ("LNP") on wetlands will be insignificant is that adverse impacts will be prevented by the monitoring and mitigation requirements of the Conditions of Certification ("COCs") imposed by the Southwest Florida Water Management District ("SWFWMD") as a condition of PEF's water use permit. As stated in ¶ 114:

Even though their quantitative analysis indicated that as much as 2093 ac of wetlands could be adversely affected, [NRC Staff witnesses] Mr. Doub and Ms. Aston concluded that *adverse wetland impacts would be unlikely because of the monitoring and mitigation requirements imposed on the Applicant by the COCs.*

Id. (emphasis added). *See also* Staff PF ¶¶ 128, 129. Thus, rather than conduct a rigorous analysis of the direct, indirect and cumulative environmental impacts of the LNP groundwater wells on wetlands, the Staff chose to make a finding of no significant impact based on the COCs. On that basis, the Staff has ruled out detailed consideration of any other mitigation measures.

Exhibit NRC001 at 4-17.

As the Supreme Court has held, however, NEPA requires the NRC to understand and report on the effects of its licensing action now, before the action is taken. *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989). The Staff cannot escape this obligation by relying on a plan for post-licensing monitoring and mitigation, unless that plan provides enough information "to ensure that environmental consequences have been fairly evaluated." *Id.*, 490 U.S. at 1847. Here, the Final Environmental Impact Statement ("FEIS") for LNP fails to satisfy that requirement because the COCs rely heavily on the very studies that the NRC deemed

inadequate to rule out significant adverse environmental impacts to area wetlands. In their proposed findings, neither the Staff nor PEF has provided evidence to suggest otherwise. While they attempt to show the existence of factual disputes in which Intervenors' evidence fails to controvert their evidence, we find that these disputes generally do not exist or are not relevant to our decision. Furthermore, for the few issues that are genuinely indeterminate, they should be construed in the Intervenors' favor, because the Staff bears the burden of proof.

In Section II below, we will address the issues on which the Staff and PEF claim there is a factual dispute in which they prevail. In Section III, we will discuss their legal arguments.

II. REBUTTAL FINDINGS OF FACT

A. Site Characterization

PEF paints a picture of the site and its environs as one that has abundant groundwater. PEF PF at 13-14, ¶¶ 5, 6, 9.¹ However, this picture is contradicted by the testimony of its own expert that PEF originally proposed to install groundwater withdrawal wells on the north parcel, but moved the wells to the south parcel because the model predicted large drawdowns from the withdrawal in the northern part of the site. Tr. 1265 (Lehnen); PEF PF at 17, ¶14. In addition, to aid calibration, an artificial recharge of 5 Mgd was added to the groundwater model by placing a river cell within the model, even though there was no river there and this effectively added non-existent rainfall. Tr. 1422-1424 (Lehnen). Finally, all witnesses agreed that conditions in the karstic limestone are highly variable spatially, so that the area of Rainbow spring, which is

¹ PEF argues that Intervenors' evidence of local wells drying up is "anecdotal" and "inapposite." PEF PF at 13-14, ¶ 6. But we find that there is a reason for concern when local residents and nearby communities dependent on the same aquifer for drinking water that LNP will dewater are already experiencing water quality and quantity issues. At the very least the evidence would indicate that the current SWFWMD process for evaluating how much water is available is significantly flawed. **Exhibit INT701R, A.6.**

approximately five miles away, discharges over 600 mgd. Tr. at 1215-16 (Rizzo); Tr. at 1275 (Lehnen). Therefore, it is not appropriate to base the analysis of LNP's wetlands impacts entirely on generalizations about the characteristics of the region.

With regard to the presence of conduits, rather than assisting the Staff to carry its burden to show that it took account of their potential presence, PEF tries to shift the burden to Intervenor to prove their existence. PEF PF at 30, ¶ 45. In fact, the presence of fractures and joints is acknowledged in the FSAR, which states: "Additionally, as with nearly all rock formations, fractures, joints, and bedding planes exist in the Avon Park Formation. These discontinuities (vertical fractures, joints, and bedding planes) are key elements in the localization and development of karst." **Exhibit PEF703** (FSAR at 2.5-98).

In addition, although PEF attempts to suggest it has systematically looked for karstic phenomena such as sinking streams and swallets on the site (PEF PF at 31-33, ¶¶ 46-50), in fact, it did not do a systematic survey for such features. When asked directly whether it had looked for such features, PEF replied that its staff surveying wetlands has not found such phenomena, but that was not their primary task. Tr. 1340-41 (Griffin). When asked if there are swallets on or close to the site PEF merely hedged without making a definitive statement. Tr. 1341 (Griffin). In contrast, the intervenors provided a video of a swallet very close to the site (**Exhibit INT373**), and strong testimony from Dr. Bacchus on this issue. Tr. 1342-43 (Bacchus). In addition, in their proposed findings, Intervenor showed that the available evidence, including voids found during the geotechnical investigation of the north site and the presence of Big and Little King Springs 2 miles from the site, indicate that conduits could be present. Int. PF at 33-40.

Once again PEF misleadingly suggests that Mr. Davies' testimony proposes drilling hundreds of thousands of boreholes throughout the entire 7,000 acre property. PEF PF at 33, ¶

51. In fact, he simply explains why drilling boreholes is not an effective method of identifying conduits in karst by citing to a 1984 study that shows wells and borings have a low probability of intersecting conduits. **INT001**, A.13. As he states, “predicting where conduits occur in the subsurface can be done to some degree, but it requires large amounts of empirical data on hydraulic head variation, groundwater velocity and geochemistry.” *Id.* Furthermore he notes the availability of several different sources -- including a USEPA publication -- that contain recommendations for investigating preferential flow through carbonate settings. **Exhibit INT001**, A. 14. In oral testimony he reiterated that randomly drilled wells have a low probability of intersecting conduits and that tracers in wells could have been of assistance. Tr.1317, 1319.

PEF contends that the Staff stated that tracer tests are only relevant for contaminant tracking. PEF PF at 33, ¶ 51. Mr. Davies’ extensive experience in mapping preferential pathways for more accurate knowledge of groundwater movement shows this is not true. **Exhibit INT001R**, A.15. Also, Staff consultants are not experts in tracer tests or even in Florida karst. Tr. 1171 (Vermuel). Therefore we find this argument unpersuasive.

PEF’s assertion that Dr. Hazlett and Mr. Davies were unable to explain how tracer tests could reveal anything more than surface tracer entrance and exit points is incorrect. Dr. Hazlett testified, for example, that data from dye tracers improve the robustness of models and that by using the results, conduits can be inserted into porous media models as discrete features, thus improving the ability of the numerical model to represent reality and accurately simulate the effects of pumping. Tr. 1436-1437. Moreover, contrary to PEF’s claim that Dr. Davies did not explain how the natural potential method for locating conduits could be helpful, he explained that drilling accuracy can be increased by using geophysical techniques (tr.1445) because

groundwater in a conduit produces a millivoltage difference that can be detected and plotted on the surface. Tr. 1446 (Davies) (mistakenly identified in the transcript as Dr. Hazlett).

Although PEF admits that it found voids of 3 to 19 feet in size, with evidence of dissolution at the edge of the voids (tr. 1249-52 (Rizzo)), PEF asserts that these voids are not conduits because they are not inter-connected, based upon grout take testing. PEF PF at 34, ¶ 54: However, the grout testing described is in no way equivalent to a tracer testing as described by Dr. Hazlett, which would be able to identify preferential flow features and allow them to be modeled. Tr. 1437. Dr. Hazlett also stated that very small spaces could be parallel to the bedding planes that could easily be clogged with grout injection, yet could be conduits for vast quantities of water to move on to the site. Tr. 1327-28. Furthermore, the FSAR's description of the grout test program shows that the grout test program with low viscosity grout was limited to 12 boreholes and was designed to test grout design for the construction of the nuclear island. **PEF 703** at 10 (FSAR at 2.5-322). As stated in the FSAR, grout design and grouting techniques were the primary purposes of the study:

A Grout Test was implemented to specifications consistent with the design parameters set forth in this FSAR. The Grout Test Program consisted of nineteen grout holes arranged in a hexagonal pattern, including seven "Primary" grout holes of a higher viscosity grout, and twelve "Secondary" grout holes of a lower viscosity grout. These 19 holes were upstage and downstage grouted from a depth of 141 ft. bgs to a depth of 66 ft. bgs, as prescribed for the large-scale foundation grouting effort. *The purpose of the Grout Test Program was to validate the grout design and grouting techniques, to measure the change in the shear wave velocity and permeability of the grouted zone, and to determine the grout take in the Avon Park Formation.*"

Id. (emphasis added). If the study's purpose had been to determine the interconnection between the observed voids, presumably boreholes with large voids would have been selected, but there is no mention of whether the 12 boreholes contained major voids. Even assuming that the grout test was able to simulate the movement of water, a showing that 12 boreholes in the northern part

of the site did not intersect major conduits simply does not prove that there is not an interconnected conduit network below the northern and southern sites. Based on the evidence presented, this Board concludes that such a network cannot be ruled out without further investigation.

PEF asserts that Intervenors have misapprehended the effect of the nuclear islands. They assert that the islands are only 75 feet deep, not 100 feet as Intervenors allege. PEF PF at 39, ¶ 65. But PEF's own evidence shows that water flow will be disrupted to a depth of 99 feet by grout designed to "inhibit the flow of water through porous zones in this zone beneath each nuclear island." **PEF703** at 8 (FSAR at 2.5-320).

PEF also states that Intervenors ignore groundwater modeling performed in connection with the reactor foundation design, which concluded that excavation and grouting of the LNP reactor island foundations would cause negligible effects to existing groundwater flow. PEF PF at 39-40, ¶ 65 (citing **PEF013**, **PEF015**). The focus of the first cited study, however, was the effects of the islands on groundwater flow velocity. **PEF013** at 3. The velocities were found to be insufficient to cause erosion at the edge of the grouted area. *Id.* at 7. The focus of the second study was to help design the dewatering system. **PEF015** at 3. The results of this analysis were highly uncertain with seepage estimated from 67 gpm to 452 gpm. *Id.* at 11, 12. Thus, neither cited study looked at the potential impacts on wetlands and springs located on and off the LNP site that could be caused by the nuclear islands.

The NRC Staff admits that site characterization did not include drilling boreholes or aquifer testing on the South Property. Staff PF ¶ 65. The Staff attempts to suggest that the northern and southern sites are similar, but fails to note that the limestone gets less dolomitized and more transmissive to the south. Staff PF ¶ 79.

There is a dispute about whether Dr. Bacchus observed seeps or springs along the CFBC (erroneously called the CFBC in the FEIS). Staff PF, ¶ 80. We note that the FEIS references “freshwater spring inflow just downstream of the Inglis Lock” along the Withlacoochee Canal. **Exhibit NRC001** at 5-12. Additionally, Dr. Bacchus submitted **Exhibit INT 343**, which shows springs she identified along the Withlacoochee Canal. **Exhibit INT301R**, A.17. In addition, the FEIS specifically mentions freshwater springs in the Withlacoochee Canal. **Exhibit NRC001** at 2-93. At a minimum therefore, the Staff and PEF have failed to establish the lack of springs in this location, as is their burden. Moreover, this dispute could be easily resolved with a more adequate site investigation. Measurement of the flow variation and the salinity of the water coming from these features would be dispositive. Int. PF at 36. We find that this is an area where the site characterization was inadequate and must be improved.

Similarly, we do not think PEF or the Staff has collected enough information to say with reasonable certitude whether the observed sinkholes are relict sinkholes or surface dissolution sinkholes. PEF PF at 39, ¶ 64. The Staff acknowledged that the site is karst with sinkholes, but terms it "surficial karst dissolution." Staff PF at 31-32 ¶ 63; Tr. 1148 (Barnhurst). According to Staff “sinkholes are few, generally shallow, broad, and developed gradually” and are floored by silts and clays. Staff PF at 31-32 ¶ 63. This is entirely different from Intervenors’ assertions about relict sinkholes, but this difference is not critical to our analysis. Although the silts and clays at the bottom of the sinkholes impede connection with the underlying aquifer there is no evidence to suggest that there is no connection at all and never could be. Indeed, implicit in the Staff’s assessment that wetland impacts could be significant is an acknowledgment that the underlying aquifer and the wetlands are connected. We also find it concerning that the Staff was unaware of the sinking stream that flows west from the site as well as other sinking streams in

the vicinity Tr. 1342, 1343 (Bacchus) (Compare Tr. 1153 (Vermeul) to **Exhibit INT373**. In addition, we note that the FEIS states that “the cypress dome wetlands on site may represent karst development and likely provide for preferential recharge between the surface and groundwater.” **Exhibit NRC001** at 5-26. Reversing this logic, these wetlands must also be subject to preferential dewatering if the groundwater level reduces.

On the morning of December 20, 2012, PEF filed a motion to correct the record regarding Mr. Lehnen's testimony. He stated that having reviewed core borings from a pair of monitoring wells closest to the southern site (wells MW-1S and MW-4S), he found they were only 30 feet deep and therefore did not represent the underlying rock. While Mr. Lehnen states that his testimony remains that the site overlays the Avon Park formation, he conspicuously fails to clarify whether there are signs of Ocala in the logs from MW-1S and MW-4S. Mr. Lehnen's failure to be explicit highlights the failure of PEF and the Staff to carry their burden of showing what the site characteristics actually are in the southern portion of the site.

B. Groundwater Modeling

PEF claims that the discharges of Big King and Little King Springs were introduced into Models 1 and 2. PEF PF at 41-42, ¶ 71; Tr. 1269 (Lehnen). In fact, Mr. Lehnen stated under oath that CH2MHill “calibrated those springs to about a discharge of five million gallons per day combined” and that that figure was based on the “FGS Springs of Florida” records. *Id.* Under questioning, Mr. Lehnen once again stated that the data used for the springs' calibration came not from measurements of the springs but from literature, specifically, from the “Springs of Florida” publication. Tr. 1415. This document is provided as **Exhibit PEF209**, but only three springs are listed for Levy County, none of which is Big King Spring or Little King Spring. **Exhibit PEF209** at viii. We are unable to find any mention of either spring, let alone their

measured discharges, combined or single, in the exhibit submitted.

We find that there is no basis provided in the record for the flow assigned by PEF and the Staff to Big and Little King springs. Furthermore, Mr. Lehnen's repeated assertions of this manifestly incorrect proposition, coupled with the correction filed on December 20th, 2012, under oath, undermines our confidence in this witness. We therefore assign his testimony less weight than other witnesses.

PEF implies that the T&J Ranch well data should have been omitted from the calibration. PEF PF at 25, ¶ 34. However, as discussed in Intervenors' proposed findings, even PEF's witness believes this level represents surficial aquifer system ("SAS") levels. Int. PF at 32-33. Because it has been stated repeatedly in the FEIS that the two aquifers are hydraulically well connected (*e.g.*, **Exhibit NRC001** at 2-27, 2-92, 5-26), there is no reason to disregard this data. Indeed, Dr. Hazlett has said these data should not be rejected merely because they do not conform with a preconceived notion of reality. **Exhibit INT601**, A.15. Moreover, this data point was only one of 23 site-specific data points incorporated. Int. PF at 33.

There is a dispute between the parties about whether the presence of preferential pathways would give rise to anisotropic patterns of drawdowns along the lines of those pathways or an isotropic pattern equivalent to drawdowns in a porous medium. *See* PEF PF at 30, ¶ 44. We find that we cannot fully resolve this dispute until more is known about the nature of the preferential pathways on the site. There is credible evidence that the vertical fractures can function to direct wetland dewatering along the line of the fracture in response to pumping. Int. PF at 33-36. With regard to the potential conduits below the northern and southern parcels, we know virtually nothing about them. Although, there is the potential for preferential flow through fractures and conduits (*e.g.*, **Exhibit INT355** (Brook, 1985)), the nature of the pattern of

drawdown will depend on the size of these features and other factors. At present, NRC Staff and PEF have failed to rule out the potential for anisotropic drawdowns that would magnify the severity of the adverse impacts due to preferential flow and would confound the proposed monitoring.

Thus, we find that until PEF and the NRC Staff do more to characterize the conduits under the northern site and all the features on the southern site, it will be impossible to produce a wetland drawdown model that can simulate potential impacts with reasonable accuracy. We also note that general assertions that drawdowns would be lower if conduits were present (*e.g.*, PEF PF at 37, ¶ 60), fail to seriously address whether the conduits could give rise to more severe localized impacts.²

Intervenors and the Staff broadly agree that Model 1 was a poor fit to the actual water levels at the site. Staff PF, ¶ 85. The Staff also agreed that some of the conceptual models suggested by Intervenors may be appropriate. *Id.*, ¶ 88. Furthermore, as already discussed in Intervenors' PF at 15, the Staff found the results of both models to be uncertain and concluded that while the model was appropriate for a water use assessment, it does not provide an accurate enough estimate of drawdowns to be used in wetlands assessment. *See also* tr. 1390 (Vermeul).

C. Mitigation Measures

Both the Staff and PEF assert that testing, monitoring, and mitigation plans in the COCs will guarantee that the environmental impacts of dewatering are insignificant. Staff PF ¶ 114;

² PEF asserts drawdowns of less than 0.5 feet are of no concern. PEF PF at 44, ¶ 79. But as Dr. Bacchus points out, the resources in the area have already been affected by mines and other water withdrawals, and therefore are increasingly vulnerable to *any* water withdrawals. **Exhibit INT 301R**, A.46. Dr. Still, former Suwanee River Water Management Director, also has testified that this is merely a “rule of thumb” to be used when more data are not available. It is not implemented by Florida rules and statute and not considered by the State of Florida as an acceptable criterion for deciding when harm to wetlands will occur. **Exhibit INT701R**, A.5.

PEF PF at 55, ¶ 117. As previously discussed (Int. PF at 45-46), however, this assertion lacks adequate support to satisfy NEPA, because neither PEF nor the Staff has gathered enough information about the behavior of groundwater in the vicinity of the LNP to reach any such conclusion. In the words of Mr. Hubbell, “It is very difficult to be able to come up with a fix when we don't really know what the problem is or if there is going to be a problem.” Tr. at 1511.

As Intervenors testified, the current monitoring plan is based on the notion that impacts will be cone-shaped, isotropic and homogeneous, expanding slowly in all directions. In fact, however, the impacts may be heterogeneous and anisotropic because they will be aligned with preferential flow pathways in fractures and other conduits. The impacts could also develop more quickly than anticipated because flow velocities in the preferential flow pathways are much faster than in an equivalent porous medium. Given that it has little or no information regarding where or when impacts will occur, the NRC Staff's assertion in the FEIS that they can be detected and prevented or mitigated is tautological.

In addition, the monitoring is designed only to measure groundwater withdrawals, not to detect actual impacts to plants and wildlife. **Exhibit PEF305** at 24; tr. 1470-71, 1475-76, 1478-79 (Dunn). Moreover, significant impacts may occur offsite, where PEF has no plans to monitor other than two allegedly "background" transects proposed for off-site monitoring. Tr. 1478 (Dunn). These alleged "background sites" may not be useful because in fact they have already been affected by human activity. Tr.1537 (Bacchus). If flow through LNP wetlands off-site to the Gulf and elsewhere is disrupted, the proposed monitoring plan will also fail to identify those adverse effects.³

³ The presence of hydrologically connected wetlands on the site is confirmed in the FEIS. **Exhibit NRC001** p-4-34. In fact, virtually all of the wetlands on the site are in fact hydrologically connected Jurisdictional Wetlands identified by the USACE. **Exhibit INT337**,

Finally, PEF has not made any concrete plans for mitigation because it does not “believe” any adverse effects will occur. Tr. 1507 (Hubbell). Thus, the record fails to support any conclusion that monitoring and mitigation will be effective.

D. Cumulative Impacts

PEF claims that the FEIS specifically and extensively considered the potential direct, indirect, and cumulative impacts from active dewatering to wetlands and aquatic ecosystems during construction and operation of the LNP. PEF PF at 61, ¶ 138. In fact, the FEIS does not address any environmental effect as being amplified through combination with any other adverse conditions. Intervenors have consistently maintained that the environmental impacts analysis should consider phenomena “synergistically” or cumulatively, rather than individually (in the disjunctive – salt drift or dewatering). Considering each stressor as if it were occurring in a vacuum does not make sense, nor is it consistent with governing regulations. *See* 40 C.F.R. § 1508.7.

The direct impacts on wetlands of LNP’s water withdrawals are likely to be exacerbated by other wetlands impacts such as drought, salt intrusion, salt drift from LNP cooling towers, climate change effects, and impacts from nearby mining operations. Because the NRC Staff has gathered very little information about the impacts of water withdrawals – and much of the information it has gathered is concededly faulty – it lacks an adequate basis to make a reasoned assessment of how these direct impacts combine with other impacts. *See* Int. PF at 49-50. For example, by failing to correctly characterize the karst geology of the LNP site, the FEIS incorrectly ignored the increased potential for significant cumulative effects caused by dewatering and salt drift, as well as the deleterious effects of wildfires on wetland hydroperiods.

Figure 1C (*see also* **Exhibit INT344**).

PEF, however, consistently uses the term “cumulative effects” while addressing dewatering. PEF PF at 21, ¶ 24 and PEF PF at 22, ¶ 26. But the Staff admits that the modeling did not account for the effects of the construction of the two nuclear islands covering one acre each. Tr. 1418 (Lehnen). If the nuclear islands intersect a conduit network that feeds Big and Little King springs, as is likely, they will have a pronounced effect on water flow throughout the region. **Exhibit INT 301** at A.12.

The Staff’s and PEF’s attempts to minimize the significance of cumulative impacts are misleading. For instance, PEF argues that the Knight Farm Sand mine need not be considered in cumulative impacts because it will not use water. PEF PF at 38, ¶ 63. As Mr. Still testified, however, regardless of the fact that permitting of mines generally does not require a consumptive water use permit, mining involves land use changes that impact water resources through passive dewatering-evaporation during times of drought, diversion of historic sheet flow and changes to preferential pathways. **Exhibit INT201**, A.25.

The Staff attempts to account for cumulative effects of salt drift by addressing combined LNP and CREC salt dispersion. Staff PF, ¶ 164. Thus, it addresses the effects of salt drift in singular terms, without linking the effects with dewatering. Tr. at 1123 (Martin). This completely ignores the crux of Dr. Bacchus’ issue of cumulative impacts: the FEIS fails to examine the cumulative effects of dewatering and other hydroperiod alterations when combined with deposition and drift of salt from the LNP cooling towers and beneficial fires that are essential in maintaining important ecosystems in the vicinity of the proposed LNP. **Exhibit INT 301** at A.3 (Bacchus). PEF goes so far as to claim that if Dr. Bacchus’ estimation of damage due to salt drift is incorrect, there **cannot** be significant cumulative effects of salt drift. PEF PF at

90, ¶ 39.⁴ The FEIS already admits that salt drift could cause damage at the LNP site. **Exhibit NRC001** at 5-21. Using a TDS deposition rate of 10 kg/ha/mo as a threshold limit above which adverse impacts on vegetation could occur, salt-drift modeling still suggests that some vegetation on the LNP site could suffer leaf damage from salt drift in some years. As noted above, the maximum predicted onsite monthly salt deposition rate was 10.75 kg/ha/mo when modeled using the 2004 meteorological data year. *Id.* But the NRC Staff made **no** analysis of the combined effects of dewatering and salt drift.

PEF also argues that there is “no credible evidence” that salinity impacts are significant. PEF PF at 59, ¶ 130. In fact, the record does contain evidence that salinity impacts, when combined with the other impacts of LNP, could be significant. For instance, the FEIS itself admits shoreline vegetation of the Withlacoochee Canal could change from species adapted to freshwater to brackish water species because of the salinity change. **Exhibit NRC001** at 5-33. We agree with Dr. Bacchus that such a change in vegetation is not “minor” because it is a clearly noticeable effect that is sufficient to destabilize the resource. **Exhibit INT301**, A.17. Another cumulative effect that will increase salinity in the Withlacoochee Canal is the withdrawal of water from the Canal by the Cooling Water Intake System (“CWIS”). **Exhibit INT301**, A.18 (Bacchus). Not only would the Canal become more saline, but flow of fresh water to coastal

⁴ PEF claims nutrients cannot be transported laterally off site PEF PF at 77, ¶ 12 But this claim is contradicted by the FSAR: "the LNP site can be drained by overland flow directly to the Lower Withlacoochee River or the Gulf of Mexico"(**Exhibit INT365**) (FSAR, rev.2 p. 2.4-3) . See also *Id.* p. 2.4-92 (asserting that groundwater moves downgradient from LNP 1 and 2 and resurfaces within the Lower Withlacoochee River, a distance of approximately 7km (4.3 mi.) *Id.* PEF offers no reason why, if salt can be transported to water bodies downstream, nutrients would not also be transported in the same way.

estuaries would also be reduced, thus impacting plants and animals that live there. *Id.*⁵

PEF also claims that periods of drought are taken into account by SWFWMD and therefore in the FEIS. PEF PF at 61, ¶ 136. But the evidence clearly shows that the groundwater model upon which SWFWMD relied used annual average rainfall in prediction mode. Tr. 1424-25 (Lehnen). Even the calibration was based on precipitation that was approximately equal to the long term average. **Exhibit INT701R**, A.19 (Still) (quoting testimony by Mr. Rumbaugh that “the precipitation used for his DWR modeling used “rainfall approximately equal to the long-term average for the area.”) *See also* **Exhibit INT101**, A.7 (Hazlett); **Exhibit INT201R**, A.8 (Still).

According to PEF, Intervenors have failed to show that destructive, long lasting wildfires can be attributed to the cumulative impacts of LNP dewatering. PEF PF at 80, ¶ 25. According to PEF, such wildfires are attributable only to drought. *Id.* However, Dr. Bacchus provided numerous exhibits of peer-reviewed published evidence that hydroperiod alterations result in destructive wildfires such as those that occurred in Goethe State Forest, where a network of fractures link that wildfire site to the existing mine and the proposed LNP site. *See, e.g.*, **Exhibit INT359**, edited by the U.S. Geological Survey (USGS) subsidence expert, which cites an additional peer-reviewed publication describing the causal link between groundwater alterations and destructive wildfires (Bacchus, 1995a); **Exhibit INT360**, published by the Journal of American Water Resources Association⁶; **Exhibit INT366**, published by the Hydrological

⁵ PEF argues incorrectly that this issue is beyond the scope of the contention. PEF PF at 58, ¶ 129. To the contrary, depletion of freshwater flow to the estuary was a clearly pled and relevant part of Contention 4A. *See* Memorandum and Order ((Admitting Contention 4A) (unpublished), slip op. at 8, 11, 17 (Feb. 2, 2011).

⁶ **Exhibit INT360** includes the following quote from the 1996 Southwest Florida Water Management District (SWFWMD) report regarding destructive wildfires caused by groundwater withdrawals in the SWFWMD:

Processes journal; **Exhibit INT371**, published by the SWFWMD; and **Exhibit INT390**.

PEF also disputes the reasonableness of Intervenors' claim that hydroperiods were not sufficiently studied. As Dr. Bacchus testified, however, the FEIS contains no evidence that the FEIS' presumption of an 8-foot seasonal variability in groundwater levels is based on any measurements of baseline conditions before the LNP site and surrounding vicinity were affected by mines and other excavations. **Exhibit INT301R**, A.46. Data collected between 1989 and 1991 in similar pond-cypress wetlands monitored by SWFWMD that had altered hydroperiods showed less than 8-foot seasonal variability. *Id.* Moreover, study of hydroperiods is not included in the monitoring measures of the COCs. As Dr. Bacchus testified, the EMP does not provide for establishment of a valid "baseline" for monitoring impacts to wetlands, because the initial monitoring would not take into account alterations of the natural hydroperiods that have occurred already or would occur during construction. Int. PF at 47. As Dr. Bacchus testified in depth, hydroperiods are a critical factor in wetland health.

Due to the highly karstic nature of the geologic system, the clay semi-confiner can be absent in one area, but be tens of feet thick a very short distance away. These localized karst features, where the clay semi-confining layer is breached or missing, significantly increase hydraulic connection between the two aquifers." SWFWMD Water Resources Assessment Project at 2-39.(WRP, p. 2-39) "Lowered water levels in surface-water features, including wetlands, lakes, and streams, have resulted in environmental (biological) impacts. These impacts are caused not only by annual-average drawdowns, but also by decreased hydroperiods in wetlands and lakes....Environmental impacts to lakes and wetlands observed in the Northern Tampa Bay WRAP area are variable, and include wetland species changes, intrusion of upland species, ground subsidence, rapid and severe desiccation and oxidation of soils, loss of overstory, severe fire damage, wildlife loss, and complete loss of habitat. The spatial magnitude and severity of these impacts can not be attributed to variations in rainfall." (WRAP, p. 6-4) "With the ground-water withdrawal rates for the existing and proposed future wellfields cut in half, impacts are projected to be reduced in spatial distribution and overall intensity, but not eliminated . . ." (WRAP, p. 6-8)

Finally, PEF argues that the relatively high water level elevation of the LNP site (including the wellfield) ensures that LNP’s “small predicted groundwater drawdowns will not reverse the gradient between seawater and groundwater in the vicinity of the LNP site,” and therefore climate change is not a matter of concern. PEF PF at 58, ¶ 128. But the FEIS contains no technical analysis whatsoever of how much sea level may change over the course of the operating life of the LNP – even though it concedes that the effects of climate change on the local environment could be significant, including increasing periods of drought and rising sea level that could affect salinity levels in the Withlacoochee Canal and the Withlacoochee River as well as the health of the wetlands. *See, e.g., Exhibit INT001, Chapter 7.*⁷ Instead of following the logical course of conducting a detailed evaluation of the cumulative effects of climate change in connection with LNP groundwater withdrawals and other impacts, the FEIS merely states that “specific predictions” about these cumulative impacts in the area of the LNP site are “inconclusive” and labels them as “MODERATE.” *Id.* at 7-34. The fact that climate change impacts are difficult to assess is irrelevant to the question of how significant they are.

VII. CONCLUSIONS OF LAW

In this case, the Staff relied on the COCs for its conclusion that wetlands impacts of the LNP would be insignificant because enforcement of the COCs by the State of Florida would prevent or successfully mitigate those impacts. Accordingly, the Staff found it unnecessary to conduct a thorough analysis of the environmental impacts of the LNP on wetlands. Nor did it consider it necessary to evaluate any mitigation alternatives other than the COCs. As previously

⁷ Intervenors’ testimony also showed that climate change could have a significant effect on both sea level and drought conditions. **Exhibit INT201R**, A.13 (Still); **Exhibit 701R**, A.19 (Still). As testified by Dr. Hazlett, climate-caused changes in sea-level and meteorology could significantly and synergistically exacerbate the environmental effects of LNP’s dewatering. **Exhibit INT101**, A.10).

discussed, we conclude that the Staff violated NEPA by relying on these conclusions. We find the Staff's and PEF's arguments to the contrary unpersuasive.

A. The NRC Staff Violated NEPA by Not Taking a Hard Look at the Environmental Impacts of LNP on Wetlands.

1. The FEIS fails to meet the “hard look” standard.

Both the Staff and PEF argue that the Staff took a “hard look” at the environmental impacts of the LNP in the FEIS. Staff PF ¶ 58, PEF PF at 96 ¶ 5. In fact, however, the record shows that the Staff did not make any effort to evaluate the impacts of LNP on wetlands, other than to decide that the results of PEF's groundwater modeling efforts were too uncertain to allow a conclusion that the impacts would be insignificant. The NRC did not even perform an uncertainty analysis, an essential element of an EIS' prediction of future risk. 40 C.F.R. § 1502.22 (EIS must address the degree to which information is unavailable); 10 C.F.R. § 51.71(d) (impacts must be quantified to the extent possible); *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016, 1032 (9th Cir. 2006) (risk must be qualitatively described if it is not susceptible to quantification). The FEIS also effectively wrote off the issue of cumulative impacts because it erroneously considered the primary impact of dewatering to be insignificant. As the court held in *Ohio Valley Environmental Coalition v. Hurst*, 604 F.Supp.2d 860, 887 (S.D.W.Va. 2009), however, a rigorous cumulative impacts analysis is not excused by an “unsupported belief in the success of mitigation measures.” The FEIS must be rejected because it fails to meet NEPA's fundamental requirement for a rigorous analysis of the direct and cumulative environmental impacts of the proposed action. It also completely fails to meet the Council on Environmental Quality's criteria for an adequate evaluation of cumulative impacts on wetlands. *See* “Considering Cumulative Effects Under the National Environmental Policy Act” (1997), **Exhibit INT382**. Table 1-2 of the Cumulative Effects Report raises the concern that “[c]umulative effects may last for many

years beyond the life of the action that caused the effects . . . (e.g., acid mine drainage, radioactive waste contamination, species extinctions),” and therefore analysis of cumulative impacts “needs to apply the best science and forecasting techniques to assess potential catastrophic consequences in the future.” Relevant effects that must be considered include, for example, “delayed effects (e.g., collapse of karst aquifer structure, sinkholes from groundwater mining, and exposure of coastal organisms and human communities to slow-acting contaminants like endocrine disruptors from aquifer-injected effluent and other wastes);” “high spatial density of effects on an environmental system (e.g., pollution discharges into the aquifer from nonpoint sources);” “change in landscape pattern (e.g., fragmentation of critical wildlife migration corridors);” “effects arising from multiple sources or pathways (e.g., water stress combined with salt stress from salt drift from cooling towers);” “secondary effects;” and “fundamental changes in system behavior of structure (e.g., large-scale karst aquifer system changes, with historic discharges of ground water to springs, streams, wetlands, and coastal areas ceasing or reversing).” *Id.* The FEIS makes no attempt to address these issues.

2. The FEIS fails the test for an adequate “mitigated FONSI”

Instead of analyzing the direct and cumulative environmental impacts of the LNP on wetlands, the Staff took a shortcut and treated the EIS as an environmental assessment (“EA”). It conducted an abbreviated analysis of the impacts of the LNP on wetlands and claimed that they were insignificant by virtue of the monitoring and mitigation measures contained in the COCs. While the NRC and the courts have permitted findings of no significant impact (“FONSI”) that are based on mitigation measures, the standard for avoiding an EIS through reliance on mitigation is rigorous.

As PEF recognizes, the ASLB has imposed a two-part judicial test of whether reliance on mitigation measures justifies a FONSI. PEF PF at 104 ¶ 2 (citing *Detroit Edison Co.* (Fermi

Nuclear Power Plant, Unit 3), LBP-12-32, 76 NRC __ (slip op.) (Nov. 9, 2012) (citing *Ohio Valley Environmental Coalition*, 604 F.Supp.2d at 888. Under this standard, mitigation must be “more than a possibility,” in that it must be “imposed by statute or regulation or have been so integrated into the initial proposal that it is impossible to define the proposal without mitigation.” *Id.*, slip op. at 25-26. In addition, there must be some assurance that mitigation measures “constitute an adequate buffer against the negative impacts that result from the authorized activity to render such impacts so minor as to not warrant an EIS.” *Id.* In *Ohio Valley Environmental Coalition*, the court held that proposed mitigation measures would be deemed sufficient if they “are supported by sufficient evidence, such as studies conducted by the agency, or are ‘adequately policed.’” 604 F.Supp.2d at 888 (quoting *Wyo. Outdoor Council v. U.S. Army Corps of Engineers*, 351 F.Supp.2d 1232, 1250 (D.C.D.Wy. 2005)).

a. Legal components of mitigation plan are incomplete.

Here, PEF is only partially correct that the mitigation measures on which the FEIS relies are imposed by statute, *i.e.*, Florida law. Therefore, PEF does not meet the first prong of the judicial test. While the COCs on which the FEIS depends are required by Florida law, the effectiveness of the COCs depends on SWFWMD’s compliance with complementary Florida laws that are intended to conserve water resources and protect the environment against the adverse impacts of groundwater withdrawals. In particular, Florida Statute Sections 373.042 and 373.0395 require SWFWMD to set minimum aquifer levels for Levy County, as well as to prepare a Groundwater Basin Resource Availability Inventory. As Mr. Still testified, SWFWMD has done neither. **Exhibit INT201R**, A.24 (Still). The lack of these statutorily required tools is one of many factors that make it difficult to determine the environmental impacts from the Levy nuclear plant. *Id.* See also **Exhibit INT301R**, A.47 (Bacchus) which calls into question the

wisdom of relying on State processes.

b. Effectiveness of mitigation measures is not supported and is not adequately policed.

The FEIS also completely fails the second prong of the test, because the record is clear that the NRC Staff has failed to support the effectiveness of the mitigation measures with adequate studies. *See* discussion above in Section II.C and Int. PF at 45-46. Indeed, although the Staff made an assumption that monitoring under the COCs would be comprehensive, in fact PEF omitted any monitoring of springs from the Environmental Monitoring Plan. Thus, the COCs do not provide for comprehensive monitoring and mitigation, as the Staff erroneously assumed. Furthermore, the NRC's lack of knowledge about the impacts of the LNP on wetlands and springs fatally impairs the credibility of its analysis of the effectiveness of mitigation measures. *National Parks Cons. Assoc. v. Babbitt*, 241 F.3d 722, 732 (9th Cir. 2001); *Wyo. Outdoor Council*, 351 F.Supp.2d at 890 (court must inquire "whether there is sufficient assurance that the measures relied upon will lead to actual mitigation"). In *National Parks Cons. Assoc.*, the Department of Interior prepared an EA regarding the effects of cruise ship traffic on marine mammals and bald eagles, in which it asserted that "little is known" about the environmental effects of the ships. The agency proposed to rely on mitigation measures to "fill information needs . . . and to assist in the prediction, assessment and management of potential [environmental] effects . . ." *Id.* The U.S. Court of Appeals for the Ninth Circuit rejected the EA, concluding that the information the Department planned to gather in the course of the mitigation effort "is precisely the information and understanding that is required *before* a decision that may have a significant adverse impact on the environment is made, and precisely why an EIS must be prepared in this case." *Id.* Here, the NRC Staff's reasoning is similarly circular: While the Staff soundly rejected Model 1 as inadequate to support an evaluation of the

environmental impacts of LNP to wetlands in the FEIS, it *accepted* Model 1 as a way to predict impacts to wetlands under the COCs, subsequent to licensing. Tr. 1477 (Dunn). That acceptance is so illogical as to violate NEPA’s “rule of reason.” *San Luis Obispo Mothers for Peace v. NRC*, 751 F.2d 1287, 1301 (D.C. Circuit 1984), vacated in part and rehearing en banc on other grounds, 760 F.2d 1320 (D.C. Circuit 1985). Just as the Dept. of Interior was required to replace an EA with an EIS in *National Parks Cons. Assoc.*, so in this case it should be required to conduct a complete environmental analysis in a revised EIS.⁸

The NRC Staff has also failed to demonstrate that the proposed mitigation measures are “adequately policed.” To the contrary, the record shows that PEF can easily escape policing in various ways. First and foremost, it would not be possible to “police” the COCs adequately where – as here – there is no assurance that PEF will be required to monitor the locations where environmental damage is actually occurring. And SWFWMD may excuse PEF from reporting monitoring results after only five years of operation. As Dr. Dunn testified, adverse impacts to wetlands could occur long before they are visible. **Exhibit PEF300**, A.23 (adverse impacts may take 5 to 10 years to appear). Worse, Dr. Bacchus testified that adverse impacts to plants and animals may reach an *irreversible* level before they can be detected. **Exhibit INT801R**, A.9, A.10. *See also* **Exhibit INT366** and **Exhibit INT803**.

In addition, while state regulations permit enforcement of the COCs by the State, the decision of whether to enforce is entirely discretionary. *See* Section 1.13 of the Basis of Review

⁸ The Staff must also show that it has conducted its own analysis rather than relying unquestioningly on the presumed effectiveness of the COCs. *See* Staff PF, ¶ 22 (citing *Public Service Co. of Oklahoma* (Black Fox Station, Units 1 and 2), LBP-78-28, 8 NRC 281, 282 (1978); *Exelon Generation Co.* (Early Site Permit for Clinton ESP Site), SBP-05-19, 62 NRC 134, 155 (2005); *Louisiana Energy Services, L.P.* (National Enrichment Facility), LBP-06-08, 63 NRC 241, 259 (2006)). Here, as demonstrated in Int. PF at 51-52, the Staff has completely failed to apply the required level of independence and rigor to its own analysis.

(in **Exhibit PEF313** (SWFWMD “Water Use Permit Information Manual, Part B, Basis of Review for Water Use Permit Applications,” adopted by reference in Rule 40D-2.091(1)(a), Florida Administrative Code (**Exhibit PEF312**)). Section 1.13 provides that a water use permit “may” be revoked if water withdrawals cause “significant adverse impacts” and the permittee does not modify the activity or satisfactorily mitigate the impacts. The use of the word “may” places the decision in the discretion of the SWFWMD, and thus enforcement action is not mandatory as suggested by the FEIS. *See* **Exhibit INT001** at 5-30. Moreover, while the Basis of Review contains a glossary, it does not define the term “significant adverse impacts,” nor does it establish a threshold. In addition, the enforcement language of § 1.13 is not explicitly tied to the performance criteria in § 4.1 of the Basis of Review. Finally, the performance criteria are not included in the Conditions of Certification for the Levy Nuclear Power Plant (“LNP”) (**Exhibit INT212**); nor do they appear in the Final Order Approving Siting issued by the Florida Siting Board on May 15, 2009 (**Exhibit PEF004**).

Finally, the processes established under Florida laws for protection of wetlands often fail to prevent adverse impacts. Tr. 1539-1540 (Bacchus) **INT 429** (referred to in tr. 1452 (Bacchus); t. 1496 (Hubbell); **Exhibit INT701** A.15 (Still).

D. Remedy

The record is clear that the Staff had available to it reasonable measures to evaluate the environmental impacts of LNP on wetlands and springs, such as conducting some reasonable geological investigation of the southern parcel, doing some baseline measurement of spring flow and the variation of water levels in wetlands, performing an integrated assessment of ground and surface water, and using tracer tests to investigate the possible relationship between offsite springs and swallets close to the LNP site. Intervenors have supported their reasonableness and

PEF's witnesses confirmed their feasibility by promising to resolve all outstanding issues during the Aquifer Performance Testing (“APT”).

Given the feasibility of these measures, doing this additional site investigation before, rather than after licensing, could hardly be characterized as an unreasonable “research” project. *See* PEF PF at 97, ¶ 1 (citing *NextEra Energy Seabrook LLC* (Seabrook Station, Unit 1), CLI-12-05, 75 NRC __ (slip op. at 52) (Mar. 8, 2012); *Entergy Nuclear Generation Co.* (Pilgrim Nuclear Power Station), CLI-10-11, 71 NRC 287, 315 (2010); *Entergy Nuclear Generation Co.* (Pilgrim Nuclear Power Station), CLI-10-22, 72 NRC 202, 208 (2010)). The cases cited by PEF do not suggest otherwise.

More specifically, there is no dispute regarding the feasibility of testing for standard geological properties such as hydraulic conductivity on the south parcel. There is also no dispute that flow variation in springs and variation of water levels in wetlands could be monitored to provide data for the FEIS and to establish a baseline that is not affected by the project.

Moreover, the Staff conceded the feasibility of conducting tracer testing. *See* Int. PF at 38.

Integrated surface and groundwater monitoring is a standard method that has been used by the adjacent South Florida Water Management District as well as agencies in California. Tr. 1441 (Hazlett). PEF’s assertion that these are unreasonable demands is therefore unsupported. PEF PF at 97-98, ¶ 5.⁹

⁹ In some respects, PEF mischaracterizes the Intervenors’ demands for additional characterization work. For instance, PEF asserts that Intervenors seek 1,000 boreholes on the LNP site. PEF PF at 97. Intervenors never made that demand, however. Mr. Davies merely testified that if boreholes were the only way of locating subterranean conduits, PEF would need to do a huge number. Mr. Davies and Dr. Hazlett both asserted that tracer testing would be a more appropriate method. Similarly, PEF mischaracterizes Intervenors’ position by asserting that Intervenors insist that “every wetland on the LNP site should be instrumented and monitored.” PEF PF at 98. Rather, Intervenors assert that because there are no reliable predictions for when or where adverse impacts on springs and wetlands could occur, it is

Without further investigation into the hydrogeological and hydroecological characteristics and features of the LNP site and independent analysis by the NRC Staff, the FEIS lacks an adequate factual basis for its finding that the direct environmental impacts of groundwater withdrawals at the LNP site will be insignificant.

During the hearing it became even more apparent why good prediction of impacts on wetlands and springs is needed before, rather than after, licensing. At present, the last-resort mitigation measure is supposedly to install an alternative water supply five years after operation commences if impacts prove too great, but PEF's own witness said that this would not be economically feasible, calling into question whether this is merely an empty promise. Tr. 1517 (Hubbell). It is therefore essential before building the project to predict whether such an alternative supply is likely to be necessary, and, if so, whether there is a feasible alternative. If indeed there is not such a supply, as the evidence indicated, PEF would be extremely loathe to curtail operations having committed billions of dollars to build the proposed nuclear plant. The pressure on SWFWMD to allow wetland impacts to exceed stated goals to avoid a waste of billions of ratepayer dollars would be intense. NEPA is designed to avoid such dilemmas by requiring predictions of impact and studies of feasible mitigation alternatives.

We therefore find that the Staff and PEF has so far failed to do the studies of impact and mitigation required by NEPA. Furthermore, doing such studies is not only a legal requirement, it is also highly prudent to avoid unnecessary risk to the environment and the long-suffering rate payers of Florida. Just as the "hard look" standard is not satisfied by generalizations about the future effectiveness of an agency's regulatory program, *see State of New York v. NRC*, 681 F.3d 681, 481 (D.C. Cir. 2012), neither is it satisfied by generalizations about the likely success of

currently impossible to design a scientifically valid monitoring strategy that does not monitor every wetland and spring. Int. PF at 45-46.

future mitigation plans and alternatives that have not been developed. Furthermore, even an alternative water supply would not resolve the other widespread environmental harm from the proposed LNP, such as the myriad excavations and their impacts on ground and surface water flow.

Finally, because the NRC lacks the most basic information about the direct environmental impacts of water withdrawals for construction and operation of the LNP reactors, it cannot claim to have taken a “hard look” at the indirect and cumulative impacts of the LNP, including but not limited to the combined impacts of water withdrawals with drought, salt drift from LNP cooling towers, LNP construction impacts such as onsite and offsite excavations, subterranean plugging of the aquifer by the nuclear islands, impacts from nearby mining operations, climate change, passive dewatering during times of drought, increased fire frequency and other contributors to lowering of freshwaters levels and increasing salt inputs to the sub-surface. *Louisiana Energy Services*, 47 NRC at 87. *See also Ohio Valley Environmental Coalition*, 604 F.Supp.2d at 887.

Therefore, we conclude the FEIS is insufficient to satisfy NEPA and remand it to the NRC Staff. In the meantime, given the lack of an adequate supporting environmental analysis, PEF’s application for a COL is denied. 10 C.F.R. § 51.20(a)(2).

Respectfully submitted,

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December 20, 2012

Certificate of Service

I hereby certify that on December 20, 2012, I posted copies of Intervenors' Proposed Rebuttal Findings of Fact and Conclusions of Law on the NRC's Electronic Information Exchange. It is my understanding that the following individuals or offices were served as a result:

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