

Docket, Hearing

From: Norman Hopkins [norman@amyhrf.org]
Sent: Wednesday, January 25, 2012 10:10 AM
To: Docket, Hearing; Flyntz, Matthew
Subject: Federal Register 77561, Contention 4A
Attachments: Florida Register77561.pdf

1) First addressee is to the Office of the Secretary, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001, Attention: Rulemakings and Adjudications Staff

(2) Second addressee is to the Chairman, Atomic Safety and Licensing Board Panel, Mail Stop T-3E15, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001

Please see the attached, as my continued limited written appearance before the judges following my statement before them at Crystal River on 12 January, 2012. I would be pleased to forward attachments of any of the quoted references should you so desire.

Please acknowledge receipt, thank you.

Sincerely, Norman Hopkins.

DOCKETED
USNRC

January 25, 2012 (10:10 am)

OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

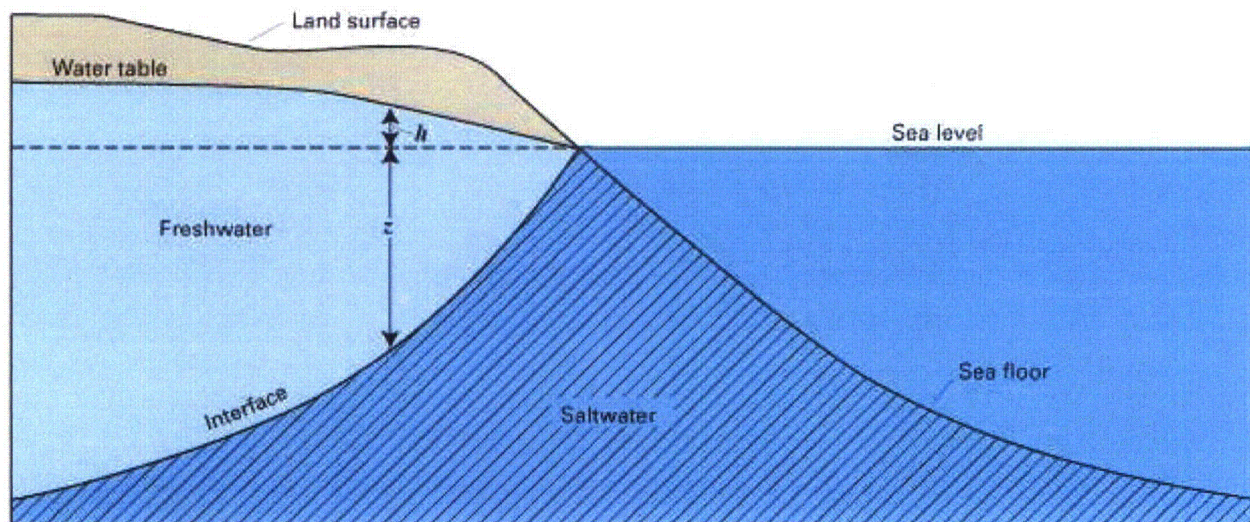
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Limited Appearance Statements Related to Contention 4A - Federal Register 77561

My Name is Norman Hopkins, Director of the Amy H Remley Foundation Incorporated - an entity dedicated to research and teaching Environmental Science. I am not an intervenor with respect to the said Contention 4A. I made verbal limited appearance before the judges on January 12, 2012. I protest that Progress Energy Corporation has no right to imperil human health nor the environment upon which man depends for potable water.

Background

When Florida's rock structures formed from sea sediments salt water became embodied in the rock structures as they formed. As sea levels subsequently subsided the Florida peninsula as we know it emerged. An extensive rainy period in geologic time followed during which fresh water precipitation accumulated at the surface and percolated into the unconfined rock structures to the extent that near surface salt waters were displaced by fresh waters. The separation between the underlying salt water layers and the fresh waters above is maintained as a function of the different specific gravity levels of salty as opposed to fresh water. This separation phenomena is named after the two scientists who first defined it as the "Ghyben Herzberg relation"⁽²⁶⁾.



The Ghyben-Herzberg relation states, for every foot of fresh water in an unconfined aquifer above sea level, there will be forty feet of fresh water in the aquifer below sea level in a state of equilibrium.

Environmentally, these Ghyben-Herzberg "lens" systems are crucially important not only to healthy stream flows and the biotic health of the protected waterways but also to the region's potable water supply.

The underground saltier and fresh water systems comprize the Floridan Aquifer situated under the land earmarked as the proposed site for Levy Nuclear Plants 1 and 2, and extend regionally for many miles beyond. Liquids falling upon the region's land surface penetrate readily into the fresh water systems of the Floridan Aquifer because the soils above simply do not prevent it from happening. It is this regional phenomena of the "unconfined" Aquifer that exposes the region's environment to the risks described in the Contention 4A.

Two types of flow occur within aquifer systems⁽⁸⁾. Water under influence of artesian pressures tends to flow from areas of higher pressure to areas of lower pressure. However, over geologic time dissolution pathways have formed linking rock fractures such that when artesian flows intersect with them changes in both the direction and velocity of the flow path occur as the paths of least resistance are adopted in the fracture set⁽⁵⁾. (It is these faster flowing pathways which emerge from the surface as spring discharges).

Although the fracture set flows have formed over geologic time flow paths do change in present time⁽⁸⁾. Changes in aquifer head levels cause alternative paths to be selected. Varying levels of porosity and permeability in the pathways can also cause changes of flow over time. Both naturally occurring and man made changes to flow paths can have severe consequences to man, flora and fauna and upon dependent economies. Such aquifer systems have become stressed.

For example, the stressed Outstanding Florida Waters of Crystal River/ Kings Bay have had their total spring discharges reduced by a third over the past couple of decades due to drought and pumping. However, nitrogen and phosphorus nutrient concentrations in the discharges have not reduced. Thus, increased concentrations of nutrient loading in spring discharges stimulate algae and invasive submersed aquatic vegetative species to multiply, degrading water quality and further stressing the riverine systems.

Moreover, studies⁽³⁸⁾ show that increases in saltness from some spring discharges are already happening as the result of up-welling as depicted as Kings Bay Saltness on the next page following.

Inappropriate Characterization

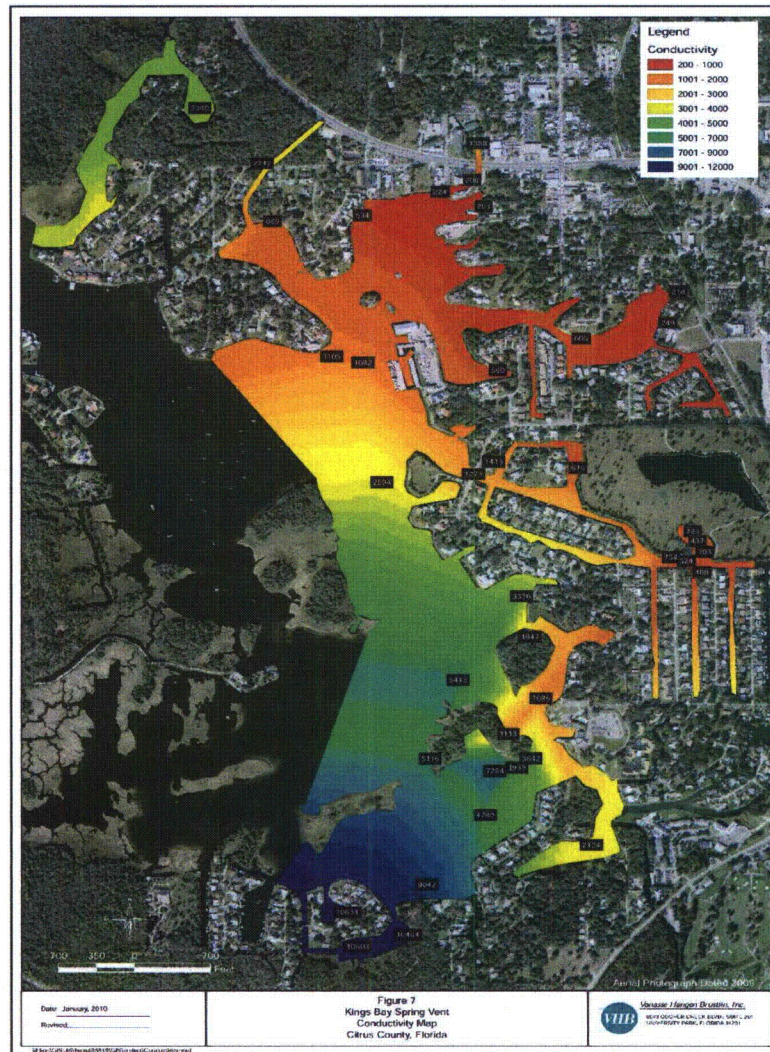
The process (enabling so many impacts to be inappropriately characterized as SMALL) was explained during an NRC public meeting in Crystal River, Florida, on 23 September, 2010, as follows:

- every circumstance reported, whether verbal and recorded or a written submission, is studied in detail and each factor extracted and arranged together with the same or essentially similar ones from other submissions,
- these groups of assembled factors are assigned to staff to judge their worth and their level of impact classified (according to NUREG-1941, Vol.1)⁽³⁶⁾ as : -
 - SMALL meaning, environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource. or,
 - MODERATE meaning, environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource. or,
 - LARGE meaning environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

Now, the environment or natural world is comprised of ecosystems which are the result of interactions among abiotic (non-living) factors, such as soils, water, rain fall, nutrients, and climate; biotic (living) factors, such as plants, animals, fungi, and bacteria; and physical and chemical processes, such as fire, floods, drought, energy flow, and water acidification.

To quote David Suzuki, in his "Betraying Nature"⁽³⁵⁾ of 8 April, 2009, "*Nature does not operate in a vacuum. Interconnections among the various parts of the natural world are what actually drive it. When we pull it apart, we lose context, and that can mean everything.*"

The boldened quote above is precisely what results from the process, leaving the subjective judgement of staff little option but to classify essentially out of context isolated factors as SMALL when any other classification would be practically impossible without consideration of the cumulative relational effects of the other factors.



Kings Bay Saltiness⁽³⁸⁾

The darker blue in the SW indicates higher (saltier) conductance with the lower readings shown brown to the north. Conductance measurements recorded from the spring vent discharges, vary with seasonal rainfall amounts. The increased saltiness from the springs appears not to be due to intrusion of sea water from the Gulf in the river.

The principal underground tributary flows of the aquifer contribute to the phenomenon⁽⁸⁾. The Aquifer tributary flow trending SE to NW serving spring vents in the south of Kings Bay experiences excessive pumping from a large housing complex on its path. The Aquifer tributary flow trending NE to SW serving spring vents in the north and east sectors of Kings Bay appears to by-pass any such pumping and have significantly lower levels of saltiness.

Dewatering

Perhaps the most dramatic active dewatering attends the excavation and sealing of the two Levy reactor site foundation areas together the size of a football stadium extending downward to disrupt aquifer flows established over eons past. Consequential passive dewatering is also a factor.

Site-adjacent wetland areas drain significantly towards the Withlacoochee River basin and Lake Rousseau and thence downstream into the Gulf of Mexico. However, southerly trending underground pathways indicate probable connectivity with flows discharging from Kings Bay springs affecting that Outstanding Florida Water,⁽⁸⁾ extending the areas impacted to those waters in addition to the Withlacoochee and Waccasassa Rivers mentioned (A3). This would be of particular significance in view of the presence of the West Indian Manatee species protected by federal law in those waters.

The proposed grouting would have to seal both microscopic and meter-wide vents both surrounding and under the foundation areas. The extent of rock/soil penetration by the grout, its chemical composition and toxicity are unknowns. The consequential passive dewatering and impact upon adjacent land areas would appear to be potentially serious and largely unpredictable.

The lack of detail in the DEIS suggests that sufficient analysis has yet to be done. Clearly a "zone of influence" which attends an encased well drilled into a saturated area of an unconfined aquifer possesses similar features in regard to unconfined saturation but could not be extrapolated to such a massive dewatering operation as that contemplated. Nevertheless, since precious drinking water supplies are put at risk classifying impact of even the dewatering process itself as SMALL would be inappropriate.

The consequent reduction of flow and diversion of ground water flow paths raises concern for the integrity of the fresh water "lens" of the region, especially having regard to the historic disturbance from excavating the Cross Florida Barge Canal (CFBC). Allowing salt water in CFBC to penetrate the eleven miles inland which has promoted first, an unstable wedge of saline water moving landward under and adjacent to the canal.^(12, 18) This salt water intrusion was judged to be contributing reason for abandonment of the CFBC project and the limiting of its dredged depth to 4 meters. Second, the sea-level hydraulic heads of the canal have created a site for strong groundwater discharge, promoting upwelling (*upconing*) of deeper, highly mineralized water under the canal. (Note that Dr Mark Stewart in his e-mail to me forwarding his paper volunteered, "*My position is that the canal should be dammed at the seaward end to keep saltwater out, as in done on the canals in south Florida.*")

Moreover, the Governor in Council for the State of Florida, as condition for transferring the CFBC lands to the state agreed on January 22, 1991, to "hold the United States harmless from all claims arising from or through the operations of the lands and facilities conveyed by the United States". The contract specifically accepted as fact that, "the Governor and Cabinet of the State of Florida have previously determined that completion of the Cross Florida Barge Canal Project (hereafter "Barge canal") could have cause (*sic.*) incalculable damage to the Floridan Aquifer and thereby threaten much of Florida's drinking water resources; "

What appears to be highly significant in relation to the LNP dewatering process, is that the upconing from the deep mineralized waters under the canal was stimulated by disturbance from excavating the CFBC by only 4 meters into the karstic carbonate rocks of the Floridan aquifer. Whereas the LNP dewatering process is to evacuate much more than that (to a depth of almost 30 meters)⁽³⁶⁾ over a very broad area so that similar upconing can be expected, possibly to a devastating degree upon the region's fresh water "lens".

Salt Drift and Deposition

The equilibrium of the Ghyben Herzberg⁽²⁶⁾ relation is fragile. Should consumption be sufficient to cause the ratio to fall below 1:40 then mixing of salt and fresh water takes place to compromise the fresh water source from the "lens".

Howard Klein,⁽¹⁷⁾ et al, 1975, concluded that loss of the lens' supply of fresh water on the east coast of Florida resulted from over-pumping of the fresh water from the lens allowing consequent mixing to collapse the "lens".

Additionally, in his address to the Citrus County Board of Commissioners on 13 December, 2011, Dr Todd Kinkaid, asserted, *"The best way to preserve the Floridan aquifer as a fresh water supply is to set and enforce extraction limits. The Floridan aquifer cannot supply everyone with all of their water needs or dreams, but it can provide for a sustainable society and economy if managed properly."*

It follows also that Salt Drift and Deposition on the land could over time percolate into the aquifer to increase saltiness of the "lens" to an extent that could encourage collapse of the "lens" especially when coincident with a period of drought that reduces aquifer head level. Such an affect would be compounded by the Tritium discharges into the atmosphere that are described in the DEIS.

Tritium⁽²⁵⁾

It would appear from items published on the NRC website and in the DEIS⁽³⁶⁾ that two important attributes of Tritium are in danger of being over-looked.

- One, the consumption by living organisms of tritiated water, or tritium irradiated foods, creates a pathway to convey an EPA certified carcinogen into human organs and other soft tissue.
- Two, the progressive accumulation over time of tritium in water molecules raises dosages available to irradiate tissue in living organisms. (Beta particles are emitted continually for about 120 years until tritium degrades into helium).

There would also appear to be little or no consideration given in the DEIS⁽³⁶⁾ to the behavior of the 60 million gallons a day of tritiated water piped daily from the Levy 1 and 2 site to the Crystal River Energy Complex for discharge into the Gulf of Mexico. (Traces of similar discharges into La Manche (the English Channel) are reported to have been detected in the Canadian arctic waters).

- In the LNP's lifetime estimated tritiated water discharges total some 3.3million acre-feet.
- What study of tidal currents has been done to calculate the flow of tritiated water likely to enter tidal flows within the nearby Outstanding Florida Waters of Crystal River/Kings Bay?
- What near shore and riverine sea grass crops would be expected to be contaminated by such discharges to hazard the protected West Indian Manatee species which forage upon them?
- What biologic and economic impact upon the entire marine food web nurtured among those sea grass crops would be expected to occur from irradiation by tritiated water ?
- What impact would there likely be upon professional and recreational uses of riverine and Bay waters once contamination with the radioactive water has become established?
- What would likely be the effect upon home and business property valuations once such contamination became evident?

Similar impact may be expected upon the downwind land and accumulations in groundwater concentrations from atmospheric fall out of tritiated water from the 50 million gallons a day vented to the atmosphere.

- What scientific analysis has been done to assess and map dosages to human organs and soft tissue, or,
- to assess agricultural crop exposures to such tritium releases, and,
- to assess degradation to the aquifer fresh water supplies exposed to such tritium releases?

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