LevyCEm Resource

From: Norman Hopkins [norman@amyhrf.org]
Sent: Monday, October 18, 2010 9:44 AM
To: Bruner, Douglas; Don Hambrick
Subject: Draft NUREG-1941
Attachments: NukeEIS Sept2010.pdf

The ,pdf file attached expands upon the comments made on behalf of this Foundation at the Crystal River meeting on 23 September, 2010.

Thank you for your help and consideration. Please acknowledge receipt of the .pdf for process, and indicate how we may be apprised of the process by which the public may view response to the issues raised.

With kind regards, Norman Hopkins. Director

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Comments of Norman Hopkins arising from the LNP DEIS review meeting on 23 September 2010

DEIS review 23 Sept 2010. The principal arguments presented at the meeting in favor of approving the Combined Licenses for Levy Nuclear Plant Units 1 and 2 appeared to be that nuclear power was the only available suitable technology capable of providing base load, and no environmentally preferable site for such could be found. Whereas, the costs and human harm likely to stem from such a nuclear facility on that site would be disabling, especially as more economic and environmentally preferable arrangements become available.

Considerations: The discussion in Section 9 of the DEIS resolves upon the applicant's assertion of need for an additional 2,200 MW(e) of base load power. This necessarily reflects increases in regional consumptive demand as well as the need to replace the capacity contributed by the two oldest 550MW coal-fired plants of the CREC as soon as the LNP comes on stream. That is to say that base load demand with respect to the CREC is expected to increase by fifty percent.

The advent of the economic recession and its extended recovery period must call into question the assent given by the FPSC to that assertion. However, the consequent impact of the recession upon the regional economy requires other criteria to be evaluated, particularly the most pressing need to create employment opportunities for regional residents while keeping electricity costs within reasonable bounds.

The first sentence of Section 9.2 ignores the fact that PEF's *current* markets have changed significantly since the scoping period. The analysis is consequently flawed at least to that extent. Not only is the assumed bounding target of 2,200 MW(e) by PEF questionable, there is no logic demanding that the NRC and USACE should be so bound. Also, the need to protect the region's scarce potable water resources likely to be impaired by any LNP facility should be given corresponding if not higher consideration as environmental damage would persist well beyond the life of the LNP facility and threaten a broad segment of the population. (See comment below on Tritium).

Section 9.2.1. of the DEIS omits the planned up-rates of the CREC - unit 3, to about 1,000MW(e).

Alternative power provided by the CREC in combination with PV arrays and hydrogen technology, for which land adjacent to the LNP site was known by PEF to be available, has not been considered (Charles Smith statement to the 23 September, 2010, review meeting). Section 9.2.3.3 of the DEIS unnecessarily limits consideration to solar *thermal* electricity. It also omits consideration of placing PV array sites closer to major demand locations (e.g.,The Villages) which would eliminate need for a significant proportion of the 180 miles of additional transmission lines postulated by the applicant.

Many statements to the DEIS review meetings have questioned the viability of proceeding with the PEF proposal on the Levy site, some of which arose after the end of the scoping period ending December 2008:

1. the inordinately high capital costs. The overwhelming magnitude of these capital costs can only be funded by massive federal government subsidies, without which no economic case for the LNP facility could be made. Moreover, these and an "up-front" customer levy to defray capital costs in advance causes taxpayers and customers to assume capital risk with no prospect of commensurate benefit - when that risk rightly should accrue to corporation shareholders or bond holders instead of consumers and taxpayers,
2. high expected costs per kWh of electricity from the proposed LNP facility. Electricity from the nuclear plants would be several times the cost per kWh that consumers pay today and that they would pay from competitive power generating options (Craig A. Severance, Business Risks and Costs of Nuclear Power, January 2009, page 32),

3. the uncertain extent of base load demand for electricity in view of the economic recession,
4. the degree of uncertainty regarding the viability of the AP1000 design causing delay and cost increases,
5. the exclusion of the Crystal River/ Kings Bay area as Affected Environment, especially in view of the groundwater flow patterns into Citrus County, which have been brought to the attention of thee NRC and USACE,
6. health hazards from the discharge of radionuclides have been assessed without sufficient consideration being given to *accumulations* of tritiated water in groundwater,
7. adverse effects upon offshore sea grass meadows and consequent irreparable damage to the marine food web from discharge of toxic heated effluent into the Gulf of Mexico,
8. the absence of safe storage for highly toxic used fuel rods removed from the reactors,
9. risk of unintended releases of toxicity into groundwater, arising from the relative fragility of the proposed single wall PVC piping to the CREC exposed to mining seismic disturbance,
10. the needs to contain national debt, and take steps to exploit the truly renewable energy resources encouraged by government policies, and creating jobs for local residents in the shorter term, should be considered in public forum.

Albeit with hindsight, all of the above in combination cast serious doubt upon the PEF decision to opt for a nuclear facility at the chosen locality. Especially a site within a region having poorly confined aquifers which supply water for domestic and other health needs. (A decision that diverts scarce financial resource away from competing alternative environmentally preferable solutions, and directs attention away from seeking significant energy savings available from increased consumptive and production efficiencies).

An alternative approach - "Renewable Electrolysis": - The Foundation is indebted for the co-operation of the DOE - NREL and particularly to Darlene Steward et. al. and NREL/PR-560-47547 from proceedings of the HTAC meeting February 11, 2010. Note that 1kg H_2 is equivalent energy to 1gal gasoline. The Florida location is not suited to the competitive Pumped Hydro or Compressed Air Energy Storage technologies.

An alternative scenario avoiding much of the negative consequence above, and be meritorious to PEF, does not appear to have been addressed in the DEIS. Time and wealth consumed inherent to the LNP propsition could be applied to bring on stream increased power capacity in a radically shorter time scale, for significantly less cost, creating local employment opportunities so urgently needed and avoiding degradation of highly valued natural resources. Earlier elimination of GHG and methyl mercury emissions from earlier ceasing operations and decommissioning the dirty coal-fired units at the CREC would be a landmark achievement for PEF.

PV arrays could be brought on stream as described below (as similar installations have already been provided elsewhere in Florida), together with hydrogen plant providing for base load supply, both of which could be progressively expanded over time, taking advantage of cost reductions as technologies mature :

- ✔ solar energy PV arrays and inverters could be installed on the LNP site to serve prescient increases in demand,
- ✔ hydrogen electrolysis and storage plant could create an off-grid local energy reserve. The energy resource for the hydrogen plant could be derived from off-peak grid supplies in times of lower demand enabling more efficient operating schedules of existing plants, complemented

by yield from solar energy arrays both on site and on adjacent land.

- ✔ disabling events to the CREC nuclear facility could be recovered more expediently using the reserve,
- ✔ a simple energy arbitrage scenario is postulated for the hydrogen plant consisting of an initial 300 MWh nominal storage capacity that is charged during off-peak hours (18 hours per day on weekdays and all day on weekends) and discharged at a rate of 50 MWh for 6 peak hours on weekdays. Process water would be electrolyzed to produce hydrogen, for storage as compressed hydrogen gas in above ground steel tanks for use in polymer electrolyte membrane (PEM) fuel cells. Some estimated time and cost parameters are suggested (excluding any benefit from possible federal subsidies):
  - ✔ acquire land bank for expansion of PV system, say, 5,000 acres @ c. $100million, bringing total acreage to 10,000 acres [say, 1 year]
  - ✔ PV indirect costs (engineer, procure,construct) @ $11million [over say, 2.5 years]
  - ✔ build initial 10MW (AC) PV array on 60 acres @ $40million direct cost (incl. inverters c.$4million)
  - ✔ initial PV total cost $151million - excluding land prepn.[elapsed time, say, 3 years]
  - ✔ Hydrogen plant (Electrolyzer, Hydrogen storage, Fuel cells) consisting of,

    50 electrolyzer units to yield 52,300 kg/day H_2 (run in of-peak hours only)

    Process water Cooling system

    Transformer, Thyristor, Electrolyzer Unit, Lye Tank, Feed Water Demineralizer, Hydrogen Scrubber, Gas Holder, 2 Compressor Units to 30 bar (435 psi), Deoxidizer, Twin Tower Dryer.

    Estimated net present (2011) cost of H_2 plant @ $225million
  - ✔ Using hydrogen for energy storage provides unique opportunities for later integration between the transportation and power sectors. Producing a small amount of excess hydrogen (five 280-kg tanker-truck loads or 1,400 kg per day) reduces the overall levelized cost of energy for this scenario by about 6% compared with the purely energy arbitrage scenario.

<u>NUREG - 1941</u> On page D-71, draft NUREG-1941, 0015-110 Nuclear power electricity generation was portrayed as prohibitively expensive. (Capital costs of the LNP exceeding three times the value of gold reserves held by the International Monetary Fund (IMF), or 5% of IMF total reserves. An enormous sum to apply to a single risky venture, taking money away from competitive power generation options which would be expected to mature years before the Levy County system were completed and degrading the environment far less). The point of the comment was to highlight the diversion of funds from environmentally preferable scenarios which would fall within the remit of the NRC. (See Response on same page). Applying even a small proportion of the LNP capital expense to improving electricity consumptive and production efficiencies would yield significant savings. It has been estimated that between a tenth and one eighth of all national electrical power generating costs could be saved by improving consumptive efficiencies. "The most urgent, technologically feasible, efficient and affordable endeavor available today".

On the page D-61, 0014-59, is record of a suggested alternative environmentally preferable strategy which does not appear to be addressed by the response on page D-66 or D-68, (See alternative scenario above) Such a strategy would create jobs for local residents in the shorter term coincident with developing the expertise and production capacities having lasting benefit to our local economy for years to come.

The attention (page D-61,) was directed to the land resource under existing power lines connecting with the CREC for positioning PV arrays (See alternative scenario above).

By way of example consider the West to East run of power lines extending from the CREC for, say. 17 miles. The width of that pathway would appear from Google Earth to be 400 feet wide with towers about 1,000 feet apart. Subtracting crossing obstructions, it would seem that a significant area could accommodate photo voltaic solar panels.

Environmentally, such an approach would avoid contamination of offshore sea grass meadows, avoid depletion of groundwater supplies and contamination from venting radionuclide contaminated water vapor into the local atmosphere with consequential harm to public health. The 5015 acre LNP site could be used to generate 500/600 MW of power for relatively risk-free transfer to the CREC. The production of dangerous used fuel rods and associated security risks are avoided. Added advantage could accrue from siting solar generation closer to substations near user conurbations avoiding environmental destruction to accommodate unnecessary power-line corridors.

Note: Some of the manufacturers approached in regard to larger static fuel cells have their business models tuned to using natural gas as their energy source, which is perfectly reasonable in view of the availability of natural gas in the market place. Their process requires natural gas to be reformed into hydrogen and then the hydrogen is the energy source for the fuel cell, as opposed to electrolyzing separation of hydrogen from water. However, a manufacturer offers a 1 MW PEM hydrogen fuel cell at a cost of about $4million.

Tritium Before licensing any LNP plant, the public needs to be apprised of how, in what quantities and into which areas harmful radionuclides are to be released and accumulated in groundwater over the operating life of the plant for both gaseous and liquid effluent pathways. Together with the calculated dosages resulting therefrom, especially regarding infants fed on mother's milk.

Concern about Tritium is expressed for several reasons (See also USNRC Tritium Backgrounder):

1. It cannot be denied that atmospheric deposits of tritium in water molecules accumulate in ground waters of a poorly confined aquifer system. Fifty or so years ago, measured amounts of tritium in ground water near Ocala had risen to exceed **one hundred times** normal background levels - due to nuclear events many thousands of miles away on the other side of the planet,
2. all nuclear reactors including those proposed for Levy County and that at the CREC **throughout their operating life continually release tritium** (together with several dozen other radionuclides such as strontium and radioiodine) (Pages, J-3 and J-7,)
3. tritium **abides in water molecules** as hydrogen as explained in the backgrounder,
4. tritium is a radioactive isotope of hydrogen and an EPA **listed human cancer causing agent,** emitting Beta particles until it **degrades after about 120 years** into helium,
5. furthermore, it is believed that the **dosage models** used in this DEIS **only consider routine radiation releases** and fail to account for both **accidental releases and tritiated water accumulations in groundwater**. Moreover calculated dosage limits also assume venting of a

routine radiation release from "standard man's" contaminated bodily fluids within a few days,

6. the **integrity of blowdown water piping** to the CR site through a single wall PVC pipe without leak detection **causes concern**, especially as it will be **subject to regular daily seismic disturbances** from mining activities.
7. the statistics put forward by Mary Olson at the 23 September 2010 review meeting indicating levels of human harm from radionuclide emissions and in high level wastes within the regulated standards were simply staggering and quite unacceptable to civilized society.

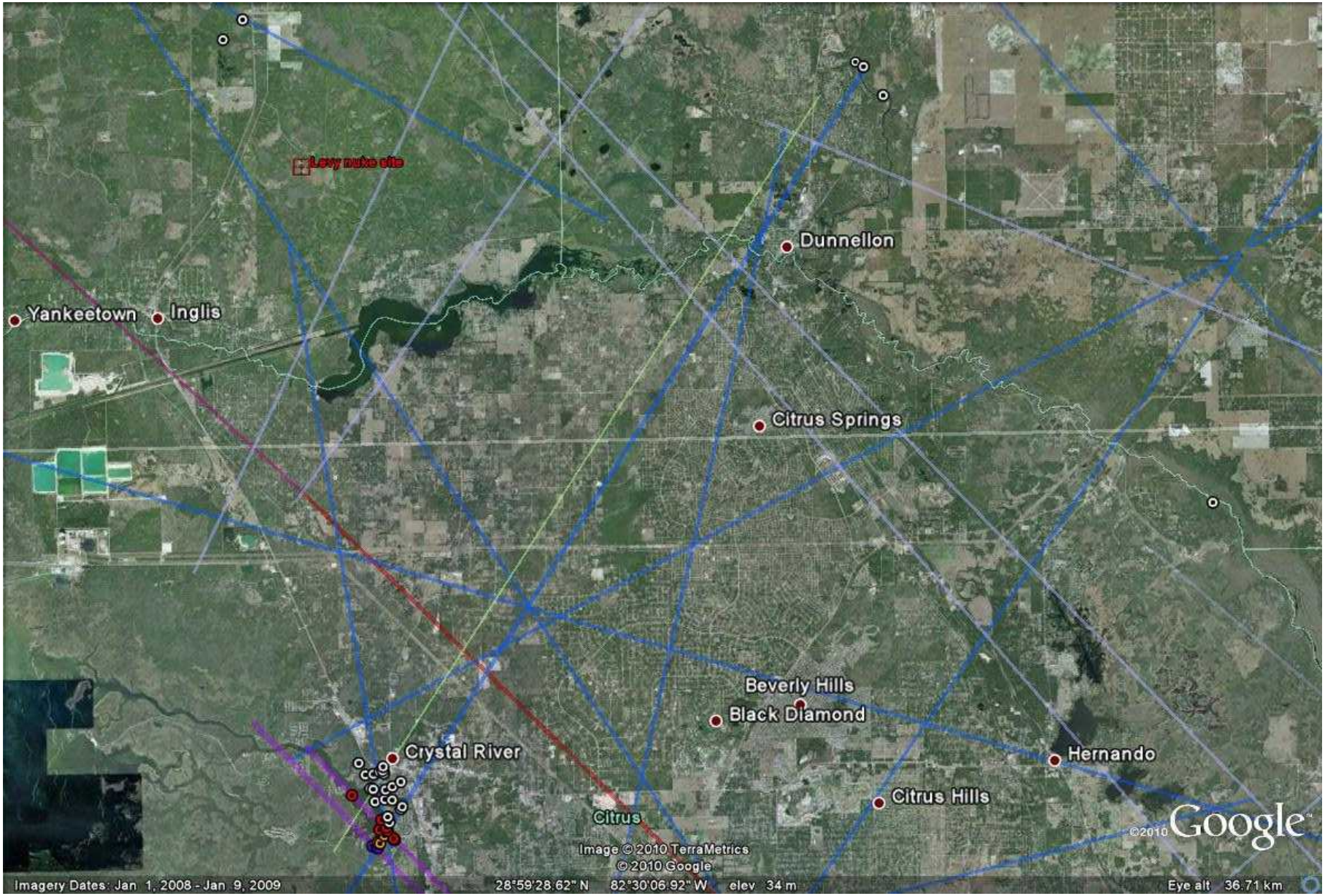
Used Fuel Rods. The so-called "spent" fuel rods are more radioactive after use in a nuclear reactor than when first inserted by an average six million times. Although fuel rods removed from a LNP reactor will have U_{235} at reduced levels, other radioactive elements (eg Boron used to control the reactor process) would raise radioactivity intensity in the used rods far above their levels before use in the reactor.

Geohydrology The DEIS documents reflect the scoping period only up to December, 2008. Research conducted in 2009, show paths taken by groundwater flows within and through areas impacted by accumulations into groundwater of effluent fallout of radionuclides. These would embrace Crystal River/Kings Bay presently excluded as Areas Impacted by LNP operations. A copy of a paper recording this research was handed to Mr Emsch at the said meeting as follow up to earlier swubmissions.

Under artesian conditions, pressure gradients are induced. As these tend to equalize groundwater flows result. Such flows when intersecting with ancient rock fractures tend to take the path of least resistance and join water flowing within the fracture set. Within the regional karst terrain extending from the site of the proposed LNP, complex flow patterns are expected to convey contaminated groundwater considerable distances over time including to well sites used for extracting domestic supplies for consumption in local communities.

Moreover, discharges of such waters from springs into protected surface waters would likely hazard recreation, and flora and fauna, including protected species such as the manatee, as well as impair offshore sea grass meadows in which the marine food web is nurtured. Such activities would adversely impact the economic worth of protected waters suggested to exceed $20 million per annum.

Page 2 -18, vol 1 of this DEIS, for example, shows run off from the LNP site westwards to the Gulf of Mexico. At best this is misleading as the unconfined aquifer system would not support such run off. Although aquifer flows across the site would be E to W, a fracture is indicated to the west of the site which would divert flows southward toward the Crystal River/ Kings Bay system and other Citrus County spring fed coastal river systems. All of which are omitted from the DEIS as Affected Environment. . (See attached Google Earth map overleaf. Note the south-trending blue lines into Citrus County from west of the LNP site).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28°59'28.62" N 82°30'06.92" W elev 34 m
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