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To:
Jeremy Rosenthal,
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625 Broadway, Albany, NY 12233-1750,
Phone: (518) 402-9159 depprmt@gw.dec.state.ny.us
(For email, the subject line must include the words "UWNY Scoping").

Subject: UWNY Scoping
Date: May 10, 2009

Dear Mr. Rosenthal:

I am a resident of Piermont, Rockland County, NY, and as a UWNY customer pay my water utility bills to UWNY. By profession I am a geophysicist; a Special Research Scientist at the Lamont-Doherty Earth Observatory; and Adjunct Professor at the School of International and Public Affairs, Columbia University.[1] I am currently serving on several advisory bodies with remote relevance to some of the topics of the *UWNY Scoping*. They include: NPCC (New York City Panel on Climate Change), the NYS SLRTF (NYS Sea Level Rise Task Force, Infrastructure Working Group), and I am the sector leader for Communication and Transportation Infrastructure of the NYS ClimAID project sponsored by NYSERDA to advise the State on Strategies for Climate Change Adaptation. I have recently completed a similar task pro bono for the MTA[2], and – with a more national scope – for the National Research Council / National Academy's Transportation Research Board as coauthor of its Special Report 290[3] entitled: Potential Impact of Climate Change on US Transportation. For the record, I also should state that I am serving on the Board of Directors of *Scenic Hudson*. Regardless of any of these aforementioned affiliations, I only speak on my own behalf and not for any of the named organizations. My professional background is in seismic hazard and risk assessment, and in climate change adaptation and sustainability. I submit the following related observations for consideration of the UWNY Scoping topics:

1. Basic Statement. I am aware of the risk of potential water shortage for Rockland County, at least as long as no serious conservation measures are undertaken. UWNY has chosen a solution to address this potential shortage that has at best little concern for sustainability. The UWNY

[1] See: (http://www.ldeo.columbia.edu/user/jacob and http://www.sipa.columbia.edu/academics/directory/khj1-fac.html)
[2] http://mta.info/environment/pdf/SustRptFinal.pdf see Adptation Chapter, pp. 56-61
[3] http://onlinepubs.trb.org/onlinepubs/sr/sr290.pdf

DEIS[4] is lengthy (in excess of 165 Mb!), with pages and chapters filled with information that often is only marginally relevant, distracting, sometimes misleading, incomplete, not always up-to-date, at times un- or misinformed, and in some cases simply wrong. Not all of the material provided bears these characteristics, but a considerable portion of it does. The reader is worn down with what has the appearance of information but often has little relevance to the true issues at stake. The UWNY DEIS lacks thoroughness, rigor and candidness. It does not adequately address the true environmental impacts of the proposed project, or merits of alternative solutions. It therefore seems to violate the intent of SEQRA and of other relevant legislation such as, for example, the *Coastal Zone Management Act*.

Without going into every aspect in which the UWNY DEIS can be found lacking, I will focus on only a few typical examples of its apparent deficiencies, in the expectation that solicitations for the requested scoping topics by other stakeholders and citizens with expertise in other fields will lead to a comprehensive rigor for the assessment of the environmental impacts of the project that the current DEIS seems to lack. The DEIS has provided formal lip service while it has fundamentally avoided taking a broad view of the basic issues of sustainability vis-à-vis continued rapid and near-unconstrained growth in Rockland County. Other insufficiently covered broad issues are the costs and benefits vis-à-vis alternatives to a desalination plant (in particular water conservation); it skips over risks of a precedent that such a plant may set by failing to preserve the Hudson River and its Valley as a unique natural, cultural and scenic resource that deserves the utmost protection.

The next items address example technical matters which merely typify how superficial the seemingly extensive DEIS in some instances is.

2. Geology and Seismology. (see DEIS Chapter 8). It is not possible from the information provided in the DEIS to get a sense of what is the geologic information of the site and its consequence for seismic design of the plant. The low-resolution geological overview map (Fig 8-3) shows it located in the down-dropped Triassic half-graben bounded in the WNW by the Ramapo Fault (Fig 8-4) without giving any hint for the depth at which Triassic rocks are being found below the superficial loose sediments; the surficial soil map (Fig 8-1) indicates apparent post-glacial soil deposits of loamy to sandy consistency, and landfill materials at the plant site proper; while at the site of the intake structure there seem to prevail silts and organic clays. But one does not get a sense, nor any data are provided, lest any geotechnical boring information, to ascertain what is the composition of the material to depths of 100 ft below grade. This is the critical depth down to which geotechnical data for seismic design are required by the International Building Code – IBC- (which applies for the site, as correctly stated in the DEIS). Note that IBC will only provide a MINIMUM standard for the seismic design of the plant, and to achieve better performance and seismic safety, higher seismic design standards would be welcome for a costly facility providing essential services to the public of Rockland County.

2a. Seismic Ground Motion Acceleration Values. Chapter 8 and its section "Seismology" are poorly informed as to what the IBC requires, and the implications for seismic design of the plant.

[4] http://www.haverstrawwatersupplyproject.com/index.php/draft-environmental-impact-study-deis.html

There is mentioning of two seismic hazard levels (10% and 2% probability of exceedance for a common exposure time of 50years). For the 10% probability in 50 years (which corresponds to an average annual seismic occurrence with a chance of about 1-in-500 per year) the DEIS quotes very small peak ground accelerations (PGA) of (Quote:)

> *"between 0.02 and 0.03g (i.e., 90 percent of the PGA values during the 50-year period would be expected to be less than those values), suggesting low seismic hazard (i.e., infrequent damaging earthquakes of magnitude 5.5 Richter or higher) in the future." (End of Quote),*

thereby lulling an inattentive reader into the believe of "low seismic hazard". The information given is useless if not misleading distraction, since IBC requires as a base for building code applications the use of the USGS 2% probability values[5] (with an annual chance of about 1-in-2500 in any given year) which for peak acceleration values measure near 15%g, if given for the IBC reference soils. However IBC does not use PGA values. Instead it uses spectral acceleration values which for the mapped site on IBC reference soils would measure for building periods of 0.2 sec (i.e. for buildings ca. 2 stories high) about 26%g, and at longer periods of 1.0 seconds near where sloshing of water in the tanks may be a seismic design concern, spectral acceleration values of about 6%g. USGS seismic hazard maps are periodically updated, so the newest values should be used.

2b. Soil Amplification Factors. For IBC design applications the in 2a quoted spectral acceleration values are further modified by a number of coefficients including soil amplification factors based on the shear wave velocity of the soils or rock in the upper 100 ft below grade. The determination of these soil amplifications typically requires geotechnical borings, of which the DEIS makes no mention. From experience with Tappan Zee Bridge foundations in the organic Hudson River clays (approximately applicable to the intake structure located in silts and organic clays), these amplification factors can reach values in excess of 8 at certain resonance periods for site-specific assessments, but are limited in building code applications to generalized design amplifications of less than 3. Still, these are considerable amplifications of ground motions and seismic design values that an EIS needs to take into account.

2c. Soil Liquefaction and Slope Stability Potential. A properly performed DEIS needs to discuss other seismic hazards. A seismic soil liquefaction study, or at least a screening test, needs to be performed of which the DEIS makes no mentioning. This is clearly warranted for the sandy and landfill soils of the plant buildings, and possibly man-made soils along the raw water transfer pipes between the intake and the plant. It may be a marginal issue with silts and organic clays for the intake. Also it is mentioned that slopes are present on the site. The stability of these slopes under seismic conditions is essential for the plant's safe and reliable performance, the foundation of the tanks, and the various types of piping buried in or anchored to the ground. Slope stability should be addressed as part of the EIS.

2d. Seismicity, Maximum Magnitude and Proximity to the Ramapo Fault and Indian Point Nuclear Power Plant. It should be noted, that the USGS allows for a uniform maximum magnitude value in excess of Mw=7 (Moment Magnitude) for this geologic environment. This is a much larger than the magnitude values of m=5.5 mentioned in the DEIS, although not

[5] http://gldims.cr.usgs.gov/nshmp2008/viewer.htm

explicitly labeled as maximum magnitude. Also, the DEIS does not take into account the latest available information on seismicity of the region. A final EIS should take note of the most recent pertinent insights about the seismo-tectonic regime of the region provided by Sykes et al. (2008)[6]. This is especially true since the plant lies at a surface distance of less then about 2 miles from the Ramapo Fault System and its related fault strands (Figure 8-4). Sykes et al. state, when discussing the seismicity for their entire study area that extends from near Philadelphia, PA, to just beyond Peekskill, NY: "Extrapolation of the frequency-magnitude relationship indicates that an event of mbLg ≥6.0 is expected about once per 670 yr", and*: "Extrapolated repeat times in our study area for events of mbLg 6 and 7 are about 670 and 3400 yr, respectively. The corresponding probabilities of occurrence in a 50-yr period are about 7% and 1.5%, respectively. The probability of an earthquake the same size as the 1884 event, mbLg 5.25, during a 50-yr period is about 22%."* And further below: *"Indian Point is situated at the intersection of the two most striking linear features marking the seismicity, and [is] also in the midst of a large population that is at risk in case of an accident to the plants. This is clearly one of the least favorable sites in our study area from an earthquake hazard and risk perspective."* The Sykes et al. (2008) quotes are in contrast to the DEIS message of "suggesting low seismic hazard (i.e., infrequent damaging earthquakes of magnitude 5.5 Richter or higher)".

Moreover the Sykes et al. paper points to the potential seismic risk to the Indian Point Nuclear Power Plant. Such a scenario, albeit of low probability, in which a seismic event may cause the release of radioactive materials including cooling waters or leaked fluids into the Hudson should be at least mentioned, if not assessed in the EIS for the UWNY desalination proposal. In my opinion, it must be a scoping issue in the context of emergency and contingency planning for a water supply scheme relying on Hudson River water. Such a scheme should not be considered unless it has appropriate and reliable contingency and recovery plans.

3. Climate Change (CC), Sea Level Rise (SLR), Salinity, and Storm Surge Flood Elevations. *[Applies to: Chapter 16 (Climate Change - CC) and Chapter 9 (Natural Resources) of the UWNY].*

3a. SLR, Salinity Increase, and Rising Energy Costs. The energy demand for removing salt from the Hudson River water to obtain potable water depends on the river's salinity. Also the basic optimal design of the plant depends on the salinity of the water taken as a source. The proposed technology, reverse osmosis, works best when the filter membranes are tuned to a specific salinity with as little variation as possible around the long-term mean salinity average. The Hudson River hydrology, in combination with climate change (CC), sea level rise (SLR), Storm Surges, and related variations in salinity content of the water will make the proposed plant having to perform under variable salinity and turbidity conditions that at times, and in the long-term future will be far from optimal for a fixed given design. Rising salinity will increase energy demand for every gallon of produced drinking water. Climate change causes sea level to rise before the end of this century between less than 2 feet and as much as about 4 feet, by the 2080s (NPCC-CRI, 2009 [7]). Rising sea level is generally associated with the upstream migration of the

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[6] Lynn R. Sykes, John G. Armbruster, Won-Young Kim, and Leonardo Seeber (2008). Observations and Tectonic Setting of Historic and Instrumentally Located Earthquakes in the Greater New York City–Philadelphia Area. Bulletin of the Seismological Society of America, Aug 2008; 98: 1696 - 1719.

[7] http://www.nyc.gov/html/om/pdf/2009/NPCC_CRI.pdf

"salt front". And at any given location downstream form the salt front, SLR implies an increase in salinity. We are not aware of any modeling efforts in the Hudson River estuary that would forecast the increase in salinity as a function of SLR. But such modeling forecasts have been performed for various locations of the Delaware River[8], and for Philadelphia in particular, we quote some results form the pertinent report: *"These studies collectively suggest that, in the vicinity of Philadelphia, chloride increases roughly 3-6 ppm for every 0.1 m of sea level increase. Thus, sea level projections of 0.6 to 1.5 m by the end of this century imply chloride increases of 18 to 90 ppm—anywhere from a doubling to a quadrupling of current chloride levels."* (End of Quote). While the Delaware River results cannot be directly transferred and applied to the Hudson River and Haverstraw Bay, they show in principle that such effects from SLR can be substantial and definitely need to be taken into account in an EIA, for the design of the plant, and for the computations of its expected energy consumption. The UWNY DEI fails to do so, and this omission must be corrected.

3.b) SLR and Increased Flooding Potential. In addition, sea level rise in combination with storm surges will flood the location of the raw-water pumping facility near the intake structure at the Hudson River waterfront. The current FEMA FIRM flood zone map[9] indicates a 1% per year base flood elevation of 8ft above the NGVD 1929 vertical reference datum. By the end of the century this 1% per year flood elevation (also referred to popularly as the 100-year flood elevation) could increase due to SLR to 12ft above NGVD'29; and the 0.2% per year probability flood (also known as 500-year flood) may add an additional 2 feet to these critical elevations. A facility of this importance should probably be designed to be safely above the 500-year flood elevation anticipated by the year 2100, SLR estimates included. The UWNY DEIS does not consider any of these suggested targets. It is based on backward instead of forward-looking information. This partly could be due to the EIS process as carried out currently by NYS DEC, which does not require flood zone projections in tidal waterfront locations to account for SLR. One would hope that the FEIS will voluntarily take SLR into account, unless internal NYS DEC guidelines will have changed by then, and follow likely recommendations of its own NYS DEC SLR Task Force to account for SLR for future projects along coastal and tidal waterfront projects, irregardless of what FEMA's NFIP or FIRM guidelines may require. In any case, while there is an entire Chapter 16 addressing CC issues, the UWNY DEIS misses these points altogether and omits dealing with the increased flood potential in the context of SLR at the location of the proposed raw water intake facility and pumping station.

4. Visual Appearance: *Chapter 2 - Project Description. WATER TREATMENT PLANT BUILDINGS AND SITE LAYOUT. Figures 2-9 and 2-10 related to text on pp. 2-19 to 2-20.*

Figure 2-9 Provides a "Conceptual Rendering" of the Buildings and Site Layout. It is misleading about the height of portions of the building complex and the 3 Raw Water Storage Tanks. The artistic rendering of Figure 2-9 gives the (false) impression of a fairly uniform height of the

[8] http://www.depweb.state.pa.us/energy/cwp/view.asp?a%20=1532&q=539829 (page 71)
[9] (FIRM Map Sheet 3606810011C , see: http://map1.msc.fema.gov)

structures, including the tanks. This is in stark contrast to the two views of the vertical elevations of Figure 2-10, in which the upper one indicates that the "Belt Filter Press Building" is about three times as high above current grade as the Administration Building (and about 2.5 time as high above the future grade) and the lower view shows that the 3 Raw Water Tanks reach about the same absolute elevation (about 69 ft above the chosen vertical datum). These glaring differences have impact on the visibility of the structure from the Hudson River and its water front or from other vistas, including perhaps residential areas on the west of the CSX rail tracks; therefore the DEIS (and Fig 2-9) does not truthfully describe the visual impact of the plant. The structure heights need to be a scoping issue.

5. Summary:

I hope these few examples of omissions and/or misleading content in the UWNY DEIS will be scrutinized for the selection process of valid scoping topics, and the added ones will be properly addressed for the subsequent versions of the FEIS and its SEQRA review. As stated in the introductory remarks, these examples are only symptomatic and do not describe exhaustively deficiencies of the DEIS. Other, much broader and more basic issues than those tackled here are that need to be added to, or deserve full treatment in the FEIS, include:

- Water conservation,
- Repair of leaking distribution pipes
- UWNY sending water to downstream communities at the expense of upstream communities in excess of legal limits;
- New storage options, whether in new reservoirs behind new or enlarged dams or in the many unused, or sooner or later to be unused quarries of Rockland County.

These items seem all valid issues for scoping, which I do not have the expertise to comment on, but suggest them urgently for scoping. An even broader issue is:

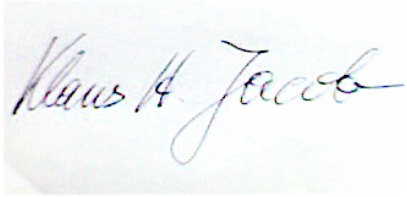
- Unsustainable, open-ended development in Rockland County which needs to face up to the finiteness of natural resources, and the limits to which these resources should be harvested for human use at the expense of a sustainable ecological balance.

Lastly there is the question whether

- Profit motives of the private sector are compatible with the interest of the public at large.

Some of these issues need political discussion and decisions perhaps legislative action, that transcend the largely technical approach during the SEQRA process.

Yours Sincerely
Klaus H. Jacob



Cc: Harriet Cornell, Chair, Rockland County Legislature
Connie Coker, Chair, Committee for the Environment, RC Legislature
Ned Sullivan, President, Scenic Hudson
Tom Kleiner, Orangetown Town Supervisor