

MEMORANDUM

To: Groundwater Advisory Council
From: H. Bokuniewicz
Re: Minutes of the meeting of May 7, 2012
Date: May 15, 2012

PRESENT

H. Bokuniewicz
N. Bartilucci
S. Colabufo
C. Gallagher
G. Hanson
R. Liebe
R. Mazza
D. Paquette
S. Reutlinger
M. Scorca
W. Spitz
S. Terracciano

REGRETS

M. Alarcon
L. Koppelman
M. Nofi
A. Rapiejko
K. Roberts

1. There were editorial changes made to the minutes of 2 April. These were typing errors and misspelled words (Aldo Andreoli). Negotiations for continued funding for the USGS monitoring were not with Nassau County but with the water districts themselves.
2. The USGS conference was held at Hofstra on Wednesday, 2 May. About 100 people attended. Several water systems were represented by their consultants. Among other presentations, Fred Stumm reviewed the EM logs done in collaboration with the Nassau County DPW. These demonstrate saltwater intrusion. The USGS hopes to update the position of the saltwater interface. The Raritan Confinary layer was also discussed based on new information. Whereas models often assume it to be a clay layer 200-feet thick, it is clear that it is not uniform and may be absent in some places.

The Northern Atlantic Coastal Plain study (USGS) is compiling coastal groundwater conditions from North Carolina to Long Island. A presentation was given concerning the quantification of flow and a regional model will be done as part of this study. It was shown that groundwater stresses in NJ were also seen in Brooklyn and Queens. A report is expected to be finalized in fiscal year 2014 including compilation of all the water-use data and distribution of both private and public septic systems.

3. The NAWQA PAA Principle Aquifer Assessment study of the principal coastal aquifers includes 60 supply wells (**See Attached**). Raw water will be analyzed for emerging contaminants, viruses and bacteria, for tracers for age-dating and major ions. Ten of these wells will be on Long Island outside of NYC. The study is particularly designed to look for detectable levels of contaminants; individual wells will not be identified in the report. NYC may be planning to start using the Jamaica Water Supply wells again and may be concerned about unregulated contaminants. Other

suppliers, too, may have been hesitant to participate because of the chance that wells would be shut down based on the results. This hasn't happened in the past, however, and the results of previous investigations have been both informative and helpful. In some cases, the results guide future monitoring and can be used to establish trends, for instance, for the analyses of antibiotics or PCP's. Any agencies interested in supporting additional sampling to better inform understanding of LI conditions should contact the USGS. The SCWA has provided the USGS with a list of potential wells.

4. The USGS groundwater monitoring program is still suspended in Nassau County and in jeopardy in Suffolk. The Water Conference may be able to provide some funding for the USGS work in Nassau County. Nick Bartilucci and Paul Granger have been very helpful. Although the USGS solicit funding of the monitoring program, DEC has suggested that it may be possible to require monitoring as well water districts permits are renewed.
5. In Suffolk County, the cooperative agreement between the County and the USGS for groundwater monitoring expires on 30 September, 2012 and it seems that the county considers such monitoring as outside their mandate. The professional programs in The Department of Health Services are also intended to be reduced. These programs had been supported by the quarter-cent sales tax (477). Some legislators seems to be open to continuing that use of funds but, at this stage, "certificate of necessity" may be needed to expedite any process for continued funding. Any appeals can be made especially to legislators Romaine, Kennedy, Spensier, Browning, Achor and Hahn.
6. The Nassau County DPW has supported the USGS monitoring in the past and, with capital projects, perhaps has provided over one million dollars over the last 20 years. A capital project to get an outpost monitoring well alone may run a million dollars. But the county has decided that the operating fund for engineering design does not include a mandate to support monitoring.

The USGS had received as much as \$630,000 in Federal match but the current funding is down to \$450,000 not including participation in USGS regional studies to assist in the new water-quality programs.

7. Gil Hanson spoke about a current research project being done by Sara Reutlinger under his supervision. Sara is a student in the MS Hydrogeology Program and works for Envirotech. It has long been recognized that about 50% of the nitrogen load at the surface never reaches the water table. It may be that this loss represents that sorbed onto aquifer material in the (anoxic) sewage plumes from septic systems. It is unlikely that it is lost as ammonium gas at the cesspools since this process works most effectively at a pH of 9 whereas septic systems tend to operate at a pH of 6 or 7. Ammonia however, may be either adsorbed or absorbed, we don't yet know the process, but ammonium is a cation and highly reactive with particulate.

While denitrification of nitrate may occur in the vadose zone, recent research by Caitlin Young has shown that there is essentially no denitrification in the groundwater in Northport or around Stony Brook Harbor.

Data that might shed light on this process had been collected in the 1960's for a LI Water Pollution Study. This was done by the state primarily to address concerns over detergents. These data will be reanalyzed using a modern, cation exchange model. (This model had been used by Linda Liu, another student, and reported at a previous meeting). In this model the fate of cations (Ca^{2+} , Mg^{2+} , Na^+ , K^+ and NH_4) is exchanged with coatings on the aquifer particles as the

plume migrates. The model will be re-applied to model the sewage plume dynamics. In addition, chemical exchange experiments may also be done in the laboratory using typical aquifer material.

Ammonia is sorbed on the sides of the cesspool where the concentrations of dissolved oxygen are low then subsequently sorbed on organic or clay coatings on sand grains as the plume depresses dissolved oxygen levels along its path. The exchange occurs very rapidly, usually within minutes. The cation exchange capacity is highest in the top meter or so of the soil but tends to be low in sand. In places, like at Watch Hill on Fire Island, where the flow paths are short there are no coatings and consequently no cation exchange capacity.

The data to apply this model had been collected at six sites in the 1960's. Monitoring wells, for example, were placed up to 65 feet for a cesspool receiving about 250 gallons, day from a new (5 year old) home. The chemical oxygen demand is quickly depressed; ammonium levels may rise a bit as organic nitrogen is converted to ammonium but then concentration decrease as it is sorbed onto the particles. The distribution of other elements can be used in the model to help quantify the effects of dispersion and diffusion.

As an example, a plume 20 m long might have a cross-sectional area of five square meters. If water use is about 1000L/day the waste-water might be assume to provide 50 grams of NH₄/day. 42,000 grams of ammonium or a 2.3-year supply would then be stored on the aquifer material. This is roughly half the nitrogen in that plume.

Since the DEC didn't exist until 1972, this work was done by the State Health Department. Nick Bartilucci provided publications from two additional studies. Some studies at BNL had added a carbon source to the plume in order to encourage denitrification. Currently at the BNL STP 15 to 20% of the treated wastewater leaks into the vadose zone to the water table. The new seepage pits will handle all of the wastewater starting in 2014.

Septic systems may clog over time. The permeability may be very low around the systems due to clogging, of, say, caking agents, or bacterial growth. Bay Park had been pumping tertiary-treated water into the aquifer as a barrier to saltwater intrusion, but bacterial growth clogged the injection wells. Clogging could also occur by the introduction of small, clay particles or even air bubbles. The plan for aquifer storage recharge had to find a way to overcome such injection issues.

8. The next meeting will be on **Monday, June 4 at the offices of Dvirka and Bartilucci** in Woodbury.