

## MEMORANDUM

To: Groundwater Advisory Council  
From: H. Bokuniewicz  
Re: Minutes of the meeting 28 February 2011  
Date: March 1, 2011

### PRESENT

I. Abbene  
R. Alvey  
N. Bartilucci  
H. Bokuniewicz  
S. Colabufo  
G. Hanson  
S. Jones  
J. McGovern  
D. Paquette  
K. Roberts  
W. Spitz  
A. Zhang

### REGRETS

M. Alarcon  
L. Koppelman  
R. Liebe  
R. Mazza  
M. Nofi  
A. Rapiejko  
S. Terracciano

1. Nick Bartilucci offered corrections to the minutes of the last meeting. The last two paragraphs of item 5 were revised to read:

“Nassau County has built the sewer system with over 85% State and Federal money. Such support is no longer available. The principal cost is in installing the pipes, not the STP itself. In Nassau, almost all STP discharges are to surface waters; one exception is the *recharge basin* at NY Institute of Technology. Discharges to groundwater are more common in Suffolk. An STP in Coram discharges to groundwater, and BNL is planning to expand its STP *so that it will* also be discharging to groundwater *through recharge basins* as discussed at the last meeting.

Nassau has also recently tried consolidating *public* plants but the proposal proved to be politically unacceptable.”

2. We had two guests, Jiangzhao (Amily) Zhang, a project engineer at Gannett Fleming and Janet McGovern, Suffolk County Department of Public Works. The County is involved with modeling of Port Jefferson’s nitrogen budget as part of a permit condition covering the expansion of the STP on the Stony Brook campus.

3. Gil Hanson described a two-year research project in Port Jefferson Harbor that starts tomorrow (1 March, 2011) with funding from the Long Island Sound Study. At Stony Brook he is joined by Dr. Teng-Fong Wong, and graduate students, Caitlin Young and Josephine Durand. The work is done in cooperation with Ron Paulson (Suffolk County Department of Health Services) and Chris Smith (Cornell Cooperative Extension). They are looking at the input of nitrogen to both Port Jefferson Harbor and Stony Brook Harbor *via* groundwater seepage under the shoreline. (They are not investigating the fate of nitrogen once it enters the open water of the harbor).

The objectives are to determine the volume of submarine groundwater discharge. (SGD, across the harbor floors; the amount of nitrate and ammonium in the groundwater discharged; the extent of denitrification; the potential for the dissimilarity nitrate reduction to ammonium (which is unexpected because of the relatively high oxygen content of the groundwater), the importance of non-point sources of nitrogen and the mapping of nitrate plumes.

SGD is composed of fresher groundwater from the land mixed with sea water that has been recirculated through the harbor sediments. If both the freshwater and the saltwater are oxygenated the nitrate should be delivered without denitrification to the sea floor and any iron will be present as ferris iron but if one of them, perhaps, sea water, is anoxic thee will be denitification in the mixing zone. Phosphorus will be present, rather, as FeP or CaP.

If the sea floor is sandy, the nitrogen would be expected to reach the open water without additional transformations. However, much of the shoreline is marshland, and the submerged sediments may be muddy and anoxic. If they are permeable enough, denitification may occur as the groundwater passes though them to reach the open water.

The study hopes to sample six transects in Stony Brook Harbor and twelve transects in Port Jefferson Harbor.

“Superstring” resistivity surveys would be done on the transects by Josephine Durand. The technique is able to distinguish between fresh groundwater and saline groundwater beneath the harbor floor. It had been used, for example, in the Forge River where virtual plumes of fresh groundwater were found beneath the river bed.

A Trident probe will also be deployed along each transect. This device penetrates the sediment to a depth of about 60 cm, recording temperature and salinity and collecting pore water samples for analysis. Piezometers will be installed near the shore and the discharge of groundwater across the sea floor can be measured directly at selected stations using an “Ultraseep”, a vented benthic chamber that measures the upward, groundwater flow rate at the harbor floor and from which

samples can be collected. In addition to nutrient analysis, nitrogen isotopes and Nitrogen-Argon ratios will be measured.

One sampling concern is the possible presence of clay layers, perhaps the Smithtown Clay near sea level. Another concern was raised about how to account for the small, groundwater-fed creeks. Ideally, these might be sampled during base flow for analysis.

The Suffolk County Department of Health Services will install some additional monitoring wells and the USGS has at least one water table well in Old Field. There also are EPA monitoring wells from Lawrence Aviation and, perhaps, wells put in to monitor a PERC plume from St. James. In addition, there may be abandoned monitoring wells (DEC) at around the old oil terminal in Port Jefferson. The SCWA also has a well field at West Broadway that's not used anymore: these wells showed a hydraulic connection to Port Jefferson Harbor, because, when the harbor was dredged, chloride levels went up in the wells.

The study is relevant to the LISS because, as a result of that study, TMDL's were set assuming that all nitrogen entering the harbors ultimately reached the Sound proper. Suffolk County with Fleming Gannet and Hydroqual is working on a modeling exercise concerning the fate of nitrogen introduced to the Harbor. Hydroqual had done the original hydrodynamic and water quality modeling for the LISS. This would be part of the permit condition for a delay of the 2014 TMDL for the STP on the Stony Brook campus. Historical water-quality measurements are available from the Suffolk County Department of Health Services although their application, in this case, is awaiting QA/QC.

4. Such nitrogen issues also have been addressed in the recent watershed management plan for the Carmans River by the Town of Brookhaven, Suffolk County Comprehensive Water Resources Plan, and Ivan Valiela's nitrogen model for the south shore estuary for TNC and DEC. The issue is being examined also for the Peconic Estuary and by the Suffolk County Department of Health Services. Depending on the results of studies in Port Jefferson Harbor, it may be prudent to expand such investigations to other bays and harbors.
5. The Long Island Geologists Meeting will be held on Saturday, 9 April. This is a chance to get a wide range of geological topics before a diverse audience. Abstracts are due now, so if there is particular research that you'd like to get "on the table", please contact Gil Hanson right away. We expect to have presentations related to STPs by BNL, CPM and the USGS.
6. Caitlin Young was not available to join the discussion on the use of zero-valent iron (ZVI) for nitrate remediation. She is continuing her experiments, however, and anticipating samples of ZVI made in an Argon atmosphere. It is now routinely made in a nitrogen atmosphere which, apparently, causes nitrogen to be

incorporated into the atomic structure, so that, while ZVI removes nitrate it produces excess ammonium.

Three undergraduate, engineering interns are doing a project on the potential ways to deliver ZVI to a waste stream. They meet with experts at Dvirka and Bartilucci and the Suffolk County Water Authority, and prepared a preliminary report. They intend to conduct physical, model experiments this semester.

Researchers at Stony Brook are also considering a research project using ZVI to extract uranium from sea water. They would like to conduct experiments on the effluent from a desalinization plant, because the salts are pre-concentrated. There was a desalinization plant proposed for development on the north fork, five or ten years ago but that did not materialize. Rockland County also considered desalinization. It seems that the EPA had a project using ZVI as nanotubes. Rob Alvey will see if he can find more information.

7. It was briefly noted that the student who was interested in phytoremediation, has decided to move to a different project. The investigators of the topic at BNL have moved off of Long Island.
8. I have fielded several calls lately about geothermal systems. We had looked into possible groundwater impacts and regulation a few years ago but no much progress was made. Perhaps, there is renewed interest due to the price of oil.
9. The next meeting will be on Monday, March 28, 2011.