

MEMORANDUM

To: Groundwater Advisory Council
From: H. Bokuniewicz
Re: Minutes of the meeting of 22 September 2008
Date: September 30, 2008

PRESENT

R. Alvey
H. Bokuniewicz
S. Colabufo
S. Jones
D. Paquette
K. Roberts
W. Spitz

REGRETS

M. Alarcon
N. Bartilucci
L. Koppelman
R. Liebe
R. Mazza
M. Nofi
A. Rapiejko
S. Terracciano
K. Willis

1. The minutes of the meeting of 12 June 2008 had been sent out. Copies were also distributed at this meeting. There were no comments.
2. In the spring we did studies of the nitrogen input to Manhasset Bay and Northport Harbor due to underflow (the flow of groundwater under the shoreline). We attempted to sample sewered and unsewered shorelines. (Sewer systems are expected to accommodate 5% leakage). The first phase of an investigation of coastal groundwater systems was done in May of 2008 to constrain nutrient delivery to Manhasset Harbor, a portion of which is sewered, and Northport Harbor, which is largely unsewered. We found an unusually thick (up to 7 m) intertidal zone of recirculating brackish groundwater in the aquifer, consisting of low-salinity groundwater in shore-parallel bands of varying width along the shorelines of both bays. There is clear evidence of discharge of groundwater to each embayment both from measurements of Rn-222 in surface water and seepage rates measured directly by vented benthic chambers which were as high as 32 cm/day and modulated by the tide. Initial data showed a variable groundwater total DIN concentrations, spanning similar concentration ranges in both the sewered and unsewered areas. Concentrations of organic geochemical tracers of sewage, such as caffeine and imidacloprid, are high in samples with high nutrient concentrations and also span comparable ranges in sewered and unsewered locations. A preliminary interpretation of these results would suggest that a large portion of the nutrient flux from groundwater is from wastewater in both the sewered and unsewered settings.

The second round of testing will test this preliminary result. These results may be especially useful now because the TMDL for nitrogen to Long Island Sound are now

being revised. This includes the work on denitrification that Caitlin Young, a student at Stony Brook is doing under the supervision of Dr. Gil Hanson.

3. In Manhasset Bay we have been considering the application of water reuse. There are two sewage plants (STP), Port Washington and Great Neck that produce about 10 MGD of treated effluent. Each treatment plant is in the design or construction phase of a nutrient removal upgrade that will yield high quality effluent. Perhaps, (a) effluent from the Port Washington Plant might be used for aquifer recharge to curtain salt-water intrusion, (b) the water from the Great Neck Plant might be useful for golf course irrigation and (c) that water from either might be used in wetland creation. In any case, any reuse has the added benefit of reducing the direct inputs to the Bay. Additional treatment will probably be necessary but the STPs involved may benefit by the accumulation of nitrogen credits.

Cheryl Webber has a DEC Committee finishing a report on water reuse, examining the regulation both in NY and elsewhere. Any plan would have to be accepted by both the DEC and the Health Department. In Riverhead, a reuse project had to hire a consultant to study exposure to and consider treatment technologies for viruses, although it was probably more of a perceived threat. Similar concerns were raised in Sands Point. These operations are fairly common in other parts of the country but we are more (too?) conservative on Long Island. Even though ground breaking work has been done in the southwest, there continues to be great public concern over the possibility of sewage in drinking water. Avoiding any perception of “toilet-to-tap” is a major issue.

4. Another project is starting this month on the contribution of underflow to Great South Bay. The USGS from Woods Hole is the lead and it is funded by the National Park Service. We will be involved.
5. Sea Grant has funded a project to quantify submarine groundwater discharge (SGD) to Long Island Sound (LIS) using naturally occurring geochemical tracers, specifically, the radium isotopes and radon-222. SGD has been shown to be important in other places, especially those settings, like Long Island, where there is little stream discharge. This SGD could be contributing a significant, but largely unknown, nitrogen input to the Sound via unseen, submarine seepage of groundwater and is thus important to decisions concerning the impact of septic systems as a source of N, for example. In addition, because of the policy of no new nitrogen inputs to the Sound, sewage treatment plants have been considering adding extra capacity by injecting treated waste-water into Long Island’s aquifer rather than discharging it directly into LIS. Because groundwater travels slowly, enhanced inputs of nutrients from submarine groundwater discharge might continue for decades following any management decision. The study will begin in 2009. Measurements of the nitrogen species in shallow groundwater in these areas will permit estimates of nitrogen inputs via SGD.

The Institute remains interested in convening a workshop of people working on nitrogen budgets here. There seems to be some disparities that would be beneficial to all to sort out if only by consensus.

6. Under the supervision of Gil Hanson, Caitlin Young is looking for evidence of denitrification using a variety of sampling techniques including acetylene inhibition, isotope doping, nitrogen mass balance calculations and measurement of dissolved gases. She has given a presentation on this research. Caitlin also presented a talk on

denitrification as a mechanism for total nitrate loss in Long Island aquifers at the 2008 NGWA Conference on Eastern Regional Ground Water Issues in Ronkonkoma, NY (June 23-24). She is looking for evidence of denitrification in Long Island groundwater by measuring the ratio of dissolved nitrogen gas to dissolved argon gas. Any excess nitrogen gas found in groundwater above atmospheric levels indicates the presence of denitrification.

Five USGS monitoring wells in Northport were sampled. Five USGS monitoring wells at Watch Hill State Park on Fire Island were also sampled. Seventeen SCWA supply wells in Northport were sampled. All wells have historically nitrate values in excess of 10 mg/l for drinking water.

Sampling began on May 14, 2008 and was completed on June 11, 2008. Temperature, pH, dissolved oxygen and specific conductivity measurements were measured using YSI 556 Handheld Multi-Probe Meter. Each well was sampled for nitrogen (nitrate and nitrite), major cations, major anions, and dissolved nitrogen/argon gas ratio.

Two new wells in Patchogue will also be tested. All wells will be sampled for nitrogen, cations, anions and dissolved nitrogen and argon (for MIMS analysis) using the same protocol used this spring. Additionally, fifteen (15) diffusion gas samplers will also be employed to test for the following dissolved gases; $^{28}\text{N}_2$, ^{40}Ar , ^{20}Ne , ^{84}Kr , ^{129}Xe , ^3He , ^4He .

7. Lisha Zhou has completed her Master's degree on the use of weather radar records to estimate precipitation on a 4-kilometer grid.
8. Jennie Munster has published an article on her perchlorate research titled "The Fallout from Fireworks: Perchlorate in Total Deposition" in the Journal of Water, Air and Soil Pollution (DOI 10.1007/s11270-008-9833-6) with Gilbert N. Hanson, W. Andrew Jackson and Srinath Rajagopalan. This is the abstract: "Recent studies have shown that natural perchlorate may be an important component to the general population exposure. These studies indicate that natural perchlorate is likely deposited by atmospheric deposition. Perchlorate concentration of total (dry + wet) deposition is relatively unstudied yet these measurements will aid in understanding natural levels in the environment. We sampled total deposition monthly at six sites in Suffolk County, Long Island, NY from November 30, 2005 until July 5, 2007. The mean perchlorate concentration is 0.21 ± 0.04 (standard error) $\mu\text{g L}^{-1}$ with a maximum value of $2.78 \mu\text{g L}^{-1}$. Here we show up to an 18-fold increase above the mean concentration in July 2006 and July 2007 samples. It appears that this increase in perchlorate in total deposition is associated with Fourth of July fireworks".

The article in the NY Post today said that EPA has chosen not to set low standards on perchlorate. New York State has an action level of 18 ppb and the Bethpage Water District has installed the first perchlorate removal plant in NY (<http://www.newsli.com/2008/09/22/bethpage-water-district-h2m-install-first-perchlorate-removal-plant-in-new-york-state/>). Perchlorate in water may be overshadowed by levels in milk, produce, etc and there is some concern that Congress might use EPA's action to legislate standards.

9. Larry Swanson at Stony Brook had an article in the Three Village Times on the plastic waste associated with bottled water. The SCWA has a campaign to distribute high-density polyethane (non-leaching) water bottles made from post-industrial scrap material.

They (SCWA) have also recently tested some water bottled in October 2001 by Ken Tuthill under the label Pine Barrens Pure. It was found the same as the 2007 source water in every respect except for the presence of five plasticizers due to leaching.

Chester Mountain Water in Deer Park delivers bottled water to office buildings on LI. While household water lines can be flushed in a few minutes, non-residential settings in large buildings may be difficult to flush so that bottled water may be better.

10. There was discussion of chromoglass denitrification plants in conjunction with comments concerning the status of Suffolk County's Comprehensive Water Management Plan. It seem unlikely that there can be downgrading of allowable densities to allow high density (work force), affordable housing without sewerage; all areas of the US seem to require sewerage at densities lower than those on Long Island. Denitrification plants built in the 80's and 90's were probably over designed ; designed for high flows they do not operate efficiently at the (actual) low flows going into them. They fail because they are not maintained by private owners rather than because of flaws in the technology. There was some discussion of the county possibly taking over their operation.
11. Cynthia Barnes (President of the Three Village Community Trust and a board member of the Civic Association of the Setaukets and Stony Brook) is having samples from the artesian spring at West Meadow Beach tested. Residents often fill up water bottles there but its quality is unknown. The same is true for the spring near the shore at Cold Spring Harbor.
12. Pump-and-treat operations continue at Brookhaven with more wells in operation.
13. Teng-Fong Wong will be presenting a public lecture at Stony Brook (Friday, 26 September, 2008 at 7:30 in ESS 011, Geosciences Department) titled Salt-Water Intrusion and Submarine Groundwater Discharge in Long Island. This is part of the Geology Department "Open-House" lecture series.
14. The Pine Barrens Research Forum will be held on Thursday, 2 October with field trips on 3 October. The agenda has been mailed. There is little attention to ground-water this year.
15. I was invited to give a presentation on emerging contaminants at the Cornell Program on Breast Cancer and Environmental Risk Factors to be held at Stony Brook on 3 November. Bruce Brownawell will be helping me put this together and I would appreciate the Council's advice also. The invitation came on the heels of the API news stories of pharmaceuticals in public water supply. The principal messages are (a) the low levels of detection, (b) the occurrence in surface water supplies not groundwater supplies and (c) lack of evidence of risks to the public. SCWA has the equipment now to test the PPCPs in public supply, but no results are available.
16. We will participate in an "environmental fair" at the Melville Library with the educational models and literature on LI groundwater (10 November). The "Groundwater University" was not run this year; Camp Seawolf was cancelled because Cornell Coop Extension did not renew our lease at Peconic Dunes. We hope to continue the program next summer at a Boy Scout camp.

17. The EPA has funded the USGS to help with the updating of the hydrogeologic atlas. Monitoring wells in the region are being reassessed and will be added to the hydrogeologic atlas. The USGS is also intending to publish depth-to-groundwater maps rather than just elevation of the water table. The Hauppauge EPA superfund site is going to ROD.
18. In discussion, it was suggested that a student might consider the carbon footprint of remediation projects. Remediation at a site in Montrose, for example, has 20 wells pumping four gallons per minute. It might be interesting to include the energy demands in the bigger picture of environmental costs.
19. The next meeting is **Monday, October 20** at the offices of Dvirka and Bartilucci (Woodbury) from 9:30 – 11 AM.

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