MEMORANDUM

To: Groundwater Advisory Council
From: H. Bokuniewicz
Re: Minutes of the meeting of 15 June 2009
Date: June 16, 2009

PRESENT	**REGRETS**
R. Alvey	M. Alarcon
N. Bartilucci	S. Jones
H. Bokuniewicz	L. Koppelman
S. Colabufo	R. Liebe
D. Engelhardt	R. Mazza
D. Reardon	M. Nofi
K. Roberts	D. Paquette
W. Spitz	A. Rapiejko
K. Willis	S. Terracciano

1. Minutes from the meeting of 11 May had been distributed and were also available at this meeting. There were no comments.

2. The nitrogen research was briefly reviewed. There are two projects. One is a long-term project to monitor nitrogen levels under turf-grass and the other is a project to quantify denitrification in LI aquifers. The monitoring of nitrogen leaching for turf grass began in 2001. Lysimeters are used to collect samples from below the root zone for nitrate analyses. Long-term studies are needed both because of annual variability and because of aging of the turf-grass. Measurements were started at Oakdale, and then expanded to sites in Stony Brook, Hauppauge, Huntington and East Hampton. Later on, the East Hampton site was discontinued but each of the remaining sites was divided into a section receiving chemical fertilizer and a section receiving organic fertilizer. Nitrate levels under the organically fertilized sites tend to be marginally lower than under the chemically fertilized sites and the highest individual levels in 2008 were under the chemically fertilized site in Hauppauge (80 ppm). Timing of fertilizer applications seemed to be as important than the type used and, at this stage, we seem to be seeing impacts due to aging of the turf. Three lysimeters are not functioning and, in response, we will reduce the number of sites monitored to three. These will be Hauppauge, Stony Brook and Oakdale.

   There was some evidence of denitrification in the vadose zone. Conventional wisdom is that about half of the nitrogen source at the ground surface is lost in the vadose zone before it reaches the water table. Caitlin Young, a PhD student at Stony Brook, is studying denitrification. Preliminary results are that the 50% loss of nitrate in the vadose zone is not due to denitrification at Northport and near the Forge River, but denitrification is important under conditions at Fire Island. At other locations, absorption

of ammonium onto the aquifer material may be responsible for the decrease in nitrate levels above the water table.

3. The DEC is documenting the occurrence of pesticides in the groundwater beneath particular farmland in Suffolk County. High levels of nitrogen were also found in soil samples**.** Reports of this situation at other sites would be helpful.

4. Deb Engelhardt and Dave Reardon attended to join a discussion of geothermal systems. Both are with Miller Environmental and Deb is also a graduate student in SBU's Hydrogeology Program working on geothermal systems for her research project.

   Geothermal systems are not a new concept; what may be new on LI, however, is the installation of many, small systems in individual homes. Under the Economic Stimulus Package, geothermal systems can garner a 30% tax credit. This has raised interest in such systems significantly.

   Current DEC regulations require a permit from the Division of Mineral Resources if wells are over 500 feet deep, and the L.I. Well Authority requires a permit if pumpage is over 45 gpm which discourages open loop systems. There maybe some question whether geothermal systems are "water wells" under the same regulations. A geothermal system, open or closed, for a 3,000 square-foot house might require 3 to 5 tons of cooling capacity at 1.5 to 3 gpm per ton; of course, they are often designed to stay under the 45-gpm limit so that a permit isn't required.

   After a short moratorium, geothermal systems, both open-and-closed-loops, were recently banned in Shelter Island. There seemed to be no mechanism to regulate them. Even if a matrix of relevant parameters was established, for example, to document clay layers salt-water intrusion, etc., the local managers might not have the capability to process such information. In discussion, it was unclear whether or not the Town had the legal authority to impose such a ban unless so designated, somehow, from a higher authority. However, similar regulations have been imposed by other communities and it may have to be resolved in court, if it comes to that. In general, however, reluctance to allow geothermal systems may just be a "fear of the unknown". It's easier to merely deny new requests than to resolve all concerns. It seems that some rules governing proper sites investigation would be helpful.

   One of the technical issues is the penetration of clay layers. There apparently is a history on LI of contaminant plumes being drawn into the aquifer by older systems. There are no requirements for grouting. Although grouting is routinely, and successfully, used for supply wells, the bentonite grout for geothermal systems has a different composition in order to control its thermal properties. There is concern that it may not form an adequate seal to prevent contaminant leakage through punctured confining layers. The DEC guidance is that water taken from the aquifer should be returned to the same part of the aquifer. When a permit is required this is often a permit condition, but it would seem to be good management practice in general.

   The DEC, of course, might extend their existing regulations but regulation also could be written into the Building and plumbing code or other professional groups, such as the Building and Plumbing Association might develop guidelines, or regulations incorporated into the sanitary code. People interested in such systems generally turn to the HVAC industry who, in turn, approaches well drillers.

Closed loop systems are subject to leakage. Fifteen percent propylene glycol is often added to the recirculating water because the heat exchangers are efficient enough to freeze the system without antifreeze. At one EPA Site (Hilton Ave.) freon contamination in a public supply well most likely came from a leaking AC system, although not a geothermal system. There are "direct exchange" systems being marketed. In these systems, the copper loops from the AC are run directly into the ground to recalculate refrigerant. The danger of leakage is an issue and direct exchange systems have been banned in Westchester and elsewhere.

Even in closed loop system thermal contamination is a concern, although it may not be significant problem. The impacts of set-backs and cumulative impacts from multiple systems should be considered. There seems to have been one case, for example, where school district's injection well was too near a neighbor's private well, causing the neighbor's water to come out of the tap hot. Thermal convection set-up in the aquifer could initiate, or alter the path of, contaminant plumes; changes in the groundwater temperature might alter contaminant solubility or dissolved oxygen level; discharges into surface water could alter the temperature of surface-water habitats. There seems to be little evidence to decide whether or not any of these could pose serious problems.

Closed-loop systems may be economical for small (2 to 3 tons) systems but two or three times more expensive than open-loop system for bigger tonnage. Open-loop systems will have fouling problems and, therefore, higher maintenance costs. In large systems, redundancy can be built in so that maintenance can be done on part of the system without shutting down completely but this is unlikely to be the case in small systems where one injection well serves one supply well. When private systems become clogged, the owner at least incurs additional costs and may find it easier to abandon it or, worse, by-pass the system.

On the east end of LI, systems are usually only used in the summer for cooling, but temperature impacts might be mitigated in locations where the groundwater is used both as a heat source and as a heat sink during the year, reversing the cycle from winter to summer. Efficient design may, in fact, also mitigate potential impacts. For closed-loop systems, for example, it may be more appropriate in particular situations to use many, shallow (50-feet) loops rather than a few deep (400-500-foot) loops on a property. Anecdotally, however, "unscrupulous" installations seem to be a problem, such as systems where the public water supply is used as source water for the geothermal system. Installations large enough to affect public supply wells (over 500 gpm) would require permits and review. In addition, there's a concern about the lack of adequate backflow prevention in these systems.

Modifying DEC regulations at this stage may have a chilling effect on the use of geothermal systems and might result in the banning of open-loop systems all together. There may be some benefit to an education program to include not only previous work on impacts but also economics (Is there a real advantage to open-loop systems on Long island?). The Heating and Ventilation Association might be willing to sponsor an event aimed at getting information out to a broader audience, like architecture and design firms.

Deb's thesis is intended to critically examine the issue of thermal contamination which is perceived an issue for both open and closed systems.

5. The Water Reuse report seems to be stalled in the Executive Offices of the DEC. This seemed like a very useful report and we should encourage it to be made available (before it becomes too dated). Water reuse may not be critical on Long Island but has been part of discussions for contaminant reduction and energy conservation.

6. The "Consolidation Legislation" (S. 5661 and A. 8501) is apparently on the Governor's desk for signature. It would allow a petition by 10% of the districts' population to call a referendum on eliminating special districts. Presumably, if a water district was eliminated, towns, private water companies, or adjacent water supply corporations would take over operations.

7. We will not meet over the summer, but will resume at the end of September, 2009. I'll send out a schedule as soon as my academic schedule is set.

HB/ed
GWminutesjune09.doc