MEMORANDUM

To: Groundwater Advisory Council
From: H. Bokuniewicz
Re: Minutes of the Meeting of 15 November, 2004
Date: November 30, 2004

PRESENT	**REGRETS**
M. Alarcon	S. Jones
N. Bartilucci	L. Koppelman
H. Bokuniewicz	R. Liebe
J. Milazzo	R. Mazza
J. Munster	B. Nemickas
S. Robbins	D. Paquette
K. Roberts	G. Proios
W. Spitz	K. Willis

1. The minutes of the meeting of October were distributed.

2. J. Munster discussed the study of lawn maintenance. Data was available between January 2003 and August 2004. Lysimeters had been placed below the turf grass root zone at nine sites on Long Island. The sites varied in terms of the fertilizer applied, amount used, precipitation, infiltration rate, age of the turf grass, thatch thickness, soil type and other parameters. It was found that infiltrate rate had the greatest influence on the concentration of nitrate leaching below the root zone. East Hampton had the lowest infiltration wile the site at Huntington had the highest.

   The concentration of leached nitrate also depended on the age of the turf. Concentration increased with age until a plateau was reached when the turf was 25 or 30 years old. Our oldest site was 40 years old. Keeping a lawn young (i.e. reseeding every 5 or 10 years) would reduce leaching. Leaching of nitrate decreased with thatch thickness; the more thatch the less leaching.

   In 2003, lawn receiving chemical fertilizer showed an increase in nitrate concentrations in the autumn due to increased precipitation and the end of the growing season. Sites receiving organic fertilizer showed higher concentrations, i.e. more leaching, than the chemically treated sites. In 2004, however, the chemically treated sites showed higher concentrations, perhaps because no fertilizer was applied at the organic site where compost was used instead.

   A USGS model was applied to calculate the fraction of applied nitrogen leached for both the organically and chemically treated sites. At the organic sites, less nitrogen was applied but a greater percentage, more than 50%, was leached resulting in higher concentrations at depth. In one case more than 80% was leached. At the chemically treated sites, more nitrogen was applied but only 10 to 14% leached. The fraction

leached appeared to be a function of the age of the turf with older sites leaching more nitrate. Older sites can't store as much nitrate so more will leach to below the root zone. There was less leaching in well-thatched sites (but the quality of the grass appeared lower). It was noted that at these sites, that the distribution of lawn vegetation was patchy; this might mean that the infiltration and leaching was unevenly distributed also.

During this study, major ions were also studied in an attempt to fingerprint nitrate sources. Under vacant land, nitrates were supplied by rain alone as expected. Residential land still had between 50 and 90% of its nitrate supplied by rainfall depending on whether it was high or low density development, respectively.

Jennie is defending her master's thesis this week (Marty Petrovic at Cornell is one of her readers) and will continue on for her Ph.D. research which will include an assessment of boron isotopic tracers. Another student hopes to continue to use the lysimeter samples to study nitrate and perchlorate.

3. A preliminary assessment was done to examine the seepage of groundwater into Long Island Sound. In 2002, an international experiment was conducted on Shelter Island to explore ways to measure the seepage of groundwater and associated pollutants into coastal waters. Two classes of methodologies were applied, (a) the use of geochemical tracers and (b) the use of chambers embedded into the sea floor to collect seepage directly. Direct measurements have been made at eleven sites on Long island's south shore including two on Fire Island. Geochemical tracers have been applied at Shelter Island, and, most recently in Jamaica Bay. No measurements, however, have previously been done in the Sound.

The assessment in Long Island Sound was prompted by recent developments involving the Long Island Sound Study and Management Plan. The Plan calls for no net increase of nitrogen releases to the Sound. One of the ways that sewage treatment plants may limit discharges to the Sound would be by recharge of some, or all, of their effluent to groundwater instead. Recharged water, however, may still reach the Sound via submarine groundwater discharge especially if the recharge is close to the shoreline. Dilution, and to some extent, denitrification would reduce the threat from more distance sources.

The denitrification studies, briefly discussed at the last meeting, are relevant to this issue, as is the volume of submarine seepage. The seepage was assessed using radium isotopes. Radium is a naturally occurring, radioactive element. Radium is elevated in groundwater, being continually supplied by rock fragments in the aquifer material. The amount of groundwater discharged into the Sound can therefore be estimated from measurements of excess radium in the open water. Measurements of radium concentration in Long Island Sound were interpreted to correspond to a groundwater input of 3×10^{13} liters/year. The total freshwater input is about 10^{14} liters/year, so the groundwater discharge may be 30% of the freshwater input, however not all of the submarine groundwater discharge is fresh groundwater. Much, if not most is recirculated seawater.

Based on the water budget for Long Island, we estimate that 3×10^{11} liters per year of freshwater might be entering the Sound under the shoreline. This is equivalent to the discharge of the North River Sewage Treatment Plant, one of the largest in the world,

on the Hudson River in New York City. The distribution of submarine groundwater discharge along the north shore of Long Island would not be uniform. East of Port Jefferson, where the shoreline consist of series of necks and bays, groundwater input is expected to be concentrated into the harbors.

We would like to follow up this work with more detailed tracer measurements in the harbors as compared to the straighter shoreline of eastern Long island. Direct measurements using vented chambers embedded into the Sound floor should also be made.

4. A conference is to be held at Dowling College (Eco-summit Long Island, November 23) on a broad range of ecological issues including groundwater. I am scheduled to speak on "Contamination of groundwater by chemical contaminants: the unseen menace?" (their title choice, not mine). It was suggested that I point out that (a)"unseen" does not mean "undetected"; we monitor conditions closely and implement remediation and (b) not all contaminants are a "menace". This could be used as an opportunity to encourage good stewardship by pointing out the range of potential contaminants, especially household chemicals, and introducing the emerging issues involving personal care products and pharmaceutical.

5. I'd like to set up a workshop to review the baseline data used in groundwater models on Long Island. Subsequent to our discussion, I'd like to try:

   Monday May 23
   All day, here at Stony Brook

   I'd invite the Advisory Council or their designee of course, as well as

   Paul Misut (and others from USGS)
   Danny O'Rourke (CDM)
   Dennis Kelleher (H2M Group)
   Who else?

   We'd like to (a) track down some successful applications (b) look at data needs and and (c) consider the best way to improving the situation.

6. The county is moving ahead on several applications for Brownfield restoration. Industrial owners have apparently been submitting Brownfield work plans to the DEC (in Albany?). The Suffolk County Health Department expects to review these plans but it seems that arrangements have not yet been made. We will try to clarify how these reviews will be coordinated. As it stands, the state is committed to doing any offsite groundwater remediation (unless the plan's sponsor is also the original owner).

7. The Comprehensive Management Plans for Suffolk is slated to start on 1 January if the contracting can stay on schedule.

8. The next meeting will be at Stony Brook on Monday 20 December 9:30 to 11:00 AM.

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