MEMORANDUM

To:	Groundwater Advisory Council
From:	H. Bokuniewicz
Re:	Minutes of the meeting of April 7, 2014
Date:	April 16, 2014

PRESENT	**REGRETS**
R. Alvey	M. Alarcon
N. Bartilucci	R. Liebe
H. Bokuniewicz	R. Mazza
S. Colabufo	M. Nofi
C. Gallagher	A. Rapiejko
P. Granger	K. Roberts
D. Paquette	K. Willis
J. Pilewski	
M. Scorca	
S. Terracciano	

1. Minutes from the last meeting were distributed. There were no comments at this time.

2. LICAP (Long Island Commission in Aquifer Protection) held their "kick-off" meeting on March 27, 2014. Meetings will be scheduled quarterly, but dates have not been chosen yet.

3. The annual meeting of the Long Island Geologists run by Dr. Gil Hanson at Stony Brook University will be (was) held this Saturday (12 April). The agenda and abstracts are on the web site < http://pbisotopes.ess.sunysb.edu/lig/>.

4. Doug Paquette reviewed the status of groundwater remediation at Brookhaven National Laboratory (BNL). Seventeen remediation systems had been installed since 1996. The systems were positioned near source areas in the center of the BNL site, along the southern boundary of BNL to prevent further off-site migration, and in several offsite areas. Ten of the systems are still operating full time**,** four were recently shut down after having met the established clean-up goals (now in a monitoring only phase, and can be reactivated if concentrations rebound), and three other systems have been fully decommissioned. Most of the VOC treatment systems have a cleanup goal of 50 μg/L (total VOCs). Once the plumes have been actively remediated below 50 μ g/L, there is a period of Monitored Natural Attenuation. Monitoring is used to verify that natural attenuation will reduce contaminant concentrations to less than the typical drinking water standard of 5μg/L. One of the off-site plumes consists of the pesticide Ethylene Dibromide that had been used on an old agricultural field on the BNL grounds that is now occupied by the Long Island Solar farm. This compound has a cleanup standard of 0.05 μg/L.

Between 1996 and 2012, twenty three billion gallons have been treated, and 6950 lbs of VOC's have been removed.

In 2011, a plume of Freon-11 was discovered. Freon-11 has a high vapor pressure and can be easily removed by air stripping. Initial concentrations were as high as 38,000 μ g/L, and successfully reduced over the past two years to below 100 μ g/L. (The standard is 5 μ g/L.) As part of the planning process, BNL had to ensure that the planned release of Freon-11 (an Ozone Depleting Substance) to the atmosphere met the NYS air standards. With the observed reductions in Freon-11 concentrations in the groundwater, the plan is to go to "pulse-pumping" this summer (2014).

The High Flux Beam Reactor tritium plume was discovered in 1997. The leading edge of the plume was intercepted and recharged to a basin up-gradient to allow the tritium to degrade naturally on site via dispersion and radioactive decay. Except for occasional detection of tritium near the HFBR source area, most tritium concentrations are now less than the 20,000 pCi/L drinking water standard. It was also noted that there are also several low level tritium plumes associated with the accelerator facilities. The co-occurrence of tritium and Na-22 indicate that the source is activated soil shielding. Engineered controls are in place to prevent rainwater from leaching the tritium and Na-22 from the soils and into the groundwater. Twenty-seven micro curries of Sr-90 have been removed. (Sr -90 can be removed by ion exchange.) Groundwater treatment systems are currently remediating Sr-90 contamination at the former Brookhaven Research Reactor Area, former Waste Concentration Facility and the former Chemical Holes burial area. At the former Chemical Holes area, detections in 2005 were at 4,720 pci/L but are now (2013) at levels below 63 pCi/L. BNL might be able to shut the system down in 2015.

USEPA, NYSDEC and the SCDHS have oversight of the BNL remediation. Rob Alvey noted that he is the EPA hydrogeologist that oversees the BNL remediation work, and he favorably views BNL proactive approach and success. Plumes have substantially diminished in size between 1997 and 2012. One of the "lessons learned" during the remediation effort has been to balance withdrawals and recharge across the site. In 1997, water conservation measures reduced the demand from on-site supply wells and there was reduced cooling water recharge in several areas. The resulting change in hydraulic gradients shifted the HFBR tritium plumes away from a number of the monitoring well installed to track the plume. BNL carefully monitors water withdrawals and recharge to maintain steady groundwater flow directions. All VOC clean up in the Upper Glacial Aquifer is scheduled to be complete by 2030. However, remediation of Sr-90 in the Upper Glacial and several areas of VOCs in the Magothy will require remediation and monitoring for the next 50 years.

The cost to date for the entire BNL remediation program (including reactor D&D and Peconic River cleanup efforts) has been about $567 million. On-going costs are about $7.5 million/yr, of which about 80% is groundwater treatment, monitoring and maintenance. The BNL Community Advisory Council still holds regular meetings to follow remediation efforts. In March 2014, BNL provided a summary of the cleanup program progress which includes many of the slides in today's presentation: http://www.bnl.gov/community/cac/docs/CAC_03_14_EMProgress.pdf

(As an aside, the 300-foot, red-and-white HFBR stack is scheduled for removal by 2020.)

5. John Masterson (USGS, Northeastern Water Science Center, MA) is leading the USGS's "North Atlantic Coastal Plain" Study. This is one of 14 regional groundwater availability studies being conducted across the country. The NACP study area extends over the connected coastal-plain aquifer from the southern boundary of Pamlico Sound to, and including Long Island. Long Island

was included because it can be demonstrated that Long Island aquifers are hydraulically connected to NJ; withdrawals in NJ impact hydraulic potentials in the Rockaways. A model will be constructed for the entire region to look at the quantity of the resource and its changes over time as well as to forecast the system's response in the future. Over the entire area, the typical situation is, as on LI, that all streams are gaining streams, that are groundwater is discharging into surface water.

A new method is employed to account for recharge and return flow. SWB - A Modified Thornthwaite-Mather Soil-Water –Balance Code for Estimating Groundwater Recharge Soil-Water-Balance (USGS Technical and Methods Report 6-A31) utilize a soil-water approach that allows estimates of recharge based on soil types. A Soil-Water-Balance (SWB) computer code has been developed to calculate spatial and temporal variations in groundwater recharge. The SWB model calculates recharge by use of commonly available geographic information system (GIS) data layers in combination with tabular climatological data. The code is based on a modified Thornthwaite-Mather soil-water-balance approach, with components of the soil-water balance calculated at a daily time step. Recharge calculations are made on a rectangular grid of computational elements that may be easily imported into a regional groundwater-flow model. Recharge estimates calculated by the code may be output as daily, monthly, or annual values. The code uses, available online, water capacity in the upper 50 inches of soil).

Over the entire area, recharge calculated to be 13.9 inches/year; most of LI has a calculated recharge between 18 and 21 inches/yr. More recharge per unit area occurs in undeveloped (eastern) area of the Island. Separate, (program line items in the federal budget fund other) regional studies, such as the Great Lakes Research Initiative, and the Delaware River Study are being incorporated into the NACP Study as appropriate.

6. The University's NYS RISE project is a collaborative effort with NYU to look at a broad range of impacts from SANDY. One of the many tasks is the generation of a report describing problems encountered by LI groundwater suppliers. A draft report was distributed and any advice would be greatly appreciated.

   Redundancy in the supply system provides resiliency. Suppliers are not pumping at peak capacity except at periods of highest demand in the summer. The Jericho District, for example, has 25 wells in place in July but need only 4 in the winter months.

   Back-up generators should be moved out of flood prone areas where possible or elevated. Using natural gas as a fuel source is not an option available at all sites. The goal should be to have a diversity of back-up power sources perhaps including even wind or solar power.

   Risks of back-flow would not seem to be a problem. Backflow preventers are required in Nassau County but not in Suffolk. The systems, however, are under pressure so accidental contamination of back-flow would not be a problem unless pressure is lost.

   Rick Bova and Phil Thompson are in charge of Emergency Management for the SCWA.

   State supported programs might be useful targeting improvements of back-up generators, back-up monitoring programs that are not sensitive to changes in administration.

7. As part of the NYS RISE initiative, we are planning a workshop at SBU to consider EPA Tools for water suppliers to deal with extreme events and climate change. We will be meeting with the EPA at the end of April to help craft the tools and hope to have a workshop on Long Island before

the end of June. The workshop would focus on the immediate post-SANDY experience and how to apply that experience to anticipated future events.

8. Next meeting will be on **Monday, May 5 in Woodbury** and a future meeting is scheduled for Monday, June 9.

HB/ed
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