State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
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TO: Frank Faranca, Site Manager, SRP, Bureau of Case Management

John Boyer, Technical Coordinator, SRP, Bureau of Environmental Evaluation and Risk Assessment

FROM: Gary A. Buchanan, Ph.D., Chief, Bureau of Natural Resources Science

SUBJECT: BIOACCUMULATION-BASED SEDIMENT QUALITY VALUE FOR ACID BROOK DELTA AND POMPTON LAKE, DRAFT, DELIBERATIVE MATERIAL

DATE: December 29, 2008

Please see attached concerning the calculation of a bioaccumulation-based sediment quality value (BSQV) for the mercury-contaminated sediments in Pompton Lake (Acid Brook Delta). This value was developed by Dr. Ed Demarest (BEERA, retired August 2008), Dr. Keith Cooper (Rutgers University) and me during a series of meeting in 2008. The BSQV calculation was patterned after the value developed for mercury contaminated sediments at Onondaga Lake in New York under the direction and oversight of the New York State Department of Environmental Conservation and Region 2 of the U.S. Environmental Protection Agency.

Specifically, this value was based on the following data and assumptions:

- Average surficial mercury sediment concentrations as reported by DuPont in various reports.
- Average mercury concentrations in small and large fish from the contaminated portion of Pompton Lake.
- Biota Sediment Accumulation Factors (BSAFs) calculated from the sediment and fish mercury data.
- Target tissue concentrations for mercury based on lowest-observed-adverse-effect-level (LOAEL) for piscivorous wildlife.
- Dietary contributions of small and large fish to the diet of the piscivorous wildlife.

A BSQV of 1.0 mg/kg dry weight of mercury was calculated and is the recommended mercury sediment concentration to be protective of all piscivorous wildlife receptors that use Pompton Lake. Additional detail is provided in subsequent pages.

Average Sediment Mercury Concentrations: The calculations were based on two average surficial sediment mercury concentrations 1) area outside the delta (not including areas to the north or channel to the south) with a concentration of 9.2 mg/kg dry wt from DuPont (2008); and 2) area outside the delta and including the channel area to the south (6.1 mg/kg dry wt). The latter value was calculated from a weighted average of sediment data from these areas (DuPont, 2008). We note that the average surficial mercury concentration for the reference end of the lake was 0.3 mg/kg, with the highest value observed only 0.4 mg/kg.

Average Fish Mercury Concentrations: Mercury concentrations in whole fish were used from the delta area (Exponent, 1999). Small fish (total length up to 21 cm) consisted of 12 composite samples including bluegill, largemouth bass, black crappie, white perch, pumpkinseed and golden shiner, whereas large fish (>21 cm) consisted of 9 samples of largemouth bass, yellow perch, white perch, golden shiner and black crappie.

Biota Sediment Accumulation Factors (BSAFs): These values were calculated on a dry weight basis for each area and size of fish based on the average fish concentration divided by the average sediment concentration. Resulting values are detailed on the attached sheet.

Target tissue concentrations: The no-observed-adverse-effect-level (NOAEL) and the low-observed-adverse-effect-level (LOAEL) for methylmercury that were developed for Onondaga Lake avian and mammalian receptors were utilized for target tissue concentrations in (whole) prey fish (Exponent, 2004; Parsons, 2004). These values were used to calculate target sediment concentrations (BSQVs). However, the use of the LOAEL-based BSQV value is recommended since NOAEL values are often affected by dose selection (see Dr. Cooper letter, attached).

Dietary contributions: The diet of the five wildlife receptors used those values developed for Onondaga Lake (Parsons, 2004). Each receptor was conservatively assumed to consume 100 percent fish with varying portions of small and large fish. The dietary contribution is detailed in the attached sheet.

These calculations and assumptions have been reviewed by Dr. Keith Cooper and he concurs with their appropriateness. As indicated by Dr. Cooper, the similarities between calculated Pompton Lake and Onondaga Lake BSAFs based on data unique to each lake, "lends further support to utilizing this approach". The letter detailing his review and comments is attached.

Please feel free to contact me with any questions (3-8457).

References:

The following references and data were used in the development of the BSQV.

Corporate Remediation Group. 2006. Acid Brook Delta Draft Remedial Action Proposal, Appendices, DuPont Pompton Lakes Works, Pompton Lakes, NJ. DuPont and URS Diamond, Wilmington, DE.

Corporate Remediation Group. 2008. Revised Acid Brook Delta Remedial Investigation Report, DuPont Pompton Lakes Works, Pompton Lakes, NJ. DuPont and URS Diamond, Wilmington, DE.

Exponent. 1999. Acid Brook Delta Ecological Investigation Phase 2 Report. Prepared for DuPont Pompton Lakes Works, Pompton Lakes, NJ by Exponent, Bellevue, WA and The Academy of Natural Sciences, Philadelphia, PA.

Exponent. 2004. Onondaga Lake Feasibility Study, Appendix G: Technical Basis for Preliminary Remediation Goals for Fish Tissue in Onondaga Lake. Prepared for Honeywell.

Parsons. 2004. Onondaga Lake Feasibility Study, Prepared for Honeywell, Morristown, NJ by Parsons, Liverpool, NY in association with Anchor Environmental, Seattle, WA and Exponent, Albany, NY.

TAMS Consultants. 2002. Onondaga Lake Baseline Ecological Risk Assessment. Prepared for NYSDEC, Albany, NY by TAMS Consultants, Inc., NY, NY and YEC, Inc, Valley Cottage, NY.

c: Dr. Eileen Murphy, Director, DSRT
   Dr. Keith Cooper, Rutgers Univ.
   Steve Byrnes, SRP

Attachments