United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Reston, Virginia 20192

In Reply Refer To:
Mail Stop 150

JUL 20 2012

Lisa C. Goodheart, Esq.
Sugarman, Rogers, Barshak & Cohen, P.C.
101 Merrimac Street
Boston, MA 02114
617.227.3030 (tel)
617.523.4001 (fax)
goodheart@srbc.com

Dear Ms. Goodheart:

The U.S. Geological Survey (USGS) received your letter dated March 30, 2012 on behalf of Sugarman, Rogers, Barshak & Cohen (SRBC), regarding an "Information Quality Act Request for Correction of Information" about USGS Scientific Investigations Report 2011–5004, titled "Concentrations, Loads, and Sources of Polychlorinated Biphenyls, Neponset River and Neponset River Estuary, Eastern Massachusetts" (http://pubs.usgs.gov/sir/2011/5004/).

In reply to your request, a team of USGS scientists has evaluated and responded to each of the SRBC points of complaint (refer to the 8-page Attachment) regarding Scientific Investigations Report 2011–5004. I have reviewed the responses and find them to be comprehensive and satisfactory in relation to Information Quality Act requirements. Where appropriate, the authors will make changes as indicated in the Attachment.

Following the USGS procedures for revision notices, the online publication (Scientific Investigations Report at http://pubs.usgs.gov/sir/2011/5004) will be modified to reflect any changes made. A note will be made on the right side of the Web page that indicates a date of revision and a Web link will take the user to an Errata sheet which details any revisions made to the original publication. Under this text line will be the date the original publication was first posted. We will contact you when these procedures have been completed.

Thank you for your interest in this important topic.

Sincerely,

William H. Werkheiser
Associate Director for Water

Attachment

Attachment: USGS Response to SRBC IQA Request for Correction

(http://ma.water.usgs.gov/publications/Neponset/SRBC_IQA_Request%20for%20Correction033012.pdf)

Response to General Comments:

A primary purpose of the subject report is to assess the occurrence, distribution, and possible source areas contributing to the widespread occurrence of polychlorinated biphenyls (PCBs) in the Lower Neponset River. The Lower Neponset River is defined here as from Paul's Bridge to the Walter Baker Dam.

In response to general questions regarding sources: As stated in the introduction (and throughout the subject report, such as on pages 8 and 9), the Neponset River drainage basin has had a long history of urban and industrial land uses during which time chemicals, including PCBs, associated with urbanization and industrialization have discharged to the river. These urban and industrial chemicals, including PCBs, are associated with any number of possible sources, such as, for example, a PCB Superfund Site, numerous waste disposal sites, urban runoff, sanitary sewer discharges, atmospheric deposition, and inadvertent spills. Some of these potential PCB source areas were in operation prior to major storms, and the 1955 hurricanes in particular, which likely flushed contaminated-laden sediment downstream through the Neponset River Watershed. The report acknowledges, such as on page 9, that additional sources of PCBs in the Neponset River Basin are likely given the history of industrialization in the Basin.

The final conclusions, however, based on data collected in this study, confirm widespread PCB contamination in the Lower Neponset River originating in large part from Mother Brook, and, more specifically, from the lower part of Mother Brook (downstream of facility #2, which is located near the confluence with the Neponset River).

In response to general comments on data collected by another agency indicating an oil-like substance in a pipe uncovered during the excavation of Mother Brook: All conclusions presented in the report are based solely on data collected by the USGS and analyzed by a USGS contract laboratory. Other agency data, such as those provided by the Massachusetts Department of Environmental Protection related to the pipe located near facility #3, were not included in the USGS analysis. As indicated in responses to specific comments (#11) and Revision #4, reference to the pipe in the introduction (page 9 of the report) will be deleted.

In response to general comments on facility #3: Identification of "facility #3" as a source of widespread contamination will be revised because we agree that data collected as part of this study did not conclusively demonstrate that PCBs came directly from facility #3. More detailed chemical analysis is needed specifically in the area around facility #3. However, data are consistent with the findings that there are at least two sources of widespread PCB contamination to the Lower Neponset River coming from Mother Brook in the vicinity of facilities #2 and #3. Revisions will be made that define the PCB source area in the lower part of Mother Brook near facility #2 and along the banks of Mother Brook near Hyde Park Avenue. Specific references to facility #3 as a PCB source will be deleted from the report. (See Comment #9 and Revision #9).

Responses to Specific Comments:

Comment 1: The report defines background concentrations for constituents other than PCBs, including PAHs, pesticides, and metals through reference to Breault and others (2002) cited on page 22. PCB concentrations in this report are never compared to, or placed in the context of, a defined "background" concentration. However, PCBs are man-made organic compounds and do not occur naturally, as explained on page 12. Although not explicitly referred to or used in this study for comparison to measured concentrations, background for PCBs would therefore be considered zero.

In response to concerns about "concluding that PCBs pose a greater threat than pesticides....": This report does not include any comparisons or statements about possible risks or threats imposed by individual compounds. Factual statements are made in the abstract on concentrations of PCBs relative to the U.S. Environmental Protection Agency (USEPA) freshwater continuous chronic criterion for aquatic organisms and guidelines for safe consumption of fish. A statement is also made regarding concentrations of other elements and USEPA guidelines.

It is worth noting that the primary objective of this report is to assess the occurrence, distribution, and possible sources of PCBs, with the expected outcome that knowledge of existing concentrations and distribution patterns, as well as location of persistence PCB source areas, may guide river-restoration strategies (page 6 in Purpose and Scope). However, as noted on page 22, because urban rivers like the Neponset are commonly contaminated with anthropogenic organic compounds, trace metals, and other elements, river-restoration strategies can benefit from data on those constituents also. Bottom-sediment samples collected as part of this study for PCBs were, therefore, analyzed for 31 additional constituents. The goal of the additional analysis was *not* to do a comprehensive comparative analysis of all organic compounds and metals in Neponset River and estuary but rather to enlarge a data set collected by USGS in early 2000s by Breault and others (2004a) (explained on page 22 of this report).

Comment 2: In response to questions on the release of PCBs after the flood and subsequent rebuilding of dams: Ratios of unweathered PCB congeners (or unresolved congener groups) in bottom-sediment samples collected from behind the dams rebuilt after 1955 are similar to those measured in bottom-sediment samples collected in the lower part of Mother Brook, which suggests that contamination most likely continued in the time between the destruction and reconstruction of the dams (fig. 21, page 44).

PCB assemblages (or PCB fingerprints) originating from the lower part of Mother Brook also are similar to those found in bottom sediment deposited prior to the destruction of the Jenkins Dam (1955). Cluster analysis shows that PCB fingerprints from a bottom-sediment sample collected near facility #2 and from a bottom-sediment core collected from midchannel islands in the part of the Neponset River known as the "Braided Channel" are similar (fig. 19, page 39). As stated on page 6, "*This area [the Braided Channel] was once impounded by the Jenkins Dam, which was destroyed by flooding caused by two successive hurricanes (Connie and Diane) that hit the Northeast on August 3–13 and August 10–19, 1955, respectively (Dunn and others, 1955). Other dams along the Neponset River were also destroyed by the floods. Although the Jenkins Dam was never rebuilt, some of the sediment deposits that accumulated behind the dam remain. Since*

1955, the river has incised itself into these sediments, creating a landform called an anabranched channel that can be described as a meandering gravel-bed river with mid-channel islands." These sediments have been sub-aerial since the destruction of the dam as evidenced by aerial photographs taken prior to and just after the destruction of the Jenkins Dam by Hurricanes Diane and Connie in 1955.

The Abstract states that "*In 1955, catastrophic dam failure caused by flooding likely released PCB-contaminated sediment downstream into the Neponset River.*" PCB-contaminated sediments, regardless of their origin, were likely transported downstream.

Comment 3: The Charles River watershed upstream of the confluence with Mother Book is in mostly forested or single family residential land use. Two impoundments separate the Upper Charles River from lower parts of Mother Brook. These impoundments were tested as part of this study (fig. 2, page 4; Table 3, page 15). Findings showed low concentrations of PCBs and a different PCB fingerprint than that found in the lower part of Mother Brook and the Lower Neponset River. Elevated PCB concentrations found in samples collected in the Charles River as reported by Weiskel (2007) were associated with the Lower Charles River *below* the confluence with Mother Brook and in a more urbanized portion of the watershed. The findings are therefore not comparable (or relevant) to concentrations that would be expected from the overflow into Mother Brook.

Comment 4: As stated in the introduction (and throughout the subject report), the Neponset River drainage basin has had a long history of urban and industrial land uses during which time chemicals, including PCBs, associated with urbanization and industrialization have discharged to the river. These urban and industrial chemicals, including PCBs, are associated with any number of possible sources, such as, for example, a PCB Superfund Site, numerous waste disposal sites, urban runoff, sanitary sewer discharges, atmospheric deposition, and inadvertent spills. Some of these potential PCB source areas were in operation prior to major storms, and the 1955 hurricanes in particular, which likely flushed contaminated-laden sediment downstream through the Neponset River Watershed. These sources are included in the report, along with dates of operation for specific facilities (such as on pages 8 and 9). More specifically, the report discusses (on page 8) the Norwood PCB Superfund Site located on Meadow Brook. PCBs from this site have contaminated Meadow Brook, a tributary to the Neponset River. Other potential source areas include facility#2, facility #3, a chemical transfer station, a paper-recycling facility, storm drain, and street dirt (pages 8 and 9). Finally, the reader is informed (page 9) that *"Additional sources of PCBs in the Neponset River Basin are likely given the history of industrialization in the basin."* The final conclusions, however, based on data collected in this study confirm widespread PCB contamination in the Lower Neponset River originating in large part from Mother Brook, and, more specifically, from the lower part of Mother Brook (downstream of facility #2, which is located near the confluence with the Neponset River).

The report also discusses uncertainties and challenges with interpreting PCB data in an urban setting like the Lower Neponset River (such as on page 31, first paragraph in the right column). Appendix 3 is included in the report to provide a detailed discussion of measures taken to ensure data quality and to reduce uncertainties.

Comment 5: The study design was intended in part to evaluate the occurrence and distribution of PCBs by placing equal emphases on sampling locations at regular intervals in the mainstem of the Lower Neponset River, tributary streams, and the Neponset River Estuary. Additional samples were collected in association with known PCB sources to evaluate potential sources of PCBs to the Lower Neponset River in particular. Findings showed that the PCB fingerprints from these upstream samples were characterized for the upper boundary of the Lower Neponset River (Paul's Bridge) and just upstream of facility #2 on Mother Brook but these fingerprints were obscured by PCBs coming from the lower part of Mother Brook. Specifically, changes in the relative abundance of detectable PCB-congeners were observed.

Changes in PCB fingerprints measured this way indicate either a new source or a substantial change in the relative abundance of PCB congeners due to dechlorination, degradation, metabolization, volatilization, and/or preferential transport. By comparing the ratios of certain PCB-congener pairs in commercially available Aroclors and environmental samples it can be determined whether or not a new source or weathering is responsible for any observed change in PCB fingerprints (see response to Comment 9 below).

Comment 6: In response to questions on bottom-sediment samples analyzed for 31 constituents in addition to PCBs: The goal of the additional analysis was *not* to do a comprehensive comparative or risk analysis of all organic compounds and metals in Neponset River and estuary but rather to enlarge a data set collected by USGS in early 2000s by Breault and others (2004a) explained on page 22 of the report.

Co-occurrence of PCBs and heavy metals does not infer similar sources or transport by the same waste stream to the river. No data or findings in this report suggest that co-occurrence correlates with causation.

Comment 7: Root Mean Square Difference (RMSD) is a simple statistic that is used as you suggested. A change in the relative abundance (albeit large or small) of a single congener or a group of co-eluting congeners would result in a change in RMSD between sampling locations. This change may indicate the location of either a new source area, weathering, and (or) preferential transport (see response to Comment 5). Further statistical analysis was used in this study to determine the likely cause of observed changes in RMSD. RMSD alone cannot be used to determine a new source area (as indicated on page 34, first paragraph left column and second paragraph in the right column).

Comment 8: PCB fingerprints are unique for Aroclors or mixtures of Aroclors (as opposed to human fingerprints, which are unique for each individual person). Because a limited number of Aroclors (and other commercially mixtures of PCBs) were marketed and sold in the United States, it is possible that PCB fingerprints from two (or more) source areas would be indistinguishable through any statistical and (or) chemical method. This could include, for example, identical PCB mixtures used in manufacturing processes in different facilities and (or) PCBs that were un-weathered or weathered similarly.

Cluster analysis was done to determine if multiple PCB mixtures were (or were not) used in the drainage basin. As stated on page 38, "*Cluster analysis can be used to classify similar samples*

into groups called "clusters," and, perhaps more important, distinguish samples with differing PCB-congener patterns from one another." The fact that some samples clustered separately from others demonstrates that there likely were different PCB mixtures used in the basin and (or) that PCBs in some areas have undergone anaerobic degradation, weathering, and (or) preferential transport (see Comment 9). Conversely, cluster analysis also showed that there likely were some facilities operating in the basin that, in fact, used similar PCB mixtures.

The data are consistent with the hypothesis that facilities which discharged PCB at detectable concentrations were located on the upper Neponset River, tributaries to the upper Neponset River, and (or) within the Charles River Drainage Basin upstream of the confluence with Mother Brook. These facilities apparently employed similar PCB mixtures as part of their day-to-day operations. This conclusion is drawn from the fact that samples collected from these parts of the basin clustered together and because the ratios of un-weathered PCB-congeners (or unresolved congener groups) in environmental samples collected from these areas were similar. Therefore, it is understandable why some samples collected miles apart from different parts of the basin (upstream Neponset River and upstream Mother Brook) cluster together (similar source material and (or) weathering) and why those collected from the Lower Neponset River cluster independently (for example, had a different source material from those in the upstream Neponset River and upstream Mother Brook and (or) from weathering).

Comment 9: One of the primary purposes of the report is to identify possible source areas contributing to the widespread occurrence of polychlorinated biphenyls (PCBs) in the Lower Neponset River. Clusters are therefore linked to primary sampling locations and not chemistry. Renaming clusters based on the primary homolog groups as suggested by SRBC – while not incorrect – would not serve the major objectives of this study.

The cluster analysis used in this study, in conjunction with other statistical techniques (such as those described by Karcher and others (2004) is consistent with the findings that widespread PCB contamination in the Lower Neponset River originated from the downstream part of Mother Brook.

Identification of "facility #3" as a source of widespread contamination will be revised because we agree that data collected as part of this study did not conclusively demonstrate that PCBs came directly from facility #3. More detailed chemical analysis is needed specifically in the area around facility #3. However, data are consistent with the findings that there are at least two sources of widespread PCB contamination to the Lower Neponset River coming from Mother Brook the vicinity of facilities #2 and #3. Revisions will be made that define the PCB source area in the lower part of Mother Brook near facility #2 and along the banks of Mother Brook near Hyde Park Avenue. Specific references to facility #3 as a PCB source will be deleted from the report.

It is correct that weathering of PCBs can confound cluster analysis; however, ratios of un-weathered PCB-congeners in the environment and Aroclor samples in the Lower Neponset River are similar to ratios measured in the lower part of Mother Brook. This explanation of the statistical method used in our study is from Karcher and others (2004) and is cited in the report. "*A statistical method was used to distinguish between PCB congeners affected by processes like*

transformation or preferential transport and congeners unaffected by these factors. This method is based on the fact that some PCB congeners combine to form tracker pairs that maintain a constant concentration ratio in commercial PCB mixtures."

Comment 10: Passive In-situ Chemical Extraction Samplers (PISCES) samplers integrate PCBs from the water column many times over because the solubility of PCBs in hexane is much greater than water. PCBs buried in bottom-sediment will migrate upwards through pore water and into the overlying water column. Specifically, this process favors the migration of lower molecular weight PCB congeners (lower congener numbers) compared to higher molecular weight PCBs because lower molecular weight PCBs are more soluble compared to higher molecular weight PCBs. Lighter molecular weight PCB congeners are detected in the water column downstream of facility #2 and in the vicinity of Hyde Park Avenue. With that said, it is highly unlikely that the original source material is buried at depth in these upstream impoundments. If this was the case, it could be expected that water samples (collected using PISCES samplers) would be enriched in lower molecular weight PCBs upstream of the lower parts of Mother Brook. Bottom-sediment samples support this hypothesis.

Comment 11: Responses are provided to three comments:

First, the reviewer suggests that historical contamination from the Charles River may be buried at depth but was missed because cores were not collected from the impoundments on Mother Brook. PCBs migrate upwards through sediment pore water and into the overlying water column. Lighter molecular weight PCB congeners preferentially transport because they are more soluble than higher molecular weight PCB congeners. In the lower Neponset River, the relative abundance of lower molecular weight PCBs is generally greater than the relative abundance of higher molecular weight PCB congeners. This is true even in areas where anaerobic degradation is presumably not occurring. If the Upper Charles River was the source of historical widespread PCB contamination in the Lower Neponset River, the PISCES sample at Reservation Park and bottom-sediment grab samples from the Mother Brook Impoundments would be enriched in lower molecular weight PCB congeners. Findings did not show such lower molecular weight PCB congeners. These and other data are consistent with the hypothesis that widespread PCB contamination originated from the area near facility #2 and Hyde Park Avenue.

Second: The pipe mentioned in the introduction was not presented as a conduit from facility #3. It was mentioned as an example in a discussion on the numerous potential source areas of urban and industrial chemicals (including PCBs) in the Neponset River Drainage Basin. Data associated with the pipe were not included in any data analysis and, therefore, was not used to formulate or support the hypotheses that a major PCB source area is located in Mother Brook. As indicated in Revision 4, specific reference to the pipe in the introduction (on page 9) will be deleted.

Third: Information on additional sources of PCBs, such as those associated with a former auto salvage yard documented in 2012 reports through the MADEP, was not available at the time of this study. The conclusions presented in this report are based solely on data collected by the USGS and analyzed by a USGS contract laboratory.

Response to Suggested Revisions:

Revision 1: No revision needed. See response to general comments.

Revision 2: No revision needed. See response to Comments 2 and 3.

Revision 3: No revision needed. This is explained on pages 8 and 9 in the report, including reference to the U.S. Environmental Protection Agency (2004) and Shaw Environmental (2004). Specifically, the U.S. Environmental Protection Agency (2004) reported that "*Groundwater PCB concentrations measured in 2002 ranged from 0.05 to 12 µg/L in the vicinity of the Norwood Superfund Site.* Shaw Environmental (2004) reported that "*COCs [chlorinated organic compounds] detected above MCP Method 1 GW-2 standards (used as a basis of comparison) in groundwater samples collected from wells in the ADC [Aluminum Die Cast] Area include 1,1-dichloroethene (1,1-DCE), vinyl chloride, cis-1, 2-DCE and PCBs.*" Tables 4 - 7 in the report by Shaw Environmental (2004) also show detectible concentrations of Aroclors 1242/1016, 1248, and (or) 1254 in soil, sediment (storm drain and catch basin), and groundwater samples from the ADC area collected in 2000 - 2004.

Revision 4: This statement will be revised to the following:

"Additional sources of PCBs in the Neponset River Basin are likely given the history of industrialization in the basin. For example, Allis Chalmers produced oil circuit breakers along the banks of Mother Brook beginning in the 1920. Oil filled circuit breakers older than 1989 may contain PCBs. Other documented sources of PCBs in this area include a former salvage yard (MADEP, 2012a) and Tool and Machine facility (MADEP, 2012b and MADEP, 2012c)."

Revision 5: This statement will be revised to the following:

"RMSDs for adjacent bottom-sediment grab samples collected in 2002 and 2005 from the Neponset River and Mother Brook are shown in figure 17. Substantial PCB-congener-pattern changes observed in the vicinity of facility #2 (3.0; RMSDs for upstream adjacent sample site shown in parentheses) and Hyde Park Avenue (1.3) suggest the location of a major source(s) of PCBs to Mother Brook. Transport of PCBs from this source area on Mother Brook followed by deposition of PCBs in river sediments can be inferred from the low RMSD value calculated for the sample collected in Mother Brook near Hyde Park Avenue and the sample collected in the river just downstream of the confluence (0.5)." Figures and Tables will also be updated to reflect this change.

Revision 6: No revision needed. See responses to Comments 1, 3, 4, 5, and 7.

Revision 7 and 8: No revisions needed. See response to Comment 9.

Revision 9: This statement will be revised to the following:

"Therefore, data indicate that widespread PCB contamination of the downstream parts of Mother Brook, the lower Neponset River, and the Neponset River Estuary originated from

Mother Brook—more specifically, from facility #2 and from near Hyde Park Avenue just downstream of facility #2 on Mother Brook."

Revision 10: No revision needed. The fingerprint data analysis suggest both that (a) *in situ* anaerobic reductive dechlorination is occurring in parts of the Lower Neponset River and (b) that those PCBs likely originated from the lower part of Mother Brook.

Revision 11: No revision needed. See response to Comment 2.

Revision 12: No revision needed. See response to Revision 3 and associated remarks.