UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Mr. D. Lee Currey, Director
Science Services Administration
Maryland Department of the Environment
1800 Washington Blvd., Suite 540
Baltimore, Maryland 21230-1718

JUN 24 2014

Dear Mr. Currey:

The U.S. Environmental Protection Agency (EPA), Region III, has reviewed the report *Water Quality Analysis of Chromium in the Northwest Branch and Bear Creek portions of the Patapsco River Mesohaline Chesapeake Bay Segment, Baltimore City and Baltimore County, Maryland*, which was submitted by the Maryland Department of the Environment (MDE) for final review on August 26, 2013. MDE has identified the Patapsco River Mesohaline (PATMH) Tidal Chesapeake Bay Segment (Integrated Report Assessment Unit: MD-PATMH) on Maryland's 2012 Integrated Report as impaired by nutrients-- nitrogen and phosphorus (1996), sediments -- total suspended solids (1996), and impacts to biological communities (2004). The Baltimore Harbor portion of the PATMH Tidal Chesapeake Bay Segment has been individually identified on the 2012 Integrated Report as impaired by chlordane (1996) and polychlorinated biphenyls (PCBs) (1998). The Middle Branch (Ferry Bar Park to Harbor Hospital Center extending westward) and the Northwest Branch (Hull Street Pier to Canton Waterfront Park) portions of the PATMH Tidal Chesapeake Bay Segment have been individually identified on the 2012 Integrated Report as impaired by trash (2008). The Northwest Branch portion of the PATMH Tidal Chesapeake Bay Segment has been individually identified on the 2012 Integrated Report as impaired by chromium in sediments (1998), lead (Pb) in sediments (1998), zinc (Zn) in sediments (1998) and enterococcus (2010). The Bear Creek portion of the PATMH Tidal Chesapeake Bay Segment has been individually identified on the 2012 Integrated Report as impaired by chromium in sediments (1998), Zn in sediments (1998), and PCBs (1998). The Integrated Report specifies that the chromium impairments in the Northwest Branch and Bear Creek portions of the PATMH Tidal Chesapeake Bay Segment do not support the protection of aquatic life designated use of the waterbodies.

This water quality analysis (WQA) addresses only the 1998 listings for chromium in the sediments of Northwest Branch and Bear Creek. The nutrient listings for the PATMH Tidal Chesapeake Bay Segment and Baltimore Harbor have been addressed through a TMDL approved by EPA on December 17, 2007. The Chesapeake Bay TMDL, which was approved by the EPA on December 29, 2010, has also addressed the nutrient listings for the PATMH Tidal Chesapeake Bay Segment and is currently under reevaluation to determine whether a previously developed TMDL would be superseded by the corresponding Bay TMDL. The sediment listing for the

Printed on 100% recycled/recyclable paper with 100% post-consumer fiber and process chlorine free.
Customer Service Hotline: 1-800-438-2474

PATMH Tidal Chesapeake Bay Segment has also been addressed via the Chesapeake Bay TMDL. The trash listing for the Middle Branch and the Northwest Branch portions of the PATMH Tidal Chesapeake Bay Segment are being addressed through a TMDL currently under development. The listing for impacts to biological communities in the PATMH Tidal Chesapeake Bay Segment will be addressed separately at a future date. The listing for chlordane in Baltimore Harbor has been addressed through a TMDL approved by EPA on March 23, 2001. The listing for PCBs in Bear Creek and Baltimore Harbor have been addressed through a TMDL approved by EPA on October 1, 2012. The listings for Pb, Zn, and enterococcus in the Northwest Branch and Zn in Bear Creek will be addressed separately at a future date.

The analyses presented by MDE show that a TMDL for chromium is not necessary in Northwest Branch and Bear Creek since several studies demonstrated that it was not a source of toxicity in the water column and sediments and therefore not impacting the aquatic life designated use. The original listings for chromium in sediments from Maryland's 1998 Integrated Report were established using the Sediment Quality Triad (SQT) approach, the designated methodology for assessing waters of the State for toxic impairments in sediment as Maryland has no numeric sediment quality criterion for chromium. Water quality data demonstrated that sediment toxicity and a degraded benthic community were present within the Inner Harbor/Northwest Branch and Bear Creek and sediment concentrations for total chromium exceeded the Sediment Quality Guideline (SQG) Effects Range Median (ERM). These findings indicated that sediment was impaired for chromium. However, a comparison of sediment concentrations and the ERM for total chromium in this approach did not take into consideration the relative toxicity associated with the speciation of Cr (III) and Cr (VI).

MDE submitted a WQA to EPA on August 20, 2004, presenting water quality data that demonstrated chromium was not a source of toxicity to aquatic life inhabiting the water column or sediment. Results of a study in the report concluded that the sediments of the Northwest Branch and Bear Creek support a reducing environment and exhibit an excess capacity for the conversion of Cr (VI) to Cr (III). Under these conditions Cr (III), the relatively non-toxic species, will be the predominant form of chromium within the sediments. Moreover, water column and pore water samples from this study are well below the most conservative threshold for freshwater aquatic life chronic Cr (VI) criterion. EPA supported the findings of this WQA through a delayed approval, contingent upon the results of a Toxicity, Identification, and Evaluation (TIE) study underway at the time. The results of the TIE were inconclusive; therefore chromium was not delisted and remained in Category 5 of Maryland's Integrated Report.

Findings of recent studies completed by Johns Hopkins University (JHU) Center for Contaminant Transport, Fate and Remediation (CTFR), an Ecological Risk Assessment (ERA) of Dundalk Marine Terminal (DMT) and an EPA Data Evaluation of Bear Creek sediments support the conclusions of the original WQA that toxicity in the sediments of Baltimore Harbor is not due to the presence of chromium. The JHU CTFR studies investigated the relationship between toxicity and the exposure of chromium to benthic organisms, sediment ingestion as a pathway of toxicity, and stability of Cr (III) under oxygenation in the sediments of Baltimore Harbor. The sediment toxicity study established that chromium is not responsible for observed toxicity in Baltimore Harbor sediments at environmentally relevant levels. The findings of the sediment ingestion study demonstrated that Cr (III) is biologically unavailable to sediment dwelling organisms and levels of Cr (III) much greater than those found in Baltimore Harbor sediments are not toxic to benthic life. The sediment oxygenation study demonstrated that there is very little potential for oxidation of Cr (III) to occur in Baltimore Harbor sediments and if Cr

(VI) does form, it will not persist due to excess reducing capacity within the sediments. In addition to the studies conducted by JHU, the ERA of DMT and EPA Data Evaluation of Bear Creek sediments provided additional supporting information that chromium is not a source of toxicity within Baltimore Harbor sediments. Finally, sediment concentrations of total chromium in Bear Creek have also been reduced by 77% between 1996 and 2009 indicating that sources of chromium within the Baltimore Harbor watershed are declining. Therefore, due to the abundance of information included in the WQA report, EPA concluded that a TMDL for chromium is not necessary in the Northwest Branch and Bear Creek.

Thank you for the opportunity to review the WQA. If you should have any questions, please contact Mrs. Helene Drago, TMDL Program Manager, at 215-814-5796.

Sincerely,

Jon M. Capacasa, Director
Water Protection Division

cc: Melissa Chatham, MDE-SSA