

**Response to Comments Received as part of the Public Notice of the Amendments to the
Water Quality Regulations, Water Code and Comprehensive Plan to Update Water
Quality Criteria for Toxic Pollutants in the Delaware Estuary and Extend These Criteria to
Delaware Bay**

Delaware River Basin Commission, November, 2010

INTRODUCTION

This document provides the Delaware River Basin Commission's ("DRBC") response to comments received on its proposed amendments to the Water Quality Regulations, Water Code and Comprehensive Plan updating Water Quality Criteria for Toxic Pollutants in the Delaware Estuary and extending these criteria to Delaware Bay ("Proposal", "Proposed Criteria"). The comments were received in response to the DRBC's Notice of Proposed Rulemaking that appeared in the July 15, 2010 Federal Register (75 Federal Register 102, July 15, 2010, pp. 41106 – 41119). The Notice specified that comments would be received until October 1, 2010 and that a public hearing on the Proposal would be held on September 23, 2010 at the DRBC's West Trenton, NJ office.

Written comments were received from two organizations: 1) Delaware Department of Natural Resources and Environmental Control; and 2) MANKO, GOLD, KATCHER & FOX, LLP counsel for the Delaware Estuary TMDL Coalition. No testimony or written comments were offered at the public hearing.

DRBC staff outlined key points from the comments for discussion at a October 14, 2010 meeting of the DRBC's Toxics Criteria Subcommittee (TCS) and a October 21, 2010 meeting of the DRBC's Toxics Advisory Committee (TAC). The TCS reviewed the written comments, discussed technical issues, and recommended changes to the proposed criteria. The TAC discussed the proposed revisions to water quality criteria for toxic pollutants and made the following recommendations that are reflected in the final rule:

- Use of the MCL for arsenic rather than the value developed by using the equation for developing carcinogen criteria;
- Retention of the marine acute toxicity for cyanide value of 1 microgram per liter ($\mu\text{g/L}$) rather than 2.7 $\mu\text{g/}$; and
- Correction of the human health systemic toxicant fish ingestion value for beryllium from 42 to 420 $\mu\text{g/L}$ because beryllium is classified as a carcinogen and has a Cancer Potency Factor (CPF) in the EPA's Integrated Risk Information System ("IRIS"). Therefore the additional safety factor for carcinogens was incorrectly applied in the publicly noticed value of 42 $\mu\text{g/L}$.

The TAC discussed the use of the Biotic Ligand Model (BLM) to derive acute criteria for copper, but did not recommend its use at this time since it was not included in the proposal. The TAC charged the TCS with evaluating the technical basis for this approach and its application to the Delaware River, and directed the TCS to report back with recommendations.

ORGANIZATION OF THIS DOCUMENT

A List of Respondents and all comments received by the close of the comment period on October 1, 2010 is provided in the table below. The Response to Comments section contains excerpts from the comments received and the associated DRBC response. To facilitate cross checking these responses with the full original comments, the numbering in the response to comments section follows the numbering used in the submitted documents. Finally, because the number of comments were few but the nature of the comments are technical and detailed, the complete comment documents from the two respondents are attached as Appendices: Comments submitted by Manko, Gold, Katcher & Fox (Appendix A) and Comments of the Delaware Department of Natural Resources and Environmental Control (Appendix B).

LIST OF RESPONDENTS

Organization	Author	Date	Comments
MANKO, GOLD, KATCHER & FOX, LLP counsel for the Delaware Estuary TMDL Coalition	Brenda Hustis Gotanda	October 1, 2010	1, 1A, 1B, 1C, 1D, 2A, 2B, 2C, 2D, 3
Delaware Department of Natural Resources and Environmental Control	Dave Wolanski	October 1, 2010	4, 5, 6

RESPONSE TO COMMENTS

Letter from Brenda H. Gotanda, MANKO, GOLD, KATCHER & FOX, LLP counsel for the Delaware Estuary TMDL Coalition (“Coalition”), a group of municipal and industrial dischargers:

The Coalition has consistently supported DRBC efforts to ensure that its water quality standards are based upon sound and current science.

DRBC Response: The DRBC acknowledges and appreciates the participation of Coalition representatives in the DRBC Toxics Criteria Subcommittee and Toxics Advisory Committee process to revise and update water quality criteria based on current and sound science.

We agree that a consistent regulatory framework can have many benefits in appropriate circumstances and that updated water quality criteria should be based upon current and sound science, as may be set forth in EPA guidance.

DRBC Response: Acknowledged.

We have identified several significant areas of concern with the approach employed by DRBC in the development of the proposed water quality criteria, and as a result we believe that the approach fails to achieve DRBC's articulated goals and does not reflect sound and current science.

DRBC Response: The Commission does not agree. Please see the DRBC responses to technical comments prepared by ENVIRON Inter. Corp. for the Coalition below.

The issue of attainability of the proposed criteria is not addressed by the Basis and Background document.

DRBC Response: Water quality criteria are goals that will protect the designated uses of the Delaware Estuary and Bay for aquatic life, as a source of drinking water in Zones 2 and 3, primary and secondary recreation, and consumption of fish. Assessing the attainability of the criteria is not a requirement of establishing water quality criteria under regulations of either DRBC or the basin states. As noted by the commenter, the federal regulations at 40 CFR Part 131 provide a mechanism for states to modify the designated uses of their waters.

Comments Prepared by ENVIRON International Corporation for MANKO, GOLD, KATCHER & FOX, LLP counsel for the Delaware Estuary TMDL Coalition:

1. The proposal inappropriately compounds several overly conservative assumptions, resulting in unrealistic exposure scenarios and unattainable WQC.

DRBC Response: The derivations of the proposed human health criteria follow EPA guidance and methodologies used by basin states.

1A. The fish consumption rate is not representative of the consumption rate of fish from Delaware Estuary and Bay by sport anglers or the general population and should be revised to rely upon local data, a Tier 1 information source.

DRBC Response: The fish consumption rate of 17.5 grams per day is consistent with EPA national guidance and rates used by basin states for establishing human health criteria. The Commission also considered site-specific data from both the KCA (1994) study prepared for the Delaware Department of Natural Resources and Environmental Control in Zones 5 and 6 and the Faulds et. al. (2004) study conducted in Zones 2 - 4. Site-specific data indicate that the fish consumption rate used to derive the criteria is adequate to protect highly exposed populations such as recreational and subsistence anglers from adverse health effects, in addition to protecting the general population from such adverse effects. A lower

consumption rate or a risk level of 10^{-4} would not be protective of recreational anglers and their households or other sensitive and highly exposed populations.

1B. The use of a safety factor of 10, as described in Policy #2, has no technical foundation and results in unnecessary and unsupported conservatism.

DRBC Response: Section 3.10.3 D.2. of the Commission's Water Quality Regulations provides that if a cancer potency factor (CPF) is not available in IRIS for a pollutant classified as a carcinogen, an additional safety factor of 10 must be used to protect against systemic effects. No proposal has been made to alter this policy. The pollutants listed in Table 7 that are also classified as carcinogens have a CPF in IRIS (<http://www.epa.gov/IRIS/>). The application of the additional safety factor was incorrectly applied in the publicly noticed value of 42 ug/L for beryllium and will be changed to 420 ug/L.

This approach is not uniformly used by the basin states, and may be subject to change by DRBC in the future.

1C. The target cancer risk is overly stringent and adds unnecessary conservatism to achieve the cumulative risk limits.

DRBC Response: The risk level of 10^{-6} is used by the DRBC and basin states NJ, DE, and PA, and is specified in DRBC and state water quality regulations. *See* Delaware Surface Water Quality Standards § 4.6.3.3.2.1.; N.J.A.C. 7:9B-1.5(a)5.; and 25 Pa. Code § 93.8a.(d)).

1D. The compounding conservatism of multiple conservative assumptions results in overly stringent WQC that may not be attainable. WQC that are one to two orders of magnitude more stringent than warranted for protecting reasonable maximum exposures (based on fish consumption and risk levels used). Impractically low criteria are below detection limits.

DRBC Response: The proposed stream quality objectives are based on the guidance and assumptions contained in the U.S. EPA guidance document entitled "Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health (2000)". This guidance was also used by one or more Estuary States to develop their water quality standards.

2A. The cancer classification system cited under Policy #1 (DRBC 2010) is outdated; the newer USEPA (2005) cancer classification system should be cited and used.

DRBC Response: All parameters in Table 6 of the Stream Quality Objectives for Carcinogens in the Delaware River Estuary and Bay are listed by the EPA as carcinogens and have a CPF in IRIS as required by Section 3.10.3D.1 of the Commission Water Quality Regulations. Multiple carcinogen classification systems are currently referenced in IRIS. Category A, B and C carcinogen classification are derived from the Risk Assessment Guidelines of 1986, and the proposed revised Carcinogen Risk Assessment Guidelines (U.S. EPA, 1996). The U.S. EPA 2005 Guidelines for Carcinogen Risk Assessment (USEPA/630/P/03/001B), however, use a weight-of-evidence (WOE) descriptor based upon a narrative approach, rather than categories, to describe a substance's potential to cause cancer in humans and the conditions under which the carcinogenic effects may be expressed. Five standard weight-of-evidence descriptors (Carcinogenic to Humans, Likely to Be Carcinogenic to Humans, Suggestive Evidence of Carcinogenic Potential, Inadequate Information to Assess Carcinogenic Potential, and Not Likely to Be Carcinogenic to Humans) are used as part of the narrative. EPA is using these narrative descriptors as it updates carcinogen assessments, but is retaining the older letter classification for other substances in IRIS depending on the date of last revision for the chemical. To avoid confusion, Table 6 will be modified to remove the column labeled "EPA Class." The narrative classification for each parameter identified in IRIS will also be added to Table 6 in the Basis and Background Document. These revisions do not change any of the values of the proposed criteria.

2B. The intended practice for differentiating between freshwater and marine conditions in extending the toxics criteria to Zone 6 (and thus the standards to be applied) is unclear.

DRBC Response: The term "freshwater" will be deleted from the Proposal and replaced with "marine". No further modifications to the proposed language are needed as suggested by the commenter because Section 3.10.6, where the language appears, defines the geographical extent of Zone 6.

2C. The proposed criterion for copper for the protection of aquatic life does not reflect use of biotic ligand model (BLM) and instead reflects the USEPA value that pre-dates USEPA's acceptance of BLM. A criterion based on the BLM should be used.

DRBC Response: A freshwater acute copper criterion calculated using the biotic ligand model (BLM) has not been adopted by any of the basin states. The Toxics Advisory Committee (TAC) charged the Toxics Criteria Subcommittee (TCS) in

October 2010 with assessing use of the BLM in the derivation of copper criteria in the Delaware Estuary. Water quality assessment of copper in the Estuary is complicated by many factors, including: field sampling and analytical issues with contamination; the applicability of DRBC's freshwater or marine criteria; and the influence of other water quality attributes on the partitioning and toxicity of copper. Coordination among the DRBC and basin states and agencies will continue to ensure the use of the most appropriate methods and procedures for monitoring studies undertaken in the Basin; and to harmonize water quality criteria and assessment methodologies, including assessment over salinity gradients observed in estuarine environments. The DRBC has not proposed adopting the BLM for calculating the freshwater copper criterion as part of this Proposal, but may consider its use in future water quality standards modifications. The proposed revisions do not affect an applicant's ability to request use of the BLM for development of site-specific freshwater copper criteria in accordance with section 3.10.5.E. of DRBC's current Water Quality Regulations, which provides that the Commission will consider requests to modify the stream quality objectives for toxic pollutants based upon site-specific factors.

2D. DRBC should clarify the basis for the exposure duration used for systemic toxicants in Policy #5.

DRBC Response: Current DRBC regulations provide that "For the purpose of determining compliance with human health stream quality objectives, the duration of exposure shall be 70 years for carcinogens and 30 days for systemic toxicants" (DRBC Water Quality Regulations Section 3.10.3D.5).

3. There are several cases of poor quality assurance and internal inconsistency in the proposed revisions of the Delaware Estuary and Bay WQC.

DRBC Response: Tables 3 through 7 have undergone additional review for quality assurance and consistency with the derivation process described in the Basin and Background Document.

Comments from David Wolanski, Water Quality Standards Coordinator, Delaware Department of Natural Resources and Environmental Control

4. Delaware is pleased that the DRBC is proposing updates to the toxics criteria in the Delaware Estuary in an effort to remain current with available science and to foster greater uniformity in applicable criteria between Basin states. We also agree with the

proposal to extend toxics criteria to the Delaware Bay (Zone 6), which is a vital aquatic resource worthy of greater protection from impacts associated with upstream sources.

DRBC Response: The DRBC acknowledges DNREC support for the proposed revisions and staff's continued efforts on the DRBC Toxics Criteria Subcommittee and Toxics Advisory Committee to revise and update water quality criteria based on current and sound science and to extend the toxics criteria to Delaware Bay (Zone 6).

5. DRBC needs to clarify how the aquatic life criteria are applied for purposes of ambient water quality assessment versus water quality-based permitting.

DRBC Response: Rules for application of the Commission's aquatic life criteria in water quality-based permitting are set forth in Article 4 of the DRBC Water Quality Regulations (Application of Standards). With regard to the application of the criteria in ambient water quality assessment, the DRBC staff recommends that assessment methodologies be presented separately as part of the DRBC Section 305(b) Assessment Methodology.

6. The second concern we have relates to adoption of the human health criteria for inorganic arsenic. Based upon a detailed review of those criteria and the underlying factors used to calculate those criteria, we urge the DRBC to reconsider their proposal.

DRBC Response: As noted above, the TAC recommended adopting the MCL, 10 ug/L, as the proposed human health criterion for arsenic. This is the same approach used by DE and PA. Both States adopted the MCL value as an interim approach pending resolution of issues relating to toxicology and bioaccumulation of inorganic arsenic.

The TAC also discussed several issues raised by representatives of the New Jersey Department of Environmental Protection (NJDEP) with respect to the marine criterion for cyanide, and the exposure duration for several metals. These comments are discussed below:

7. Some of the proposed criteria for the protection of aquatic life are different than those adopted by NJDEP including a chronic value of 2.7 µg/L for free cyanide versus the proposed value of 1.0 µg/L.

DRBC Response: The difference in the value is due to NJDEP's use of a different acute to chronic ratio (ACR). Representatives from the U.S. Fish and Wildlife Service (USFWS) noted that a national consultation was currently ongoing with the USFWS, the National Marine Fisheries Service (NMFS) and the U.S. EPA under Section 7 of the Endangered Species Act on both the acute and chronic national criteria. They suggested that the 1 µg/L value be retained for acute

criteria and adopted for chronic criteria until the consultation is completed. TAC members agreed with this recommendation.

8. NJDEP noted that the latest revision to their water standards regulations adopted longer acute averaging periods for seven metals. An acute averaging period of 24 hours was specified for copper while an acute averaging period of six hours was adopted for six other metals.

DRBC Response: The proposed rule included no changes to the duration of exposure (acute averaging period) of 1 hour for all acute criteria for the protection of aquatic life set forth at section 3.10.3 C.1 of DRBC's current Water Quality Regulations. The TAC did not recommend changing the duration of exposure for these metals at this time, but charged the Toxics Criteria Subcommittee with evaluating the scientific basis for alternative durations, as a basis for considering possible future changes.

**APPENDIX A. Comment Document from MANKO, GOLD, KATCHER & FOX, LLP
counsel for the Delaware Estuary TMDL Coalition**

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October 1, 2010

Via E-Mail and Hand Delivery
Regulations
c/o Commission Secretary, Pamela Bush
Delaware River Basin Commission
25 State Police Drive
West Trenton, NJ 08628-0360

Re: Water Quality Criteria – Comments

Dear Ms. Bush:

This letter and the enclosed comments (“Comments”) are submitted to the Delaware River Basin Commission (“DRBC”) in response to the Notice of Proposed Rulemaking (“Notice”) that appeared in the July 15, 2010, *Federal Register*. The Notice solicited comments on DRBC’s proposed amendments to its Water Quality Regulations, Water Code and Comprehensive Plan to update water quality criteria for toxic pollutants in the Delaware Estuary and extend these criteria to the Delaware Bay (the “Proposal”). We are submitting these Comments as counsel for the Delaware Estuary TMDL Coalition (“Coalition”), a group of municipal and industrial dischargers whose members include Camden County Municipal Utilities Authority, Calpine New Jersey Generation, LLC f/k/a Conectiv Atlantic Generation LLC, Calpine Mid-Atlantic Generation, LLC f/k/a Conectiv Delmarva Generation LLC, Delaware County Regional Water Quality Control Authority, DuPont Company, Exelon Generation Company, LLC, National Railroad Passenger Corporation, PSEG Power LLC, Rohm and Haas Chemicals LLC (a subsidiary of The Dow Chemical Company), Sunoco, Inc., and The Valero Companies.

The Coalition has consistently supported DRBC efforts to ensure that its water quality standards are based upon sound and current science. In this particular case, DRBC has explained in its Notice that the Proposal is designed to bring DRBC’s criteria for toxic pollutants into conformity with current guidance published by the U.S. Environmental Protection Agency (“EPA”) and to provide a more consistent regulatory framework for managing the tidal portion of the main stem Delaware. We agree that



Commission Secretary

October 1, 2010

a consistent regulatory framework can have many benefits in appropriate circumstances and that updated water quality criteria should be based upon current and sound science, as may be set forth in EPA guidance. However, as reflected in the enclosed Comments prepared by ENVIRON International Corporation on behalf of the Coalition, we have identified several significant areas of concern with the approach employed by DRBC in the development of the proposed water quality criteria, and as a result we believe that the approach fails to achieve DRBC's articulated goals and does not reflect sound and current science.

Our most significant concern is that the methodology employed by DRBC in updating the water quality criteria relies upon unrealistic and overly conservative assumptions regarding human exposures of the general population and it compounds multiple conservative assumptions, which results in water quality criteria that are so overly stringent as to be potentially unattainable. This is not a workable or consistent regulatory framework and does not reflect the current state of the science or policy. Further, contrary to DRBC's goal of conformity with EPA guidance, the Proposal's Basis and Background Document employs an outdated cancer classification system for chemicals and fails to incorporate EPA's current recommended WQC for copper. In addition, several internal discrepancies in the Proposal suggest the need for DRBC to conduct a thorough quality assurance review of the proposed water quality criteria to verify that the final values are consistent with the Basis and Background Document and the criteria promulgated by EPA and the basin states. These and other concerns are described in greater detail in the enclosed Comments.

The issue of attainability of the proposed water quality criteria is not addressed by the Basis and Background Document. However, it is an extremely important issue. Under the Clean Water Act, attainability plays a key role in the water quality standard setting process, and is a fundamental consideration both in setting and revising water quality standards. *See* 33 U.S.C. § 125 1(a)(2) (setting forth legislative goal to provide fishable and swimmable water quality "wherever attainable"); *see also* 40 C.F.R. §§ 131.10(a) (requiring states "to specify appropriate water uses to be achieved and protected") and § 131.10(d) (defining "attainable" uses).

In setting water quality standards, states must first define the water quality goals of a waterbody by designating the uses to be made of the water. These designated uses must: (1) take into consideration the particular waterbody's "use and value for public water supplies, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other purposes," and (2) "provide, *wherever attainable*, water quality which provides for the protection and propagation of fish, shellfish, and wildlife and to provide for recreation in and on the water." 33 U.S.C. §§ 1313(c)(2)(A) and 1251(a)(2) (emphasis added). *See generally* U.S. EPA, WATER QUALITY HANDBOOK, 2ND ED. §§ 2.1, 2.4, 3 (online ed. 2007). The states must then adopt water quality criteria that are scientifically defensible and protective of the designated uses. 40 C.F.R. §§ 13 1.5(a), 13 1.6(a) - (c), 131.11(a)-(b). Under this framework, the designated

uses of a waterbody drive water-quality based controls, setting the targets for water quality criteria, and driving monitoring, assessments, and water-quality based effluent limitations in NPDES permits.

With the recognition that not all waterbodies can be expected to attain fishable and swimmable uses or any more stringent uses designated by the states, EPA adopted a mechanism in its water quality regulations that authorizes states to modify their uses. 40 C.F.R. § 131.10(g). This mechanism, termed a “use attainability analysis” (“UAA”), authorizes both the permanent removal and temporary modification of unattainable uses. According to EPA, a “key concept in assigning designated uses is ‘attainability,’ or the ability to achieve water quality goals under a given set of natural, human-caused, and economic conditions” and “[t]he overall success of pollution control efforts depends on a reliable set of underlying designated uses in water quality

standards.” EPA, UAA AND OTHER TOOLS FOR MANAGING DESIGNATED USES, iii (March 2006).

Under this regulatory framework, EPA encourages states to continually reassess the attainability of their water quality standards, and to use the UAA process to refine their standards to include only those uses that can be attained in a particular waterbody.

Given the importance of attainability in the water quality standard setting process and the legal and regulatory emphasis on adopting water quality criteria that are technically sound and scientifically defensible, we believe that DRBC should not adopt proposed water quality criteria that are not attainable. The Coalition requests that DRBC reevaluate the proposed water quality criteria to address our concerns, as set forth in the Comments, before proceeding further with the Proposal. It would be arbitrary and capricious to require point source dischargers to implement unproven and/or expensive treatment technologies in an attempt to meet effluent limitations derived from water quality criteria or standards, which were established using an inappropriate methodology and which may not be attainable. To do so could expose point source dischargers to potential enforcement action and citizen suits in circumstances where the dischargers cannot control the conditions that may cause an exceedance of an effluent limitation.

We appreciate the opportunity to submit these Comments on the DRBC Proposal and we appreciate your anticipated serious consideration of these important issues.

Sincerely,



Brenda Hustis Gotanda
For MANKO, GOLD, KATCHER & FOX, LLP

BHG/amm/1 1141-001

cc: DRBC Commissioners (w/encl.) (via U.S. Mail)

COMMENTS OF THE DELAWARE ESTUARY TMDL COALITION
ON
PROPOSED AMENDMENTS TO THE WATER QUALITY CRITERIA FOR
TOXIC POLLUTANTS FOR ZONES 2-6 OF THE DELAWARE ESTUARY:

Comments Prepared by ENVIRON International Corporation
October 1, 2010

I. Introduction

On July 15, 2010, the Delaware River Basin Commission (DRBC) proposed to revise the Water Quality Criteria (WQC) for Delaware Estuary and Bay and to extend the WQC currently applicable to the freshwater portion of the Estuary (DRBC Water Quality Zones 2 through 5) to apply to the Bay (DRBC Water Quality Zone 6). DRBC also published a Basis and Background Document (DRBC 2010) to describe the bases, including policies and technical assumptions, relied upon in developing the proposed criteria revisions. On behalf of the Delaware Estuary TMDL Coalition (the Coalition), ENVIRON International Corporation submits the following comments in response to DRBC's request for public comments on the proposed revisions.

II. Comments on the Proposed WQC

DRBC states in its Notice of Proposed Rulemaking that the proposed changes “will bring the Commission’s criteria for toxic pollutants into conformity with current guidance published by the U.S. Environmental Protection Agency (USEPA) and provide a more consistent regulatory framework for managing the tidal portion of the main stem Delaware River.” We agree that a consistent regulatory framework can have many benefits in appropriate circumstances and that updated WQC should be based upon the current state of the science as may be reflected in USEPA guidance. However, we have several serious concerns with the approach that DRBC used to develop the proposed WQC, as described in the Basis and Background Document (DRBC 2010), and we believe that these are not consistent with the articulated goals. Among our concerns are that the approach relies on unrealistic and overly conservative assumptions regarding human exposures to chemicals, and compounding conservatism of multiple conservative assumptions results in WQC that are so overly stringent as to be potentially unattainable. This is not a workable or consistent regulatory framework and does not reflect the current state of the science or policy. Further, contrary to the goal of conformity with USEPA guidance, the Basis and Background Document (DRBC 2010) employs an outdated cancer classification system and fails to incorporate USEPA’s current recommended WQC for copper. Finally, we note several internal discrepancies in the proposed

rulemaking and, therefore, recommend that DRBC conduct a thorough quality assurance review of the proposed WQC to verify that the final values are consistent with the derivation process described in the Basis and Background Document (DRBC 2010) and the criteria promulgated by USEPA and the basin states.

1. The proposal inappropriately compounds several overly conservative assumptions, resulting in unrealistic exposure scenarios and unattainable WQC.

DRBC employs several highly conservative assumptions regarding estimates of human exposure to the general population. While some degree of conservatism is appropriate in the derivation of WQC, there must be a valid technical basis for each assumption in order to ensure that the criteria reflect exposures that are within the actual range of the population's behavior and are attainable. Although the individual assumptions employed in the derivation of the proposed criterion may be consistent with national recommendations and/or have been adopted by at least one basin state, many represent conservative high end assumptions, which in combination do not accurately reflect actual behaviors of the local population.

A. The fish consumption rate is not representative of the consumption rate of fish from Delaware Estuary and Bay by sport anglers or the general population and should be revised to rely upon local data, a Tier 1 information source.

The Basis and Background Document's (DRBC 2010) Policy #6 states that DRBC used a fish consumption rate of 17.5 grams per day (g/d) to calculate the stream water quality objectives. This rate is roughly equivalent to consuming 28 half-pound (8 oz.) fish meals per year, all of which are derived from the Delaware River. As discussed below, this is not representative of local consumption rates and should be changed to accurately reflect local data on fish consumption.

DRBC (2010) identifies the following hierarchy for the selection of a fish consumption rate: Tier 1 - use of local data on fish consumption patterns; Tier 2 - use of data reflecting similar geography or population groups for the water body of concern; Tier 3 - use of data from national surveys, and Tier 4 - use of the USEPA default consumption rates. Based on DRBC's hierarchy and consistent with DRBC's (2010) text on page 8 of the Basis and Background Document, local and regional should be ranked above national or default values. However, DRBC (2010) bases the 17.5 g/d rate on a Tier 3 source published in 1998 by the United States Department of Agriculture: *1994-96 Continuing Survey of Food Intake by Individuals*. The Basis and Background Document also cites two Tier 1 sources (KCA 1994 and Faulds et al. 2004) that reportedly identified consumption rates between 17.46 and 21.7 g/d.

The reference in KCA (1994) that DRBC purportedly relied upon is an overall consumption rate *for fish consumers (i.e., excluding zero consumption cases)*. However, Table 6A of Appendix F from KCA (1994) identified an *overall consumption rate for fishermen and their households (i.e., including zero consumption cases)* of 0.289 oz./d, which is equivalent to 8.1 g/d. Compared to the higher rate for fish consumers, this overall fish consumption rate of 8.1 g/d is a more representative estimate for sport anglers and an appropriate high end estimate of the general population. The fish consumption

rate of 8.1 g/d is most applicable in the derivation of WQC because: a) it represents at least the central tendency for sport anglers; b) it is not an extreme high end estimate that excludes sport anglers who do not consume fish; c) it is a conservative estimate of at least the central tendency for the general population, as fish consumption in the general population is expected to be lower than that for sport anglers; and d) per DRBC's hierarchy of sources, it takes precedence over national default estimates. In accordance with DRBC's stated hierarchy of sources, KCA's (1994) rate for the general population (8.1 g/d), a Tier 1 source, should take precedence over USDA (1998), a Tier 3 source.

ENVIRON also reviewed the other Tier 1 source cited by DRBC (2010), Faulds et al. (2004), focusing on the data listed in Table 9. It is not clear why DRBC selected consumption rates of 17.9 g/d and 21.7 g/d for channel catfish and white perch, respectively, when Faulds et al. (2004) reports data for 12 different species, including striped bass. The complete dataset for surveyed anglers summarized in Table 9 of Faulds et al. (2004) support an average consumption rate for sport anglers and the general population (i.e. all anglers including zero consumption respondents) of approximately 7.5 g/d. This value is consistent with KCA's (1994) rate for the general population of 8.1 g/d and USEPA's (2009a) default per capita fish consumption rate for freshwater/estuarine fish of 7.5 g/d. Thus, another Tier 1 source (Faulds et al. 2004), as well as a more recent Tier 3 source (USEPA 2009a) uniformly support a fish consumption rate much lower than that employed by DRBC.

DRBC's website¹ cites two other Tier 1 fish surveys conducted within the Delaware River and Estuary (Volstad et al. 2003, Pierce and Myers 2008), although neither is cited in the Basis and Background Document (DRBC 2010). DRBC does not explain the basis for selecting the fish consumption surveys used, or rationale for disregarding other surveys, such as those cited on their website. Volstad et al. (2003) and Pierce and Myers (2008) both support fish consumption rates that are well below the 17.5 g/day employed by DRBC.

Therefore, DRBC's statement that the fish consumption rate of 17.5 g/d is consistent with site-specific data is erroneous based on the weight and consistency of the results of the relevant fish consumption studies and DRBC's own hierarchy for selection of data sources. Rather, DRBC should apply a rate in the range of 7.5 g/d to 8.1 g/d, based on the Tier 1 and Tier 3 sources discussed above.

B. The use of a safety factor of 10, as described in Policy #2, has no technical foundation and results in unnecessary and unsupported conservatism.

The Basis and Background Document's (DRBC 2010) Policy #2 lacks technical basis and results in unnecessary and unsupported conservatism in the WQC, which could make the criteria lower than can be obtained. In particular, the second sentence of Policy #2 reads, "[a]n additional safety factor of 10 shall be utilized in establishing the stream quality objectives to protect against *systemic effects* for pollutants classified as carcinogens if a [cancer potency factor] is not available in [the Integrated Risk Information System]"

¹ <http://www.state.nj.us/drbc/>

(*emphasis added*). There is no technical foundation for such a safety factor, it is not consistent with USEPA guidance on derivation of toxicity values, it adds unnecessary and unsupported conservatism that could make the WQC lower than can be obtained, and the wording is unclear. Therefore, we recommend that DRBC omit Policy #2 altogether.

Further, with respect to the wording of Policy #2, we wonder whether DRBC intended for this sentence to read, “an additional safety factor of 10 shall be utilized in establishing the stream quality objectives to protect against *the risk of cancer* for pollutants classified as carcinogens if a CPF is not available *from the hierarchy of sources for human toxicity values (USEPA 2003)*.” (*emphasis added*). Assuming that our clarification of the second sentence in Policy #2 reflects DRBC’s intent, this practice implies that a “significant” cancer risk always occurs at a lower dose than significant systemic effects, and that human’s sensitivity to carcinogenicity is always 10-fold greater than our sensitivity to systemic effects. This practice effectively decreases the WQC based only on fish ingestion (Table 7) for as many as 79 chemical by a factor of 10, without providing any technical basis for the adjustment.

In addition, this adjustment essentially adds an uncertainty factor in its derivation of reference doses (RfDs) to account for the possibility of cancer risk, a practice that is inconsistent with USEPA methods employed in IRIS or by the National Center for Environmental Assessment. DRBC has not provided: a) any technical basis for the application of such an approach for the WQC based only on fish ingestion; or b) any technical and regulatory basis for determining that the maximum contaminant levels for noncarcinogens should be decreased by a factor of 10 in order to protect against the risk of cancer via fish ingestion.

Also, because USEPA cancer classifications are not included on Table 7, it is not clear whether DRBC’s implementation of the adjustments discussed above, which are inconsistent with USEPA’s application of RfDs for ingestion of other media (e.g., sediment) artificially lowers the WQC for chemicals that are classified as human carcinogens (e.g., vinyl chloride).

C. The target cancer risk is overly stringent and adds unnecessary conservatism to achieve the cumulative risk limits.

The Basis and Background Document’s (DRBC 2010) Policy #4 specifies use of a target cancer risk level of 10^{-6} to establish stream quality objectives for carcinogens. This target cancer risk level is overly stringent and adds unnecessary conservatism in achieving the cumulative risk limits for establishing the water quality objectives for carcinogens listed in Table 6 of the Basis and Background Document. Although the target cancer risk of 10^{-6} is consistent with USEPA ambient water quality criteria derivation methods, USEPA’s (2009b) WQC table provides guidance for applying alternate target risk levels (specifically 10^{-5}). The target cancer risk of 10^{-6} also is more stringent than target risks used under other regulatory programs. For example, under Superfund, USEPA (1991) established that the cumulative carcinogenic site risk to an individual based on reasonable maximum exposure should be 10^{-4} . This cumulative cancer risk limit of 10^{-4} is also the limit that USEPA generally uses in making risk management decisions under Superfund (USEPA 1991). Therefore, establishing stream water quality objectives for carcinogens

using a target cancer risk of 10^{-4} or 10^{-5} has a strong precedent, is technically sound, and should be used especially in this case where there is serious question about the attainability of many of the proposed criteria.

Given that only 55 carcinogens are identified on Table 6 (DRBC 2010), even if every one of those carcinogens were detected at a concentration equal to its water quality objective, then the cumulative cancer risk would be approximately 5×10^{-5} . This cumulative cancer risk estimate is about a factor of two lower than USEPA's cumulative cancer risk limit (USEPA 1991). Because it is unlikely that all 55 carcinogens will be detected at any single location, let alone at concentrations equal to the WQC, the use of a target cancer risk of 10^{-6} is overly stringent for the protection of cumulative exposure to multiple chemicals.

D. The compounding conservatism of multiple conservative assumptions results in overly stringent WQC that may not be attainable.

Most of the exposure factors used in the calculation of the fish consumption criteria are high end (i.e., 90th to 95th percentile) estimates of the magnitude, frequency, and duration of potential exposures. When several such high end factors are combined, the resulting estimates of dose will be higher than the 90th percentile of the distribution of exposures in the potentially exposed populations for which the criteria were designed and could be higher than the exposure to the maximally exposed individual. In addition, DRBC's use of an overly stringent target cancer risk, in conjunction with other high end exposure assumptions, compounds the conservatism and results in WQC that are one or two orders of magnitude more stringent than warranted for protecting reasonable maximum exposures (RME) expected of sport anglers or the general population. The cumulative target risks specified by USEPA (1991) are designed to be protective of RME populations of interest, rather than hypothetical individuals outside of the actual distribution of the population. In addition, the compounding conservatism likely results in unattainable WQC. For example, the WQC for arsenic, acrylonitrile, benzidine, bis(2-chloroisopropyl)ether, 3,3 -dichlorobenzidine, dioxin, 1,1 ,2,2-tetrachloroethane, vinyl chloride and hexachlorobenzene are below their respective method detection limits. Other proposed WQC also may be below their method detection limits. We recommend that DRBC undertake a thorough review of the proposed WQC to ensure that impractically low and unattainable WQC are not advanced. Unattainable WQC will not advance DRBC's goal of improving water quality.

2. Other Errors and/or Deficiencies with the Proposed WQC

In addition to areas of significant concern described above, there are several errors and/or deficiencies with DRBC's proposed WQC that should be addressed. In some cases, the proposed WQC are not based on the most current relevant Federal guidance. Further, greater clarification is needed regarding DRBC's development and implementation of certain criteria.

A. The cancer classification system used under Policy #1 (DRBC 2010) is outdated; the newer USEPA (2005) cancer classification system should be cited and used.

The Basis and Background Document's (DRBC 2010) Policy #1 states that objectives to protect against carcinogenic effects shall be established by DRBC if the pollutant is considered a Category A, B, or C carcinogen under the Risk Assessment Guidelines of 1986. While older IRIS toxicological profiles (e.g., benzene) use the 1986 classification system, new IRIS toxicological profiles (e.g., 1,4-dioxane) and the Superfund Technical Support Center's (STSC) Provisional Peer Reviewed Toxicity Values (PPRTVs) use the more recent classification system (USEPA 2005). The 2005 Risk Assessment Guidelines recommend the use of the following five standard hazard descriptors: "Carcinogenic to Humans," "Likely to Be Carcinogenic to Humans," "Suggestive Evidence of Carcinogenic Potential," "Inadequate Information to Assess Carcinogenic Potential," and "Not Likely to Be Carcinogenic to Humans." At a minimum, DRBC should cite and use both (1986 and 2005) classification systems in Policy #1 and in the derivation of carcinogenic objectives.

B. The intended practice for differentiating between freshwater and marine conditions (and thus the standards to be applied) is unclear.

DRBC (2010) proposes to extend the applicability of WQC, listed in Tables 4-7 of Article 3, to Zone 6 (Delaware Bay) by adding the following language to the Delaware River Basin Water Code (18 CFR Part 410)².

Section 3.10.6 C

11. Toxic Pollutants.

- a. Applicable criteria to protect the taste and odor of ingested water and fish are presented in Table 4.
- b. Applicable *freshwater* stream quality objectives for the protection of aquatic life are presented in Table 5.
- c. Applicable *freshwater* stream quality objectives for the protection of human health are presented in Tables 6 and 7. (*emphasis added*)

Based on the proposed language, freshwater WQC would apply to marine waters of the Delaware Bay. If the reference to freshwater objectives in Items b and c above are not typographical errors, then a basis should be provided that supports the application of freshwater criteria to the marine waters of Delaware Bay.

On the other hand, if the reference to freshwater objectives above is a typographical error, then the Delaware River Basin Water Code (18 CFR Part 410) also will require revision in order to avoid conflicts with the proposed language of Section 3.6.10, as noted below in bold type:

Section 3.10.5 C

²http://www.state.nj.us/drbc/notice_toxics-criteria071510.htm

11. **Toxic Pollutants** (*Resolution 96-12*). Freshwater stream quality objectives apply in areas upstream of the Delaware Memorial Bridges (River Mile 68.75), and the more stringent of the freshwater or marine stream quality objectives apply in areas below RM 68.75 to the lower boundary of Zone 5 at RM 48.2. (emphasis added)

C. The proposed criterion for copper for the protection of aquatic life does not reflect use of biotic ligand model (BLM) and instead reflects the USEPA value that pre-dates USEPA’s acceptance of BLM. A criterion based on the BLM should be used.

DRBC (2010) proposes to revise the WQC for all toxic pollutants based on the most current USEPA National Recommended Criteria (USEPA 2009b). However, the criterion listed for copper for the protection of aquatic life is not consistent with USEPA’s most recently recommended criterion. USEPA’s (2009b) recommended freshwater criterion for copper uses the BLM to calculate site-specific freshwater criteria for copper (USEPA 2007). To be consistent with USEPA National Recommended Criteria, DRBC should adopt the use of the BLM for calculating the freshwater copper criterion.

The BLM is a USEPA-approved model, which is based on best available science and uses data for frequently measured water quality parameters of the water body (i.e., temperature, pH, dissolved organic carbon (DOC), calcium, magnesium, sodium, potassium, sulfate, chloride, and alkalinity) to estimate copper bioavailability. A copper criterion calculated by BLM can be either more or less stringent than the traditional hardness-based criterion, but is more appropriate because it provides “improved guidance on the concentrations of copper that will be protective of aquatic life” (USEPA 2007).

Implementing basin-wide copper criteria using the BLM may be somewhat resource intensive. If DRBC decides not to adopt the BLM for basin-wide copper criteria, we request that DRBC add language approving the use of the BLM for site-specific freshwater copper criteria derivation.

D. DRBC should clarify the basis for the exposure duration used for systemic toxicants in Policy #5.

The Basis and Background Document’s (DRBC 2010) Policy #5 states that exposure durations of 70 years and 30 *days* shall be used for carcinogens and systemic toxicants (i.e., noncarcinogens), respectively (*emphasis added*). According to USEPA guidance (USEPA 1989), the exposure duration for carcinogens and noncarcinogens is typically assumed to be the same (e.g., 30 years for residents regardless of the chemical). It is possible that Policy #5 describes DRBC’s assumptions regarding *averaging time* (the period over which chemical exposure is averaged), which Section 6.4.2 of USEPA (1989) recommends calculating differently for carcinogens and noncarcinogens, rather than exposure duration (the time over which exposure is assumed to occur which is combined with exposure frequency to obtain the total time of exposure). In addition, DRBC should verify that the 30 *days* reflects their intended method and that it is not a typographical error where “days” was erroneously substituted for “years.” DRBC should clarify whether Policy #5 is describing the assumptions regarding exposure duration or averaging time. If Policy #5 does, in fact, describe *exposure duration* assumptions,

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DRBC should provide the technical justification for the assumed exposure duration(s) and why it is appropriate to use different exposure durations for carcinogens and noncarcinogens. However, if Policy #5 describes the *averaging time* assumptions, DRBC should either use the default residential noncarcinogenic averaging time (e.g., 30 years, rather than 30 days) or provide technical justification for the use of 30 days as the averaging time, use an exposure duration of 30 days to match the averaging time (of 30 days) to be consistent with USEPA guidance (USEPA 1989), and use subchronic toxicity values in the derivation of its WQC for noncarcinogens to correctly evaluate exposure over 30 days.

3. There are several cases of poor quality assurance and internal inconsistency in the proposed revisions to the Delaware Estuary and Bay WQC.

Several inconsistencies were noted between the proposed WQC tables in the Basis and Background Document (Tables 5 through 7) with the supporting appendices (DRBC 2010). For example, the criteria derivation process for benzo[a]anthracene in Appendix A1 indicates that the final criterion for fish and water consumption should be 0.003 8, which is consistent with USEPA guidance (2009b). This value, however, differs from the proposed WQC in Table 6 (0.03 8 µg/L). Similarly, the aquatic life criterion for pentachlorophenol in Table 5 (DRBC 2010) is not consistent with USEPA or basin state criteria as listed in Appendix A7. Before finalizing the revised WQC, DRBC should complete a thorough quality assurance review of the values presented in Tables 3 through 7 to ensure that they are consistent with the derivation process illustrated in the appendices and the criteria promulgated by the USEPA and the basin states. In either event, DRBC's approach is deficient.

III. Conclusions

Overall, ENVIRON and the Coalition agree that a regulatory framework that is consistent with current federal and state recommendations can have many benefits and that updated WQC should be based on the current state of the science. However, many aspects of DRBC's approach are problematic and conflict with the stated goals. The approach relies on overly conservative assumptions regarding human exposures and compounding conservatism results in WQC that are so stringent as to likely be unattainable in many cases. Because one of DRBC's (2010) stated goals of updating the WQC for the Delaware Estuary and Bay is to bring DRBC's criteria for toxic pollutants into conformity with current guidance published by USEPA, DRBC is urged to adopt the most recent cancer classification system for carcinogenic chemicals and the WQC for copper currently recommended by USEPA, rather than the outdated approaches described in the Basis and Background Document (DRBC 2010). Finally, we note several internal inconsistencies in the proposed rulemaking that suggest a thorough quality assurance review is warranted.

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IV. References

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APPENDIX B: Delaware DNREC comment on DRBC proposed Amendments to the Water Quality Regulations, Water Code and Comprehensive Plan to Update Water Quality Criteria for Toxic Pollutants in the Delaware Estuary and Extend These Criteria to Delaware Bay 10-01-10

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The Department is submitting the following comments in response to the proposed rulemaking. Delaware is pleased that the DRBC is proposing updates to the toxics criteria in the Delaware Estuary in an effort to remain current with available science and to foster greater uniformity in applicable criteria between Basin states. We also agree with the proposal to extend toxics criteria to the Delaware Bay (Zone 6), which is a vital aquatic resource worthy of greater protection from impacts associated with upstream sources.

Although we agree with the vast majority of the proposed rulemaking, we do have a few specific concerns and suggestions. First, we believe that the DRBC needs to clarify how the aquatic life criteria are applied for purposes of ambient water quality assessment versus water quality-based permitting. These criteria will obviously be used for both purposes, potentially under different assumptions and considerations. We therefore feel it is important to distinguish between these 2 uses of the criteria and the conditions under which they are properly applied. For instance, for assessing ambient water quality, we believe that the salinity at the time of ambient sampling should dictate whether freshwater or marine aquatic life criteria apply for that sample and whether an exceedance has actually occurred. By extension, if the ambient water is judged to be fresh at the time and location of the sample, then we believe that the hardness measured in that sample should be used to calculate hardness-dependent metals criteria. Conversely, for establishing water quality-based effluent limits for continuous point source discharges located in parts of the Estuary where conditions can be either fresh or marine, we believe that the more stringent between freshwater and marine aquatic life criteria should apply. Further, we agree that an Estuary median hardness of 74 mg/L should be used to calculate hardness dependent freshwater aquatic life criteria for purposes of establishing water quality-based effluent limits. These concepts, which relate more to implementation than the actual criteria themselves, can be addressed either within the administrative code or in an appropriate implementation procedure document.

The second concern we have relates to adoption of the human health criteria for inorganic arsenic. Based upon a detailed review of those criteria and the underlying factors used to calculate those criteria, we urge the DRBC to reconsider their proposal. Our reasons follow.

The EPA recommended human health criteria of 0.14 ug/L and 0.018 ug/L were developed in 1992 (57FR60848). Information and science concerning the toxicology and bioconcentration of inorganic arsenic has changed substantially since that time. EPA acknowledged some of those changes when it made different recommendations for EPA Region 6 States in 2007. See the web page at this URL:

<http://www.epa.gov/region6/water/ecopro/watershd/standard/arsenic.htm#bioconc> .

In addition, in February 2010, the EPA released for public review and comment a draft revision to their Integrated Risk Information System (IRIS) Toxicological Review for inorganic arsenic (EPA, 2010). The comment period closed in April and the EPA is still preparing responses. The EPA has not finalized a new IRIS report as of this writing.

The other major scientific uncertainty surrounding the human health criterion for inorganic arsenic is the bioconcentration factor (BCF). While the 0.14 ug/L and 0.018 ug/L criteria were first announced in 1992, the BCF used in the derivation of those criteria actually dates back to EPA's 1980 arsenic criteria document (EPA, 1980).

This BCF is flawed because it does not equal the ratio of inorganic arsenic in fish to inorganic arsenic in surface water, as it should. Rather, this BCF was computed as the ratio of total arsenic in fish to total arsenic in water. Although most arsenic in surface water is present as inorganic arsenic, only a fraction of the arsenic in fish is inorganic. In a technical summary of arsenic bioaccumulation in aquatic organisms, EPA indicates that approximately 10% of the arsenic in edible portions of marine fish and shellfish is inorganic arsenic (EPA, 2003). In this same document, however, they go on to state that, "for the derivation of AWQC, more data is needed on the chemical form and relative amounts of the various forms of arsenic in the tissues of aquatic organisms and in surface waters." To that end, data published specifically for fish and shellfish collected from Delaware coastal waters revealed that inorganic arsenic represents between 0.7% to 1.7% of total arsenic with an overall mean of 1.2% among 27 samples (Greene and Crecelius, 2006). The Delaware findings are consistent with other recent results for marine fish and shellfish samples. In 117 samples collected from the American Samoa in the South Pacific, inorganic arsenic was less than 0.5% for the majority of samples, with only a few samples in the range of 1-5% (Peshut et al., 2008). The EPA appears to be acknowledging and embracing these lower percentages based on their use of a 2% value for coastal fish as part of EPA's 2008 Report on the Environment (EPA, 2008). With regard to freshwater fish, less is known about the forms of arsenic but the available data suggests that the fraction of inorganic arsenic is similarly small (Kaise et al., 1987). Further evidence of this is that only 38 out of 881 fish samples (~4%) collected nationwide between 2000 and 2003 as part of the National Study of Chemical Residues in Lake Fish Tissue actually had measurable levels of inorganic arsenic (EPA, 2009). It is clear based on the current data that assuming that all arsenic in fish and shellfish is inorganic is grossly incorrect.

One strategy to deal with the above findings is to introduce an adjustment factor to the BCF that was developed as part of the 1980 criteria to account for the fraction of arsenic expected to be in the inorganic form. For example, the BCF from the 1980 criteria document was 44 L/kg. If a highly conservative estimate of 10% is assumed for the percent of total arsenic present in fish/shellfish as inorganic arsenic, this would yield an inorganic arsenic BCF of 4.4 L/kg (i.e., 10% of 44 L/kg). If the inorganic fraction is a more realistic but still conservative value of 2%, then the BCF becomes 0.88 L/kg (or approximately 1 L/kg). It is interesting to note that the Great Lakes Program draft water quality criteria document (Stephan, 1993) recommended a BCF of 1 for inorganic arsenic but ultimately ended up not recommending a human health criterion for inorganic arsenic where the route of exposure is fish consumption. This same BCF was used in the EPA Region 6 recommended criteria noted above. This is important since the Great Lakes Program is often held up as the benchmark for the use of sound science in the water quality standards arena.

Applying an adjustment factor to an old and questionable BCF is not ideal from a scientific perspective. A superior approach would be for the EPA to perform a comprehensive reevaluation of the current literature to see if there is now sufficient information on the concentrations of inorganic arsenic in the water and aquatic organisms to support development of a modern and scientifically credible BCF that could be considered by the States across the U.S. as they update their criteria during the triennial review process. If such a reevaluation does not occur for whatever reason, or if it does occur but does not yield a new BCF, then Delaware believes the DRBC should consider its options, including but not limited to the use of an adjustment factor as described above or the development of a tissue residue criterion for inorganic arsenic similar to the approach currently taken for mercury in fish. This is technically appealing since it directly measures the concentration of inorganic arsenic in the fish or shellfish and hence eliminates the need to accept assumptions concerning the complex relationship between inorganic arsenic in the water and inorganic arsenic in fish/shellfish.

In addition to the technical reasons discussed above, the Department has serious concerns regarding the unqualified adoption of criteria that exceed natural levels of arsenic in rivers and seawater. The range of expected arsenic concentration in fresh river water is between 0.13 ug/L to 2.1 ug/L (Smedley et al. 2002). In seawater, the expected range is 0.5 ug/L to 10 ug/L (Smedley et al 2002; Stumm and Morgan 1981; Salaun et al 2007; Cutter and Cutter 1998; and Rakestraw and Lutz 1933).

To summarize, the Department urges the DRBC to reconsider adoption of the human health criteria for inorganic arsenic. We believe that adoption of a uniform criterion of 10 ug/L across the Estuary is protective as an interim approach until the issues discussed above are addressed.