The May 9, 2013 meeting will be held at:

Orange County Sanitation District
10844 Ellis Avenue
Fountain Valley, CA 92708
http://www.ocsd.com
(714) 962-2411

9:30 a.m. – 12:30 p.m.

This is a joint meeting with SCAP

General Meeting and Water Committee
Located in Board Room

Land Committee
Located in Conference Room C

CWEA GAC Afternoon Meeting
Located in Conference Room A

NOTE: FOR COMPLIMENTARY TRANSPORTATION FROM JOHN WAYNE AIRPORT TO OCSD, RSVP TO Tom Meregillano AT tmeregillano@ocsd.com (714) 593-7457 OR CELL (714) 655-7568 BY WEDNESDAY MORNING, 5/8/13.
PICKUP: 9:00 A.M. IN SOUTHWEST PICKUP/ARRIVAL AREA (SEE WHITE VAN WITH OCSD LOGO)
RETURN TRIPS MEET IN ADMINISTRATION LOBBY AS FOLLOWS:
*12:00 P.M. FOR RETURN TO AIRPORT BY 12:15 P.M.
* 2:30 P.M. FOR RETURN TO AIRPORT BY 2:45 P.M.
* 4:30 P.M. FOR RETURN TO AIRPORT BY 4:45 P.M.

Next Meeting:
June 14, 2013

Directions to Orange County Sanitation District (Plant 1)

10844 Ellis Avenue, Fountain Valley, CA 92708

(714) 962-2411

Directions to Plant 1 (Administrative Offices)

Going South on the 405 freeway, exit at Euclid Ave., go straight through signal, enter main gate and turn right.

Going North (from John Wayne Airport) on the 405 freeway, exit at Euclid Ave., turn right, immediately after underpass turn left at signal, enter main gate and turn right.

Important Parking Information: <u>All drivers must stop at the guard shack to sign in and obtain a parking pass</u>. The meeting will be held in our Administration offices. Parking is available, immediately after passing the guard shack, on the right-side of the road next to the Administrative offices. Public entry is allowed through the front entrance only.

TRI-TAC & SCAP JOINT MEETING

Orange County Sanitation District
10844 Ellis Avenue
Fountain Valley, CA 92708
(714) 962-2411

THURSDAY, May 9, 2013

9:30 A.M. – 12:30 P.M.

General Meeting & Water Committee
Location: Board Room

Land Committee
Location: Conference Room C

9:30 A.M. – 9:45 A.M. – GENERAL MEETING

1. Introductions
2. Future Meeting Schedule and Locations, Committee Assignments and Sign-In Roster
3. Update on Hot Topic Issues In Water and Land Committees
4. Cross-Media Issues Update
    a. Triclosan Update & Draft Comment Letter
    b. Pesticide Steering Committee Update
5. Update on Efforts to Address Non-dispersible at POTWs
6. Introduction of CWEA GAC Chair and Co-Chair

9:45 A.M. – 10:15 A.M. – SPECIAL PRESENTATION

1. Patrick Griffith – LACSD
   Presentation on OEHHA's California Communities Environmental Health Screening Tool - (CALENVIROSCREEN 1.0)

10:15 A.M. – 12:30 P.M. – COMMITTEE MEETINGS

1. Water Committee Agenda & Attachments (P. 7-39)
2. Land Committee Agenda & Attachments (P. 40-41)
3. Committee Issue Summaries (P. 42 & 48)

April 11, 2013 Conference Call Attendance

Land Committee:

Matt Bao
Layne Baroldi
Vince De Lange
Vicky Fry
Diane Gilbert
Eric Have
John Hay
Bonnie Jones
Greg Kester
Tom Meregillano
Natalie Sierra

Water Committee:

Adam Link
Andy Morrison
Ann Heil
Beverly Hann
Bobbi Larson
Bobby Gustafson
Christopher Stacklin
Dan Gallagher
Hugh Logan
James Clark
Jason Lofton
Jennifer Shepardson
John Pastore
Karin North
Lisa Rothbart
Lorien Fono
Melissa Thorme
Melody LaBella
Monica Oakley
Nicole Granquist
Paul Cobain
Phil Markle
Preeti Ghuman
Rebecca Franklin
Shannon Bishop
Sharon Green
Terrie Mitchell
Tim Potter
Tom Hall

TRI-TAC LOCATIONS & 2013 SCHEDULE

TRI-TAC MEETING DATE[1]	LOCATION/HOTEL	COMMENTS
JANUARY 10, 2013	Conference Call	CASA – January 16 - 18 Indian Wells, CA
FEBRUARY 14, 2013	Boy Scout Council 1001 Davis Street San Leandro, CA 94577	CASA D.C. Conference February 25 – 27
MARCH 14, 2013	Carollo Engineers 2880 Gateway Oaks Drive, Suite 300 Sacramento, CA 95833	
APRIL 11, 2013	Conference Call	CWEA – April 16-19 Palm Springs, CA CASA – April 24-26 Newport Beach, CA
MAY 9, 2013	Orange County Sanitation District 108 44 Ellis Avenue Fountain Valley, CA 92708	Shuttle bus offered from John Wayne Airport at about 8:40am.
JUNE 13, 2013	Carollo Engineers 2880 Gateway Oaks Drive, Suite 300 Sacramento, CA 95833	
JULY 11, 2013	Boy Scout Council 1001 Davis Street San Leandro, CA 94577	
AUGUST 8, 2013	No Meeting	CASA – August 21-24 San Diego, CA
SEPTEMBER 12, 2013	Boy Scout Council 1001 Davis Street San Leandro, CA 94577	
OCTOBER 10, 2013	Orange County Sanitation District 108 44 Ellis Avenue Fountain Valley, CA 92708	Shuttle bus offered from John Wayne Airport at about 8:40am. WEFTEC Oct. 5 – 9 Chicago, IL
NOVEMBER 14, 2013	Carollo Engineers 2880 Gateway Oaks Drive, Suite 300 Sacramento, CA 95833	
December meeting To Be Announced		

[1] If you would like to add an agenda item or schedule a presentation for an upcoming meeting, please contact one of the committee co-chairs at least 14 days before the designated meeting date

[2] If you would like an "after Tri-TAC" meeting noted in the agenda package, please contact Terrie Mitchell at least ten days before the designated meeting date.

★ Air Committee is meeting on an Ad-Hoc Basis.

TRI-TAC SPONSOR REPRESENTATION 2013

League of California Cities (LOCC)	CASA	CWEA	
Jason Rhine	Sharon Green Ben Horenstein Roberta Larson Terrie Mitchell, Tri-TAC Chair	James Clark Jim Colston Bob Gillette Tom Grovhoug Jon Hay	Chandra Johannesson Jackie Kepke, Tri-TAC Vice Chair Hugh Logan Alec Mackie Monica Oakley

Tri-TAC Liaison Representation

BACWA: Dave Williams
CASA: Roberta Larson, Greg Kester
SCAP: John Pastore
CVCWA: Debbie Webster
CWEA: Hugh Logan, Alec Mackie
LOCC: Kyra Ross

COMMITTEES

AIR	LAND	WATER	
Chair: Air Committee On Ad-hoc Basis only	Co-Chairs: Vince De Lange Tom Meregillano	Co-Chairs: Sharon Greene (Interim) & Shannon Bishop Jason Lofton Finance Subcommittee Chair: Dave Bruns	
Interested Participants	**Interested Participants**	**Interested Participants**	
Gregory Adams Terry Ahn Frank Caponi Stephanie Cheng James H. Clark Sarah Desalauriers Zeynep Erdal Kris Flaig Sharon Green Patrick Griffith Bobbi Gustafson Ron Hipkiss Kirk Howard Greg Kester Vlad Kogan John Pastore Amanda Roa Lisa Rothbart Jim Sandoval Randy Schmidt Jennifer Shepardson Kevin Steet Debbie Webster	Matt Bao Layne Baroldi Stephanie Cheng James Clark Bonnie Jones Diane Gilbert Jones Robert Gillette Eric Have Jon Hay Ron Hipkiss Al Javier Bonnie Jones Zachary Kay Greg Kester Matt Krup Derrick Lee Ajay Malik Mike Moore Octavio Navarrette Michelle Pla Tim Potter John Pugliarese Lisa Rothbart Kelly Sarber Mike Sullivan Caroline Quinn Sandy Warren Debbie Webster	Matt Bequette Rebecca Bjork Phil Bobel Barbara Buikema Amy Chastain Stephanie Cheng James Clark Paul Cobian Jim Colston Mike Connor Vicky Conway Linda Dorn Andy Eggleston Lorien Fono Rebecca Franklin Levi Fuller Dan Gallagher Preeti Ghuman Nicole Granquist Donald Gray (Gabb) Sharon Green Tom Grovhoug Bobbi Gustafson Tom Hall LeAnne Hamilton Lisa Haney Beverley Hann Ben Horenstein Al Javier Chandra Johannesson Jim Kelly	Jackie Kepke, Tri-TAC Vice Chair Roberta Larson Melody LaBella Hugh Logan Phil Markle Patricia McGovern Tom Meregillano Terrie Mitchell, Tri-TAC Chair Kelly Moran Andy Morrison Mitchell Mysliwiec Karen North Monica Oakley Laura Pagano John Pastore Michelle Pla Tim Potter Paul Prange Daniel Rynn Amanda Roa Lisa Rothbart Jennifer Shepardson Christopher Stacklin Martin St. George Curt Swanson Bonnie Teaford Melissa Thorme David Tucker Lysa Voight Debbie Webster

Tri-TAC Water Committee Agenda – May 9, 2013

ITEM #	Topic	LEAD	Time (min)	Relevant material
Discussion Items:				
1.	Resource Realignment Cost of Compliance	Adam Link/Jackie Kepke	20	
2.	SWRCB Mercury Update	Shannon Bishop	20	http://www.waterboards.ca.gov/board_info/agendas/2013/apr/042313_4.pdf http://www.waterboards.ca.gov/water_issues/programs/mercury/reservoirs/docs/mercuryupdate0423.pdf Attachment: NACWA MeHg Final Report Feb 2007 Ex Summ
3.	SWRCB Biological Objectives – Causal Assessment Guidance & Bioassessment Survey	Phil Markle	30	Attachment: Causal Assessment Guidance ftp://ftp.sccwrp.org/pub/download/TMP/Temp/750_CausalAssessmentEvaluation&Guidance_Draft_final.zip Attachment: Success Story Questions
Updates				
4.	SWRCB Toxicity Assessment and Control Plan	Phil Markle	5	
5.	SSS WDR MRP Revisions	Adam Link	10	
6.	North Coast Basin Plan update	Shannon Bishop	15	http://www.tritac.org/documents/letters/2013_0415-CASA-Tri-TAC-Comments-North-Coast-BP-Amends.pdf
7.	SWRCB Cadmium & Hardness Policy	Mitchell Mysliwiec	15	Attachment: Hardness Selection White Paper

EXECUTIVE SUMMARY

The US Fish and Wildlife (USFWS) Report: *Evaluation of the Clean Water Act Section 304(a) Human Health Criterion for Methylmercury: Protectiveness for Threatened and Endangered Wildlife in California* presents a risk assessment methodology to determine if the tissue residue concentration (TRC) of 0.3 mg/kg of methylmercury, designed to protect human health, is also protective of federally listed wildlife species in California. This report presents an independent review of the USFWS report, including a review of the literature on bioaccumulation, existing information on reference doses of methylmercury, and a risk assessment performed using California-specific data within a probabilistic framework.

The USFWS methodology used a complex series of calculations and numerous parameters (e.g., dietary composition, food ingestion rates, body weights, bioaccumulation factors, food chain multipliers, transfer coefficients) to partition mercury concentrations in prey items and to estimate the transfer to predatory wildlife. This methodology also specified a reference dose that represents the daily exposure to methylmercury at which no adverse effects to California wildlife are expected. The primary finding of the USFWS report was that several of the Endangered Species Act (ESA) listed avian species in California were at risk due to methylmercury toxicity if the USEPA methylmercury tissue residue criterion of 0.3 mg/kg was used to calculate food web concentrations.

Summarized below are key findings and recommendations for future work as they relate to the three main areas of the review: bioaccumulation factors and food chain multipliers, the estimated reference dose of methylmercury, and the risk assessment due to ingestion of methylmercury.

BIOACCUMULATION FACTORS AND FOOD CHAIN MULTIPLIERS

The use of bioaccumulation factors (BAFs), based on national averages, to estimate concentrations of methylmercury in the different trophic levels of the aquatic food chain is a key feature of the USFWS methodology. The use of the national-averaged BAFs is considered inappropriate because of the orders-of-magnitude variability that exists in the BAF values across water bodies nationally. This variability is observed in data from geographically and ecologically different water bodies. The data that was used to derive the BAFs for lakes was skewed toward temperate northern lakes. In the case of flowing waters, the data set was biased toward measurements from the Everglades. The reviewers of the original US EPA document, that was the source of the BAFs used in the USFWS analysis, also concluded that the use of the national average BAFs was inappropriate.

A suitable alternative is to use measured biota concentrations to calculate food chain multipliers for representative California water bodies. We conducted a review of the literature and identified several sets of BAFs that could be used for estimating food chain multipliers using co-located data from California waters. The California-specific food chain multipliers could be 0.1 to 2.5 times the national average for different trophic levels and water bodies, with a proportional impact on calculated prey concentrations and on calculated doses to predator species. An alternative approach, using a mechanistic model of mercury cycling in the food web, was also illustrated as a means to estimate BAFs where no site-specific information is available.

RECOMMENDATIONS:

- Wherever possible, site-specific BAFs for a species of interest in a particular region should be used to evaluate food chain multipliers and the dietary intake of listed species. The use of site-specific BAFs can reduce the variability in the calculations, and demonstrate that avian methylmercury exposure that varies significantly from site to site, even when the top-level predator concentrations are similar.
- Trophic transfer coefficients should be determined for specific prey items that are known to be consumed by wildlife species of interest, as opposed to a single value for the entire trophic level. This is important because some species cannot be accurately placed in a single trophic level and may consume food from different trophic levels depending on size, life stage, and prey availability. There is a significant difference between the fish species evaluated by EPA in the derivation of BAFs, which feed on the phytoplankton-based food chain, and the piscivorous species selected by USFWS. Most of those piscivorous species feed on invertebrates dwelling in the sediments of marshes, mudflats, or beaches, which typically have high concentrations of organic matter. That organic matter has been shown to substantially reduce the bioavailability of mercury
- BAFs may be predicted using mechanistic models that consider site-specific conditions such as water quality and biological factors such as fish growth rates. Although not a substitute for data, these estimates may be more applicable than a national average BAF.
- Some of the listed species that are considered here feed on the benthic food web. In the presence of a significant benthic pathway, the uptake at the lower trophic levels may be different from the water column, and BAFs may not be appropriate to use. This issue is of particular concern if future efforts are made to relate fish/invertebrate concentrations to water column concentrations. The

benthic pathway of methylmercury uptake should be addressed through targeted data collection.

- Dietary habit studies should be conducted for each listed species, including stable isotope techniques to determine dietary composition at the trophic level status. Diet habits should be measured at several sites within the species' range, with an emphasis on designating sites in different habitat types or of potential mercury exposure risk. Seasonal, age-specific, or gender-specific differences in dietary habits should also be explored.

REFERENCE DOSE OF METHYLMERCURY

The reference dose of 0.021 mg/kg body weight/day used by USFWS is based on a multi-generation study of mallard ducks exposed to a diet containing 0.5 mg/kg methylmercury, and this study remains the only complete chronic avian methylmercury toxicity trial. There is significant subjectivity in determination of the reference dose for methylmercury, particularly in the choice of biological responses considered adverse, and in the values of uncertainty factors used to modify the experimental doses.

There are very few published studies that can be used to set a reference dose for mammalian or avian species. During our initial analysis of data from an ongoing subchronic toxicity study in Wisconsin on common loon chicks, we estimated that a reference dose for piscivorous birds could be within the range of 0.017 to 0.087 mg/kg body weight/day, depending on the uncertainty factors used to convert the experimental dose to a reference dose. This study has not been considered in the USFWS analysis and was especially relevant because loons are a piscivorous species like most of the ESA-listed avian species of concern in California. Analysis of additional data from the loon studies on which our calculations are based is ongoing, thus our interpretation of No Observed Adverse Effects Levels (NOAELs) is not conclusive. However, as we demonstrate in our probabilistic risk assessment, the use of a value at the upper end of this range as the reference dose in the USFWS methodology dramatically changes the assessment of risk.

RECOMMENDATIONS:

- For some of the smaller bird species that consume a large fraction of their body weight as food each day, the USFWS reference dose corresponds to dietary concentrations of ~0.05 mg/kg of methylmercury. This would be considered a low value even in unpolluted waters with background concentrations of mercury. The similarity of the reference dose to background doses suggests the need for close scrutiny of the approach used to derive the reference dose, particularly the choice of uncertainty factors that are used to convert a LOAEL dose to a NOAEL dose, and to convert a subchronic dose to a chronic dose.
- All methylmercury reference doses are based on a small number of experimental studies, and these have limited coverage of impacts at the EPA human health-related TRC of 0.3 mg/kg. Future experimental dosing studies

should specifically consider using 0.3 mg/kg as test dietary concentration because of its significance in regulation of water quality.

- Controlled studies have demonstrated that the most sensitive life stage for many avian species is *in ovo*, or in the egg. Relationships between dietary concentrations and egg concentrations should be derived for selected species to calculate the potential of adverse effects to this life-stage.

ASSESSMENT OF RISK DUE TO METHYLMERCURY

Depending on the approach used to calculate methylmercury in diet organisms, 2 to 5 of the six ESA-listed bird species considered in the USFWS analysis were found to be at elevated risk due to methylmercury. Small birds in the list were at particularly high risk. Because small birds consume a greater fraction of their body weight as food each day than larger birds, if they happen to also feed on higher trophic level fish, they are very likely to be exposed to elevated doses of methylmercury even if the prey concentrations are not very high.

To extend the USFWS calculations, methylmercury doses to selected species were estimated in a probabilistic framework, using ranges of BAFs from U.S. EPA and California data, and assuming variability in body weights and diets. When the calculated dose distributions were compared to the avian reference dose, it was found that significant fractions of the selected species experienced a dose higher than 0.021 mg/kg body weight/day. Calculations were also performed with California-specific BAFs, with much narrower ranges than the EPA BAFs. This, in addition to the use of a higher reference dose that could be obtained from the loon study described above, resulted in none of the listed species exceeding the reference dose.

RECOMMENDATIONS:

- Probabilistic assessment of risk provided additional insight into the ranges of methylmercury doses to predator species, especially when input parameters such as the mix of trophic levels in diet, and the methylmercury concentrations in them, were poorly known. However, if the USFWS reference dose is used, the conclusions of risk are not very different from the USFWS conclusions. Probabilistic risk calculations provide insight into the proportion of the target population affected, but do not substantially change the conclusions.

- Methylmercury exposure should be assessed directly for some of the listed species by measuring mercury in blood, feather, eggs, and tissues (either from live captured organisms or those found freshly dead). For example, recent studies from the San Francisco Bay show that the California least tern eggs have lower methylmercury concentrations than the snowy plover eggs, although the USFWS analysis indicates that the tern should be exposed to much higher levels of methylmercury. This could be caused by different transfer efficiencies from the female to the egg or due to incorrect assumptions in the USFWS diet analysis. The collection of additional data of this nature allows more direct evaluation of methylmercury risk to avian species.

- Population level effects of methylmercury on key species should be studied. In other words, if a fraction of the population exceeds the reference dose for methylmercury, what are the potential adverse impacts on the population as a whole? Because some of the endpoints in the toxicity tests are relatively subtle effects, it is not obvious if they are likely to cause measurable effects on a population level.
- Of specific data collection measures that could be undertaken to improve assessment of risk to avian species, it seems that direct measurements of methylmercury concentrations in the relevant prey species in water bodies of interest is likely to be of most benefit.

The State Water Board is interested in hearing your success stories using bioassessment analysis on benthic macro invertebrates (BMI). The state is currently working to develop a policy on Biological Objectives and your success stories could help us to show the value of using bioassessment as a tool to collect data on stream health. If you have a success story to share, please answer the following questions by incorporating them into a summary of a page or less.

Name____
Agency/Company name________________________________

Please tell us your bioassessment monitoring success story (incorporating the questions below) in a page or less.

1. Are you required to do bioassessment monitoring by a TMDL, discharger, permit, Order or other?

2. Do you participate in a Regional Monitoring Program?

3. In addition to bioassessment monitoring, do you also monitor for other constituents such as toxicity or chemical?

4. Have you realized a monetary savings by doing bioassessments as opposed to doing other types of monitoring such as toxicity or chemical?

5. Have you identified a biological impairment as a result of bioassessment monitoring?

6. What have you done to address the impairment?
   a. Have you been able to identify that stream health has improved?
   b. Do you have baseline data for your project?

7. Where is your data stored?

Hardness Selection White Paper

Prepared by Mitch Mysliwiec, Larry Walker Associates

September 21, 2011

1 ISSUE

Questions continue to persist regarding the selection of appropriate hardness values in the derivation of effluent limitations for trace metals in National Pollutant Discharge Elimination System (NPDES) permits in the Central Valley. At issue is whether hardness concentrations measured in ambient waters upstream of a permitted discharge should be used in the establishment of effluent limitations for that discharge.

This paper has been prepared to clearly articulate the technical and legal elements of this issue and to describe a standard approach for hardness selection and effluent limit derivation for trace metals that can be universally applied and which is consistently protective of beneficial uses.

2 EXECUTIVE SUMMARY

The technical information and evaluations presented in this paper provide proof for the following findings:

- The “curve approach” that has been utilized by the Central Valley Regional Water Board in NPDES permitting over the past several years is technically sound and is derived directly from CTR criteria.
- The “curve approach” is protective of aquatic life uses and meets State and federal regulatory requirements.
- The use of reasonable worst-case downstream hardness, determined by the mixture of the effluent and upstream ambient hardness, for the appropriate metals and the appropriate conditions as described in the curve approach is always protective of aquatic life uses.
- The curve approach works for any possible combination of upstream ambient and effluent conditions, including:

    Upstream ambient metals concentrations in compliance with CTR criteria

    Upstream ambient metals concentrations not in compliance with CTR criteria

    Upstream hardness concentration greater than effluent hardness

    Upstream hardness concentration less than effluent hardness

    Critical low flow in receiving water is zero

    Critical low flow in the receiving water is greater than zero

- Upstream ambient hardness or effluent hardness should not be used in isolation in the derivation of effluent limitations for any trace metals or for any discharge conditions.

3 BACKGROUND

Discharges to surface waters that may contain pollutants are regulated under the Clean Water Act and California Water Code. NPDES permits are utilized as the primary regulatory tool by the State of California and United States Environmental Protection Agency (USEPA) to ensure that discharges do not cause or contribute to violations of water quality standards established to protect beneficial uses of the receiving water. Effluent limitations are established in NPDES permits to limit the concentration and mass of specific constituents in a discharge that may cause or contribute to violations of adopted water quality standards in the California Toxics Rule (CTR) (USEPA 2000) or the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins and the Water Quality Control Plan for the Tulare Lake Basin (Central Valley Basin Plans).

The California Toxics Rule (CTR) (USEPA 2000) promulgates aquatic life- and human health-based water quality criteria for 126 priority pollutants, including hardness-dependent aquatic life criteria for seven trace metals. For the seven hardness-dependent trace metals criteria contained in the CTR, higher hardness corresponds to higher numerical values of the standards, reflective of lower toxicity. In California, the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Plan, or SIP) (SWRCB 2005) outlines the procedures for implementing the toxic standards listed in the CTR. The SIP provides a procedure for determining if reasonable potential (RP) exists for a discharge to cause or contribute to an exceedance of a water quality criteria listed in the CTR. If RP exists, procedures are outlined in the SIP to develop water quality based effluent limits (WQBELs) to ensure the discharge does not cause or contribute to water quality criteria exceedances in the receiving water. Both the CTR and SIP state that criteria should be properly adjusted for hardness. Lacking in the CTR and the SIP is a precise statement of where hardness should be measured and how to characterize the hardness (e.g. minimum measured hardness, 5th percentile, or other value) for use in calculating the criteria for the derivation of effluent limits.

Both the CTR and the SWRCB-adopted SIP provide direction regarding the consideration of hardness in the derivation of effluent limits. However, neither the CTR nor SIP specifically state the methodology to be used in selecting hardness values for calculation of the CTR-based metals effluent limitations. However, guidance was provided on the selection of the appropriate ambient hardness by the SWRCB in Water Quality Order WQO 2008-0008 (City of Davis) and the Sacramento Superior Court in its decision regarding the El Dorado Irrigation Deer Creek Wastewater Treatment Plant (see *California Sportsfishing Protection Alliance v. California Regional Water Quality Control Board, Central Valley Region,* Sacramento Superior Court Case No. 34-2009-80000309) (EID Court Order). The Sacramento Superior Court defined "ambient" as the surface water surrounding the aquatic life and concluded that the metal criteria should be calculated based on the actual ambient hardness of the surface water after the effluent and receiving water mix (i.e., downstream receiving water hardness). (EID Court Order, p. 14)[1] The

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[1] The Sacramento Superior Court clarified in footnote #7 of the EID Court Order that this means after the effluent and receiving water *fully* mix, but did not define "fully mixed." The procedures described in this paper result in protective effluent limits for the "fully mixed" condition, and throughout the waterbody including at the point of discharge into the water body. This is consistent with the CTR, which states, "For all waters with mixing zone

court found that "*it would be unreasonable to interpret the regulation as requiring States to ignore the effect of the effluent on the hardness (and consequent toxicity) of the downstream receiving water*." (*Ibid,* p. 14)

The State Water Board allows, where reliable, representative data are available, the hardness value for calculating criteria can be the downstream receiving water hardness, after mixing with the effluent. (Order WQO 2008 0008, p. 11.) Regional water boards have considerable discretion in determining ambient hardness as long as the hardness values are protective under all flow conditions. (*Ibid.*, pp. 10-11.) The court evaluated the State Water Board's determinations and concluded, "*The Court agrees, in part. Nothing in the CTR itself gives the Board discretion to define the term "ambient" on a case-by-case basis. However, under the federal Clean Water Act, each state is free to enforce its own water quality laws so long as its standards are not less stringent than those established by the federal government.*" (EID Court Order at p. 14).

A 2006 Study[2] describes an evaluation of all discharge conditions of high to low receiving water flows, and whether the upstream ambient hardness is greater than or less than the effluent hardness. The 2006 Study considered upstream metals concentrations to equal the CTR criterion calculated at the upstream ambient hardness as the critical condition, but did not consider the case where upstream ambient metals concentrations exceed the CTR criteria. This paper augments the consideration of possible permitting scenarios.

4 METHODOLOGY FOR HARDNESS SELECTION

This section describes the methodology that has been developed for and utilized in Central Valley NPDES permitting. From 2007 through 2010, the "curve method" has been used to determine the appropriate hardness for use in trace metal criteria calculations in over 40 NPDES permits. The method remains in use by the Central Valley Regional Water Quality Control Board.

As discussed above, the CTR criteria must be calculated based on the ambient hardness. Since wastewater discharges contain hardness that will affect the hardness of the receiving water, it is necessary to consider the hardness of the effluent in the downstream receiving water. Thus, the downstream ambient hardness should be used to calculate the criteria. The CTR also requires that unless a mixing zone is allowed, the criteria are applicable throughout the water body including at the point of discharge into the water body. This discussion assumes that mixing zones have not been granted, so this means that the wastewater discharge must be in compliance with the criteria at the point of discharge (i.e., effluent dominated condition) and as it mixes with the receiving water downstream of the discharge. The 2006 Study considers all mixtures of effluent and receiving water to ensure the discharge does not cause an exceedance of the criteria.

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regulations or implementation procedures, the criteria apply at appropriate locations within or at the boundary of the mixing zones; otherwise the criteria apply throughout the water body ***including at the point of discharge into the water body***".(40 CFR Section 131.18(c)(2)(i),emphasis added) Because the CTR metals criteria are calculated using the hardness, the hardness at the point of discharge defines the metals criteria at the point of discharge. It is unlikely that the discharge has fully mixed with the receiving water at this point. However, the methodology used also prevents toxicity at the point where the discharge is fully mixed.

[2] Emerick, R.W., Borroum, Y., Pedri, J.E. 2006, California and National Toxics Rule Implementation and Development of Protective Hardness Based Metal Effluent Limitations, WEFTEC, Chicago ,Ill.

The methodology is derived from the hardness-based formulas that are contained in the CTR and relies on the shape of the resulting criterion versus hardness curves. Some of the curves are convex functions with concave up shaped curves (acute cadmium, lead, and acute silver). Others are concave functions with concave down shaped curves (chronic cadmium, chromium III, copper, nickel, and zinc). The curve-based methodology, as described below, can be used to demonstrate the proper selection of hardness values to calculate criteria that are protective of aquatic life at the point of discharge and downstream of the discharge.

As stated above, water quality criteria (WQC) listed in the CTR for some of the trace metals are dependent on hardness, with higher hardness corresponding to lower toxicity. It is generally accepted that calcium and magnesium cations compete with potentially toxic heavy metals for binding and receptor sites in aquatic organisms, decreasing the toxicity of the heavy metals, an antagonistic affect. For receiving waters and effluent from publicly owned treatment works (POTWs), calcium and magnesium account for essentially all measured hardness. Hardness-dependent criteria maximum concentration (CMC) and continuous criteria concentration (CCC) for metals are calculated using Equations (1) and (2), respectively. The values for m_A, b_A, m_C, and b_C have been determined by USEPA through the criteria calculation process for each of the trace metals. As per the CTR, the minimum of 400 mg/L as $CaCO_3$ or the measured hardness of the water being evaluated is used in Equations (1) and (2).

$$\text{CMC} = exp\{m_A \cdot ln(\text{hardness}) + b_A\} \tag{1}$$

$$\text{CCC} = exp\{m_C \cdot ln(\text{hardness}) + b_C\} \tag{2}$$

The m_A, b_A, m_C, and b_C values specific to the separate heavy metals are specified in the CTR and are listed in Table 1. For the values listed in Table 1, the CMC for a given metal will always be greater than or equal to the corresponding CCC at any selected level of hardness. Without consideration of a mixing zone, the CCC will be the most stringent criterion.

Table 1: CMC and CCC Constants for Metals.

Metal	m_A	b_A	m_C	b_C
Cadmium	1.128	-3.6867	0.7852	-2.715
Copper	0.9422	-1.700	0.8545	-1.702
Chromium (III)	0.8190	3.688	0.8190	1.561
Lead	1.273	-1.460	1.273	-4.705
Nickel	0.8460	2.255	0.8460	0.0584
Silver	1.72	-6.52	---(1)	---(1)
Zinc	0.8473	0.884	0.8473	0.884

(1) Silver chronic not promulgated.

Because the hardness-dependent metals criteria form a log-log relationship with hardness, the criteria have special mathematical properties[3]. If m_C is less than 1.0 and the CCC curve is drawn between any two hardness values, a straight line connecting the endpoints of the CCC curve will always be less then the corresponding CCC curve because the of the shape of the curve (negative

[3] The special properties of the hardness-dependent criteria equations are discussed in the Appendix.

curvature). For CCC with positive curvature, i.e. m_C greater than 1.0, a straight line connecting the end points between any two values of hardness will always be above the CCC curve (positive curvature). For example, the CCC for copper is concave down (m_C=0.8545, negative curvature) and the CCC for lead is concave up (m_C=1.273, positive curvature). The CCC for copper and lead are plotted in Figure 1 for hardness ranging from 10 to 200 mg/L as $CaCO_3$ to illustrate positive and negative curvature.

Suppose the 10 mg/L as $CaCO_3$ in Figure 1 corresponds to the upstream receiving water (R1) hardness, and the 200 mg/L as $CaCO_3$ is representative of the effluent (eff) hardness, the end points of the plotted curves are the CCC of the pure receiving water and pure effluent, respectively. If the R1 metal concentration is plotted at 10 mg/L as $CaCO_3$ on Figure 1 and the effluent metal concentration is plotted at 200 mg/L as $CaCO_3$, a straight line connecting the two end points represents any possible blend of the effluent and receiving water (Equation (3), cf. eq. 1.16 in Fischer, et al. 1979). For this example, the possible downstream ambient hardness conditions would range from 10 mg/L as $CaCO_3$,when there is no discharge[4], to 200 mg/L as $CaCO_3$, at the effluent dominated condition. Therefore, the criteria will vary based on these varying hardness concentrations. A hardness concentration between 10-200 mg/L as $CaCO_3$ may be used to calculate the CTR criteria for establishing water quality-based effluent limits (WQBELs) in NPDES permits, and must result in criteria that are protective of aquatic life. The 2006 Study provides procedures for determining the appropriate downstream ambient hardness for calculating the CTR criteria, and resulting WQBELs, that ensures the discharge does not cause metals concentrations to exceed the varying CTR criteria.

$$C = p \cdot \left(C_{eff} - C_{R_1}\right) + C_{R_1} \qquad (3)$$

Where:
C_{eff} = effluent concentration
C_{R1} = upstream concentration
C = concentration at effluent fraction p

$$p = \frac{\text{volume of effluent}}{\text{total volume of mixture}} = \text{fraction of effluent}$$

The curve method is superior to relying on downstream receiving water samples alone because it captures all possible mixed conditions in the receiving water. Both receiving water and effluent hardness vary based on flow and other factors, but the variability of receiving water and effluent hardness is sometimes independent. Using a calculated hardness value ensures that all possible mixed downstream values that may result from these two independent variables are considered. Relying on receiving water sampling alone is less likely to capture all possible mixed downstream conditions.

All concentrations of the metals less than the CCC are protective of the aquatic life in the receiving water. If the receiving water metals concentration equaled the CCC at the upstream receiving water hardness (i.e., no assimilative capacity) and the effluent metals concentration equaled the CCC at the effluent-dominated hardness, any possible blend of receiving water and effluent would be below the CCC for copper calculated with the corresponding blended hardness (i.e., from 10-200 mg/L as $CaCO_3$). For lead, however, any possible blend of receiving water and effluent would be above the CCC calculated with the corresponding blended hardness,

[4] This condition represents either infinite dilution downstream of a discharge or the upstream condition.

resulting in exceedance of the CCC throughout the receiving water and may result in toxicity. Also note that the effluent could be the lower hardness and the result is the same, if the effluent concentration of metal is at the CCC for the effluent hardness, any blend of effluent and receiving water will be less than the CCC corresponding to the blended hardness. The result is a direct consequence of the CCC curvature for each metal which is completely determined by whether value of m_C is greater or less than 1.0[5].

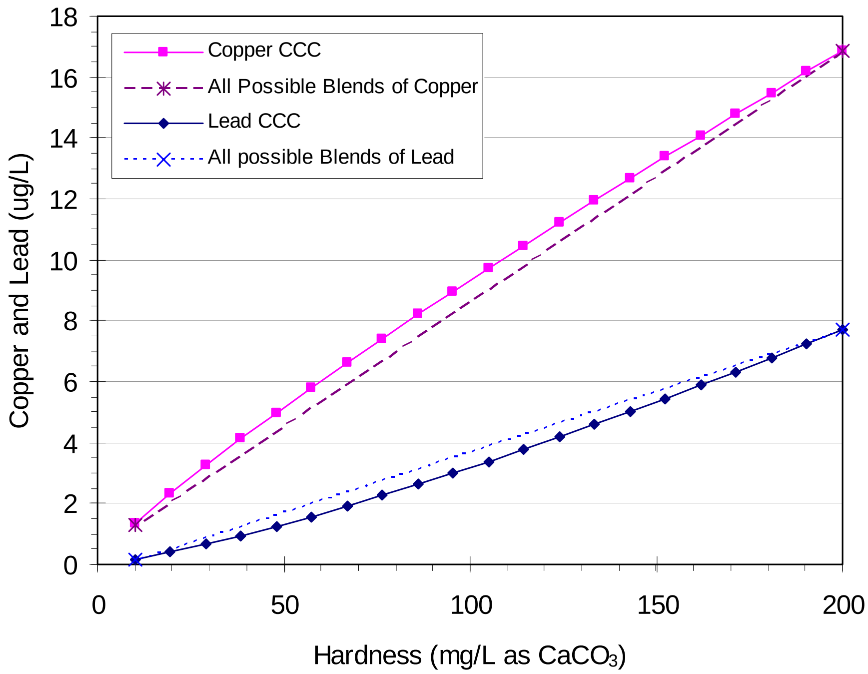

Figure 1: Lead and Copper CCC Endpoints Represent R1 and Effluent.

From Figure 1 it is clear that using the downstream ambient hardness at the effluent-dominated condition to calculate the criteria for lead, and subsequent WQBELs, would not be protective of the receiving water as all blends of lead downstream of the discharge exceed criteria. Therefore, for this example, a lower downstream ambient hardness must be used to calculate the criteria when establishing WQBELs.[6] For criteria with m_C or m_A greater than 1.0, the tangential alternate criteria have been employed by USEPA[7] to account for the concave up curve in determining the concentration in the discharge so that all blends of effluent and receiving water satisfy the criteria. To determine the maximum safe discharge concentration (i.e., WQBELs based on the reasonable worst-case downstream hardness), a line tangent to the criterion at the receiving water hardness is projected to the effluent hardness. The tangent line, representing any blend of

[5] If the value of m = 1.0, the criteria would plot as a straight line, coincident with the concentrations representing mixtures of effluent and receiving water.

[6] The downstream ambient hardness must be used to calculate the CTR criteria, which for this example ranges from 10-200 mg/L as Ca CO_3. Using a hardness of 200 mg/L as Ca CO_3 is not protective for lead, so a lower downstream ambient hardness must be determined to ensure the CTR criteria are not exceeded in the receiving water.

[7] City of Coeur D'Alene, ID NPDES permit.

effluent and receiving water, will always be below the criterion, there by guaranteeing the criteria are met for any blend of the effluent and receiving water. Equation (4) is the tangential alternate criterion with subscripts R1 and eff denoting upstream and effluent, respectively. Equation (5) is a simplified version of (4). Note that the equation is simply the criterion at the receiving water hardness plus the amount calculated by projecting the slope of the curve at the receiving water hardness the distance equal to the difference between the effluent and upstream hardness.

$$CCC_{eff} = \left\{ \frac{m_C}{hardness_{R1}} \cdot \left(hardness_{eff} - hardness_{R1} \right) + 1 \right\} \cdot exp\left\{ m_C \cdot ln\left(hardness_{R1} \right) + b_C \right\} \quad (4)$$

$$CCC_{eff} = \left\{ \frac{m_C}{hardness_{R1}} \cdot \left(hardness_{eff} - hardness_{R1} \right) + 1 \right\} \cdot CCC_{R1} \quad (5)$$

The tangential alternate criteria is used to calculate the maximum effluent lead concentration for the scenario presented above and the result is plotted Figure 2.

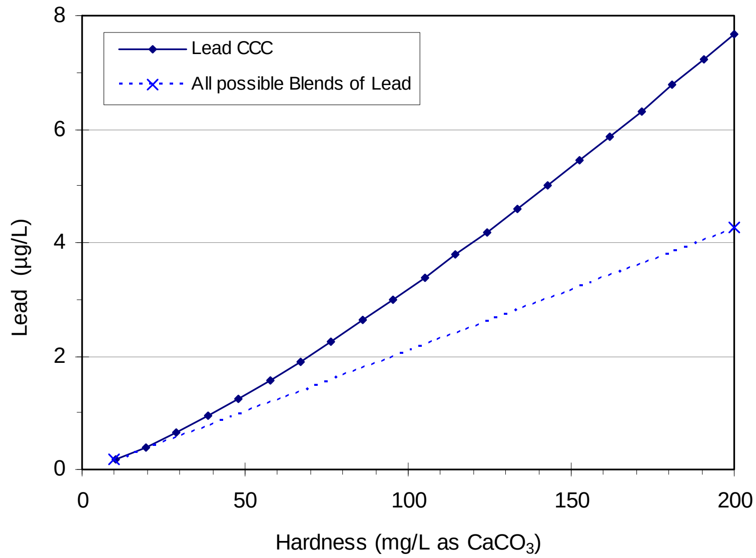

Figure 2: Lead and Copper CCC Endpoints Represent Effluent and R1, Tangential Alternate Criteria Employed for Allowable Effluent Lead Concentration.

An alternative display of the information is to plot the CCC, metal, and hardness in terms of the percent effluent, as in Figure 3. Note that a 0% effluent may represent either infinite dilution downstream of a discharge or the upstream condition. The point of discharge, or the situation when there is no receiving water flow, is represented by 100% effluent (i.e., effluent-dominated condition). The Figure is equivalent to Figure 2, with the hardness ranging from the upstream value of 10 mg/L as $CaCO_3$ to 200 mg/L as $CaCO_3$.

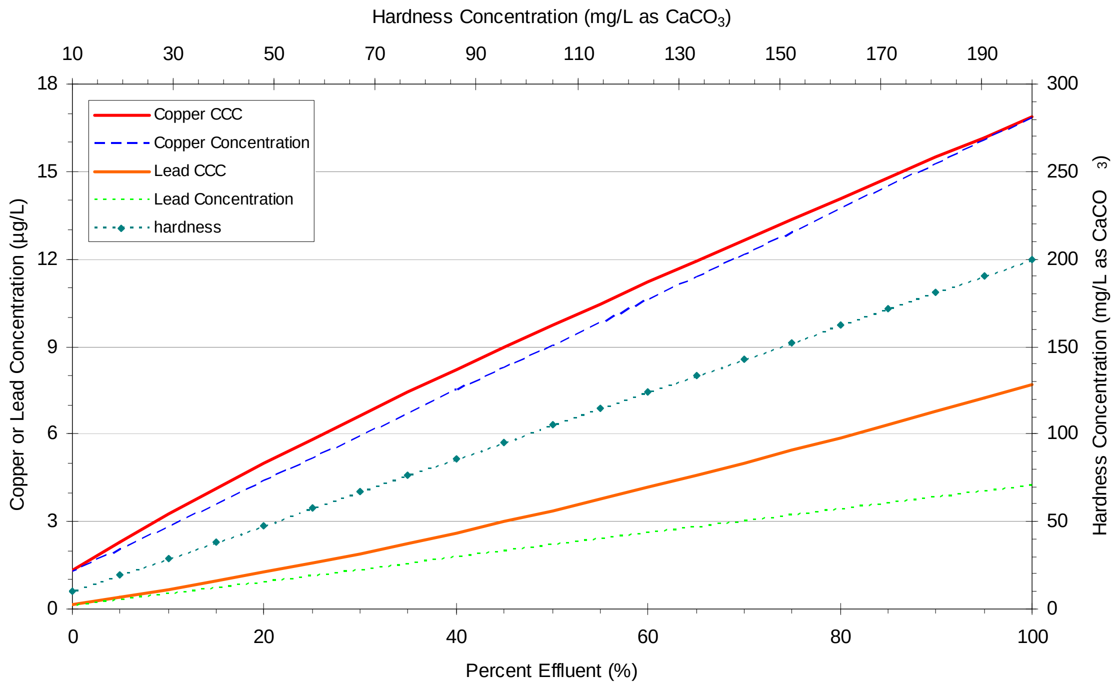

Figure 3: Lead and Copper CCC Endpoints Represent Effluent and R1, Tangential Alternate Criteria Employed for Allowable Effluent Lead Concentration Plotted in terms of Percent Effluent.

A 2006 Study[8] describes an evaluation of all discharge conditions of high to low receiving water flows, and whether the upstream ambient hardness is greater than or less than the effluent hardness. The 2006 Study considered upstream metals concentrations to equal the CTR criterion calculated at the upstream ambient hardness as the critical condition. The following is a demonstration that the curves method is the valid method to select hardness values to calculate criteria to establish WQBELs even when the upstream ambient concentrations exceed the CTR criteria based on the upstream ambient hardness.

For concave down metals, when both the effluent and upstream ambient metal concentrations are at or below the CTR criteria calculated from the effluent and upstream hardness, respectively, any mixture of effluent and receiving water will always be in compliance with the CTR criteria. Given the entire receiving water is protected when criteria are calculated using the effluent-dominated hardness, this is the appropriate choice for hardness selection (i.e., reasonable worst-case downstream ambient hardness). The concept behind the 2006 Study is presented as a schematic in Figure 4 for the case of upstream hardness less than effluent hardness. If the upstream ambient copper concentration is at the CTR criterion, there is no assimilative capacity as the water column is 100% of the CTR criterion. If the discharge is at the CTR criterion based on effluent hardness, then the receiving water at the end of pipe will equal the effluent hardness and metals concentration; and the receiving water at the end of the pipe will be at 100% of the CTR criterion. As the hardness and metals in the receiving water and effluent mix, the receiving

[8] Emerick, R.W., Borroum, Y., Pedri, J.E. 2006, California and National Toxics Rule Implementation and Development of Protective Hardness Based Metal Effluent Limitations, WEFTEC, Chicago ,Ill.

water downstream of the discharge will be below the CTR criterion due to the concave down shape of the criteria curve.

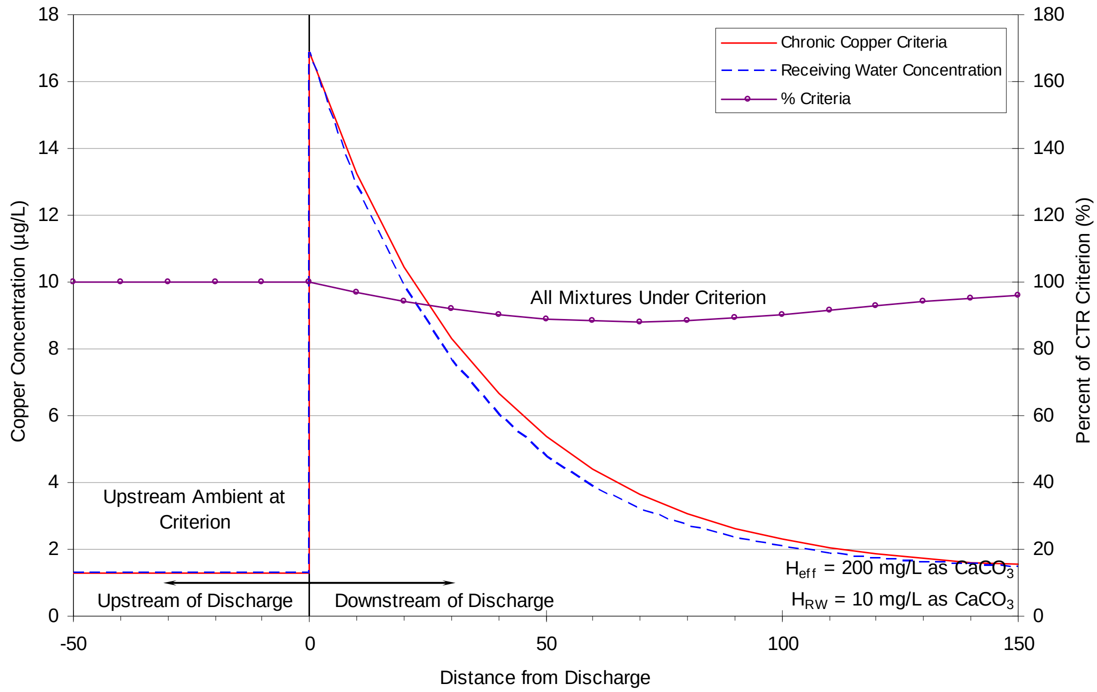

Figure 4: Schematic of Receiving Water with Discharge of Higher Hardness and Metals Criteria for a Concave Down Metal (Copper).

For the condition where the upstream ambient metal concentration exceeds the CTR criterion based on upstream ambient hardness, similar schematics may be constructed. Figure 5 is a schematic of the condition where the upstream ambient hardness is less than the effluent hardness, the upstream ambient copper concentration is 140% of the CTR criterion, and the effluent concentration of copper is 0.0 µg/L. For the scenario displayed in Figure 5, the upstream receiving water is at 140% of the CTR criterion and right at the point of discharge the receiving water is at 0% of the CTR criterion due to the assumed 0.0 µg/L in the effluent. As the effluent and receiving water mix downstream of the discharge, the water quality is improved from the upstream condition. The clean effluent is diluting the upstream ambient. However, as the plume moves downstream with increased mixing and the percent effluent decreases, the copper concentrations increase as there is more upstream ambient represented in the water column. Depending on the flow ratios, the concentration in the receiving water downstream of the discharge may increase to be greater than the CTR criterion strictly due to the influence of the upstream ambient. For the case represented in Figure 5, the effluent is not causing or contributing to a receiving water exceedance of a water quality standard. All mixtures of effluent and receiving water have improved water quality over the upstream ambient, but the downstream mixtures may exceed CTR criterion solely due to the high level of metal in the upstream ambient.

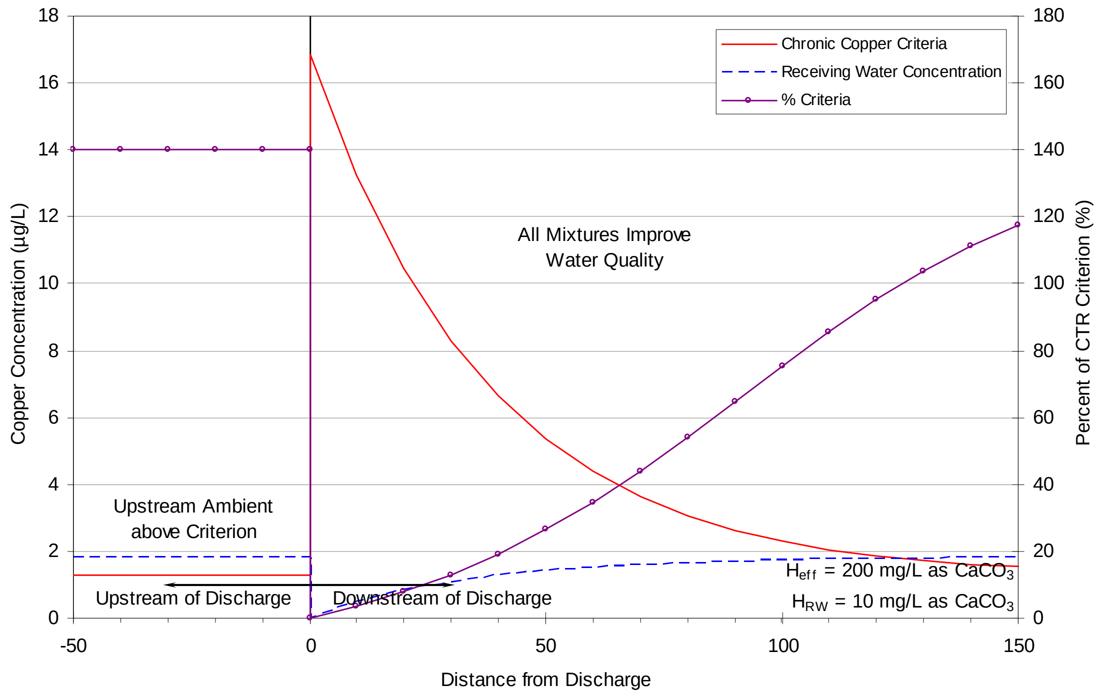

Figure 5: Schematic of Receiving Water with Discharge of Higher Hardness and Metals Criteria for a Concave Down Metal (Copper). Upstream Ambient Above CTR Criterion and Effluent at 0.0 µg/L.

A similar schematic may be constructed for the case of upstream ambient exceeding the CTR criterion with the effluent concentration equal to the CTR criterion calculated with the upstream ambient hardness level, as is presented in Figure 6. Upstream of the discharge the receiving water is assumed to exceed the CTR criterion calculated from the upstream ambient hardness. At the point of discharge the effluent is assumed to equal the CTR criterion based on the upstream ambient hardness. As with the case with no copper in the effluent, mixtures with sufficiently high ratio of upstream water exceed the CTR criteria solely due to the levels of metal in the upstream ambient. All mixtures of the effluent and receiving waters have improved water quality compared the upstream ambient. For the case of effluent metals concentration equal to the CTR criterion based on upstream ambient hardness levels, the effluent is not causing or contributing to a receiving water exceedance of a water quality standard.

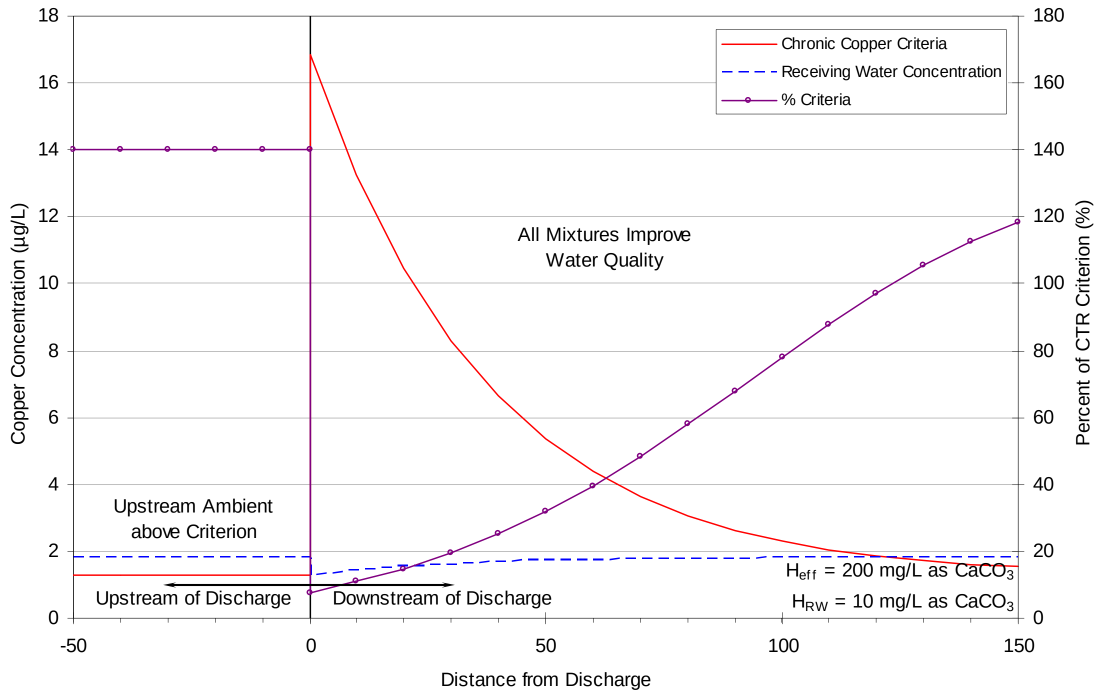

Figure 6: Schematic of Receiving Water with Discharge of Higher Hardness and Metals Criteria for a Concave Down Metal (Copper). Upstream Ambient Above CTR Criterion and Effluent CTR Criteria Calculated with Upstream Ambient Hardness Level.

A schematic of the condition where the upstream ambient copper exceeds the CTR criterion and the effluent copper concentration equals the CTR criterion based on the effluent hardness is presented in Figure 7. In the case represented in the Figure, the upstream ambient exceeds the CTR criterion and at the point of discharge the receiving water equals the CTR criterion. For all mixtures downstream of the discharge the water quality is improved compared to the upstream ambient. For the case of effluent metals concentration equaling the CTR criterion calculated with the effluent hardness, the effluent is not causing or contributing to a receiving water quality standard. For the case of upstream exceeding CTR criteria, using the curve method results in selecting the proper hardness to ensure the metals in the effluent will not cause or contribute to an exceedance of a water quality standard, as all downstream water quality is improved over upstream conditions. The conditions for the scenario presented in Figure 7 are plotted in terms of percent effluent in Figure 8. For 100% effluent, the copper concentration is equal to the CTR criterion, and the 0% effluent exceeds the CTR by 140%.

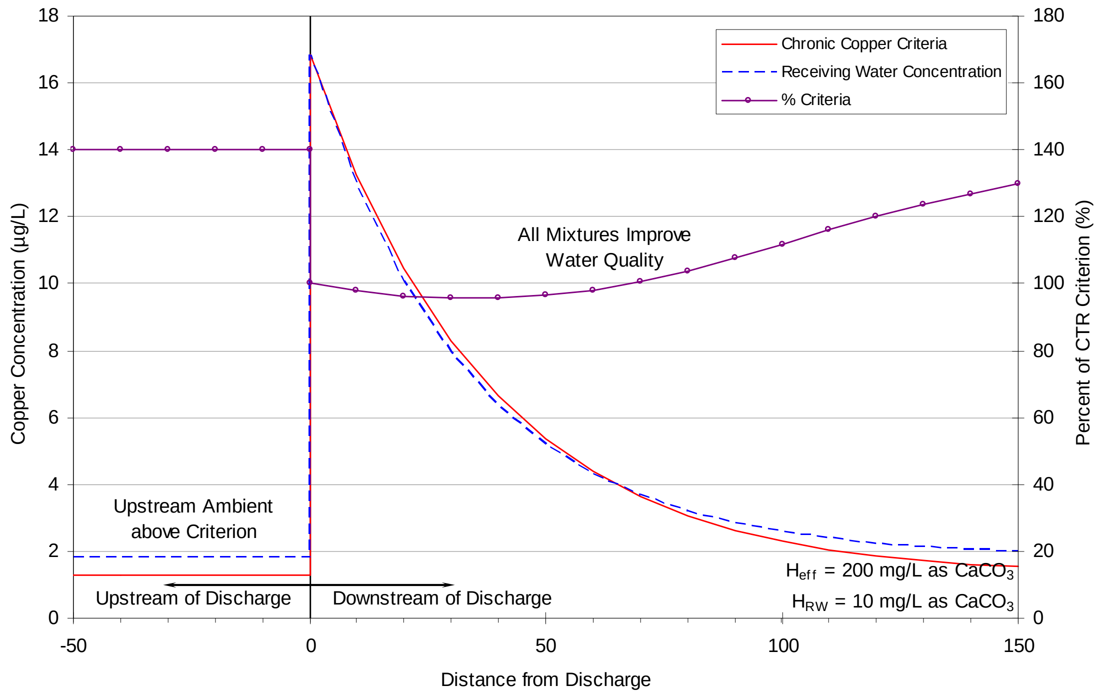

Figure 7: Schematic of Receiving Water with Discharge of Higher Hardness and Metals Criteria for a Concave Down Metal (Copper). Upstream Ambient Above CTR Criterion and Effluent CTR Criteria Calculated with Effluent Hardness Level.

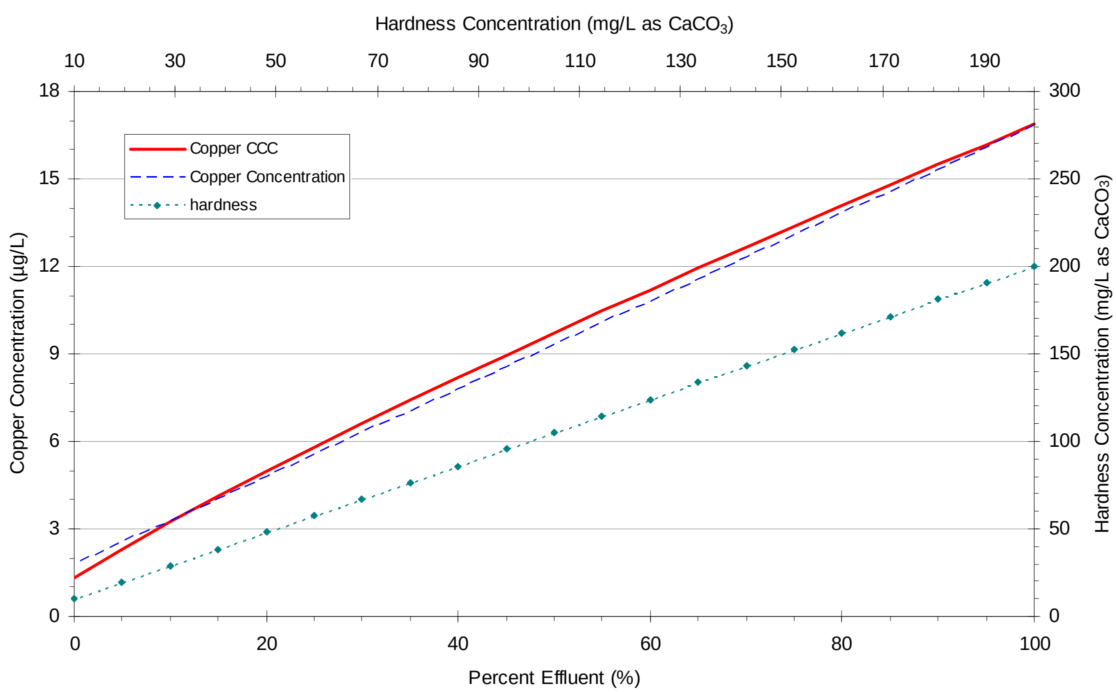

Figure 8: Copper CCC and Receiving Water Concentration Endpoints Represent Effluent and R1 in terms of Percent Effluent where Upstream Ambient Copper Concentrations Exceed CTR values by 140%.

Similar graphs may be constructed for the concave up metals and cases where the upstream hardness is greater than the effluent hardness. As will be demonstrated below, the curve method results in selection of hardness for development of effluent metals criteria that will not cause or contribute to exceedances of receiving water standards.

In Summary:

- The curve method is employed to select reasonable worst-case ambient hardness for use in calculating CTR criteria to calculate WQBELs that will not cause or contribute to a receiving water exceedance below the point of discharge.
- WQBELs are to be established to ensure the discharge does not cause or contribute to receiving water exceedances of criteria. Effluent can not be controlled to correct an upstream exceedance (even if there is no metal in the effluent). Upstream conditions are not affected by the effluent and therefore are not controllable through effluent limitations that apply at the point of discharge and downstream.
- Upstream hardness is not appropriate as the sole factor to determine CTR criteria for establishing WQBELs. Upstream hardness, in combination with effluent hardness, should be used in the determination of the reasonable worst-case downstream ambient hardness to calculate the metals criteria.
- Upstream hardness is appropriately used to determine water quality objectives upstream from the point of discharge for assessment of upstream criteria, upstream 303(d) listings, upstream TMDLs, in the reasonable potential analysis[9], etc.
- A complete suite of potential cases is evaluated below.

5 SCENARIOS THAT MAY BE ENCOUNTERED IN NPDES PERMITTING

The following ambient scenarios may be encountered in an NPDES permitting determination:

- Upstream hardness is less than effluent hardness
  - Metals violate CTR standards in upstream waters
  - Metals do not violate CTR standards in upstream waters
- Upstream hardness is greater than effluent hardness
  - Metals violate CTR standards in upstream waters
  - Metals do not violate CTR standards in upstream waters

Additionally, for each ambient scenario, the following trace metals scenarios may be encountered:

- Effluent criteria are calculated for trace metals with concave up curve

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[9] The SIP, Section 1.3 Step 6, requires a WQBEL if the receiving water is impaired upstream (outside the influence) of the discharge, i.e., if the Maximum Ambient Background Concentration of a pollutant exceeds the applicable criterion, adjusted for hardness. For comparing the Maximum Ambient Background Concentration to the applicable criterion, the reasonable worst-case upstream ambient hardness should be used to adjust the criteria. This area is outside the influence of the discharge, so the effect of the effluent hardness should not be considered.

- Effluent criteria are calculated for trace metals with concave down (convex) curve

Listing of the potential scenarios that may be encountered in a permitting context can be represented by a 3-D matrix of the above scenarios (i.e., 8 cases). Furthermore, an additional potential variable is the magnitude and duration of receiving water flow, leading to the two following scenarios:

- Effluent is diluted by upstream receiving water at critical low flow with potential dilution credits.
- Effluent is not diluted by upstream receiving water at critical low flow

The preceding discussion focused on the scenarios with effluent hardness greater than the upstream ambient hardness and metals with concave down curved criteria equations. Below, each of the scenarios is explored to ensure the curve method does in fact result in WQBELs that are protective of receiving water standards.

6 ASSESSMENT OF THE CURVE-BASED METHODOLOGY FOR EACH OF THE NPDES PERMITTING SCENARIOS

An assessment of validity of the curve-based methodology in protecting beneficial uses and downstream water quality under each of the ambient scenarios described above is presented herein.

6.1 Concave Down Metals

Trace metals with concave down criteria curves have the "m" parameter less than 1.0. From Table 1, the metals with concave down criteria curves include: chronic cadmium; copper, chromium (III), nickel, and zinc. The hardness at the point of discharge (representing the effluent dominated hardness condition) will result in criteria for establishing end-of-pipe WQBELs that are protective of the water quality standards regardless of whether the upstream hardness is greater than or less than the effluent hardness.

6.1.1 Effluent hardness greater than upstream hardness

The case of effluent hardness exceeding upstream hardness with a concave down metal is discussed above in Section 4, Methodology for Hardness Selection, using copper as an example.

6.1.1.1 Upstream metals meet CTR

The copper curves in Figure 3 are examples of concave down curve and the upstream metal meeting CTR criteria with the effluent hardness greater than the upstream hardness. A schematic of a discharge of a concave down metal into a receiving water meeting the CTR criterion is presented as Figure 4. For the case under consideration here, choosing the ambient hardness at the point of discharge (represented by the effluent-dominated hardness) to determine the criteria to establish end-of-pipe WQBELs, results in all downstream waters complying with the CTR criteria.

6.1.1.2 Upstream metals exceed CTR

The copper curves in Figure 8 are examples of a concave down curve and the upstream metal exceeding CTR criteria with the effluent hardness greater than the upstream hardness. A schematic of a discharge of a concave down metal into a receiving water exceeding the CTR criterion is presented as Figure 7, for the case under consideration here, choosing the ambient hardness at the point of discharge (represented by the effluent-dominated hardness) to determine the criteria to establish end-of-pipe WQBELs, results in all downstream waters with improved water quality in comparison to upstream. As with the case where the upstream ambient metals concentrations meet the CTR criteria, choosing the effluent-dominated hardness to calculate the criteria to establish end-of-pipe WQBELs ensures the effluent does not cause or contribute to an exceedance of a water quality standard.

6.1.2 Effluent hardness less than upstream hardness

For concave down metals, the case of effluent hardness less than the upstream receiving water hardness does not change the result that the hardness at the point of discharge is the appropriate hardness to calculate criteria.

6.1.2.1 Upstream metals meet CTR

In the case of upstream receiving water meeting the CTR criteria based on upstream receiving water hardness and concave down metals criteria curves is illustrated in Figure 9. Note that Figure 9 is the mirror image of the copper and hardness curves in Figure 3, resulting in the assertion that, for trace metals with concave down criteria, the ambient hardness at the point of discharge is the appropriate hardness for calculating the criteria to establish end-of-pipe WQBELs that are protective. Note that in the 2006 study, the case considered here is presented in their Figure 2, however, the hardness representation on their Figure is in error. Because the upstream hardness is supposed to be greater than the effluent, the effluent fraction of 0 should correspond to the higher hardness, as it does in Figure 9 of the current study. The discharge schematic for the case of upstream hardness at higher levels than the effluent hardness is presented as Figure 10.

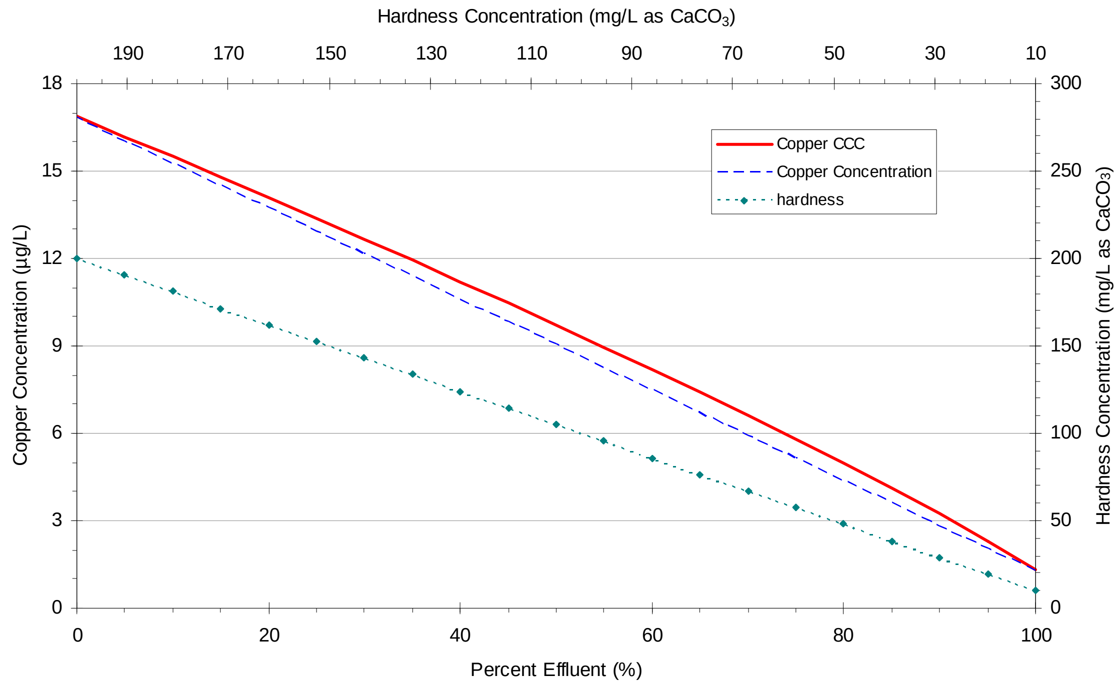

Figure 9: Copper CCC and Receiving Water Concentration Endpoints Represent Effluent and R1 in terms of Percent Effluent where Upstream Ambient Hardness is Greater than Effluent Hardness.

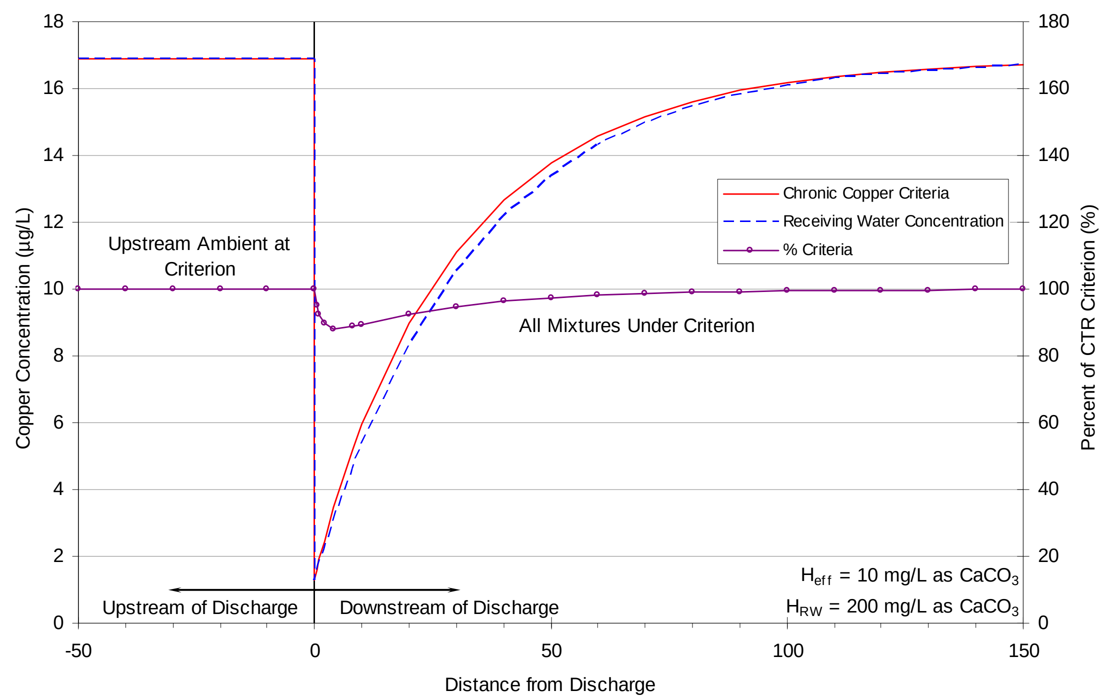

Figure 10: Discharge Schematic for Copper where Upstream Hardness is Greater than Effluent Hardness.

6.1.2.2 Upstream metals exceed CTR

Where upstream metals exceed the CTR criteria and the hardness upstream is greater than the effluent hardness, the criteria curves take the form as presented in Figure 11 for the case of upstream hardness equal to 200 mg/L as $CaCO_3$ and effluent hardness equal to 10 mg/L as $CaCO_3$. At 0% effluent, i.e. upstream of the discharge, the receiving water concentration of copper exceed the CTR criteria by 140%. When the WQBELs are based on the CTR criteria calculated using the downstream effluent-dominated hardness, all mixtures of effluent and receiving water (i.e., percent effluent > 0%), have smaller exceedances of the criteria than occurs upstream of the discharge. The matching discharge schematic is presented in Figure 12, which clearly demonstrates all downstream waters have improved water quality over the upstream conditions.

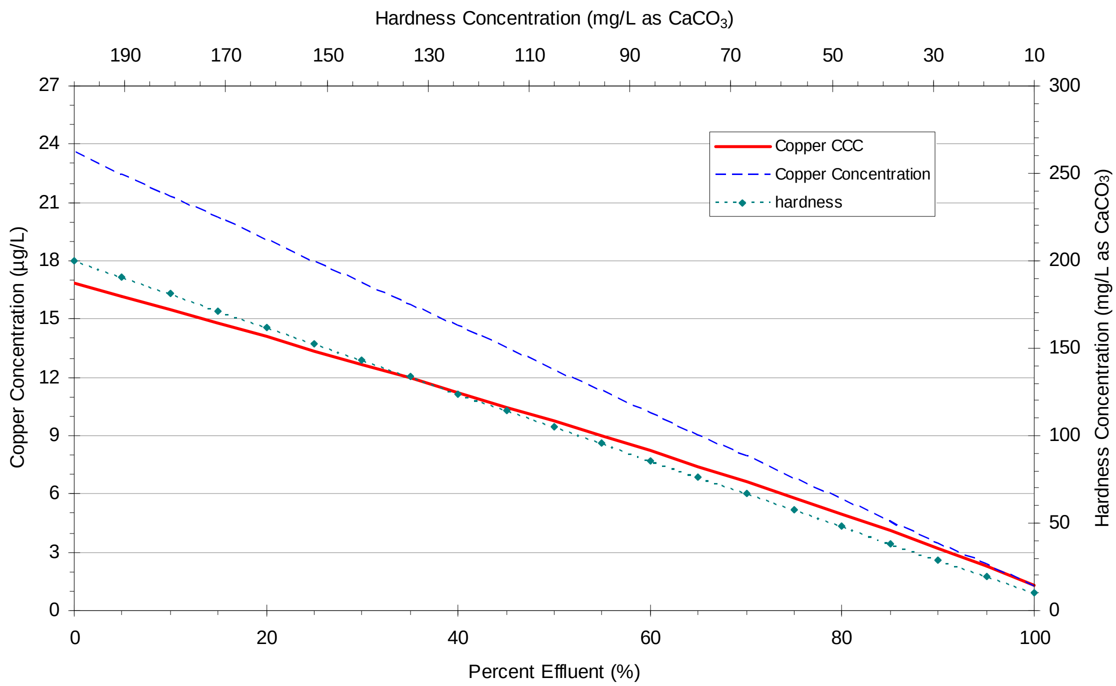

Figure 11: Copper Criteria and Receiving Water Concentrations where the Upstream Hardness is Greater than Effluent and Upstream Copper Concentrations Exceed CTR Criterion by 140%.

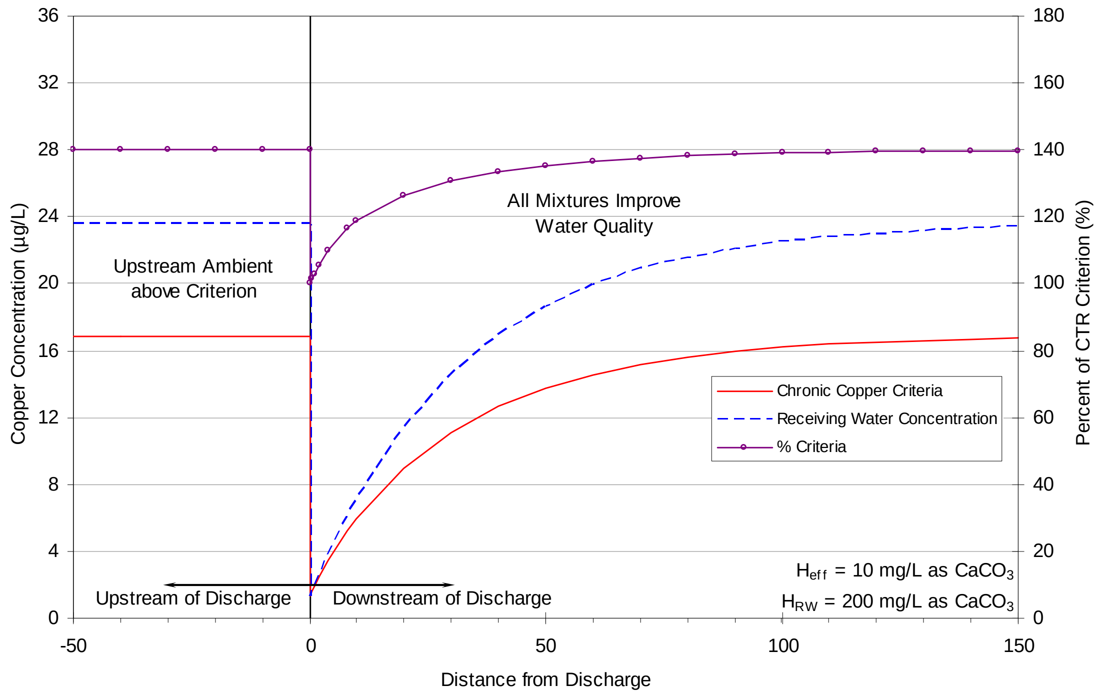

Figure 12: Discharge Schematic for the case where the Upstream Hardness is Greater than Effluent and Upstream Copper Concentrations Exceed CTR Criterion by 140%.

6.2 Concave Up Metals

Trace metals with concave up criteria curves have the "m" parameter greater than 1.0. From Table 1, the metals with concave up criteria curves include: acute cadmium and silver; and acute and chronic lead. For the concave up metals, the limiting criteria may be when the upstream hardness is greater than or less than the effluent hardness. The site-specific upstream hardness levels along with the effluent hardness should be used to determine the limiting criteria. Generally, Equation (5) is used twice, once with the maximum receiving water hardness and again with the minimum receiving water hardness to determine which is most stringent. Additionally, as is discussed fully in Section 6.2.2, if the receiving water hardness is much greater than the effluent hardness, Equation (5) may result in the calculation of a negative, or unreasonably low criterion and special consideration may be necessary to determine an appropriate criterion. The special case is not an issue with the curve method, but rather, is an identification of conditions that may occur in receiving waters, requiring special consideration to ensure the protection of beneficial uses in the receiving water.

6.2.1 Effluent hardness greater than upstream hardness

When considering effluent hardness greater than upstream hardness the tangential criteria listed in Equation (5) for chronic conditions, or the equivalent version for acute criteria, will result in effluent concentrations that will attain the water quality standards.

6.2.1.1 *Upstream metals meet CTR*

Curves corresponding to the case of a concave up metal where effluent hardness is greater than upstream hardness and upstream receiving water meeting the CTR criterion are presented in Figure 13. Using criteria calculated with the tangential equation results in all mixtures of effluent and receiving water at or less than the criterion at the corresponding receiving water hardness. The discharge schematic for case considered here is presented in Figure 14.

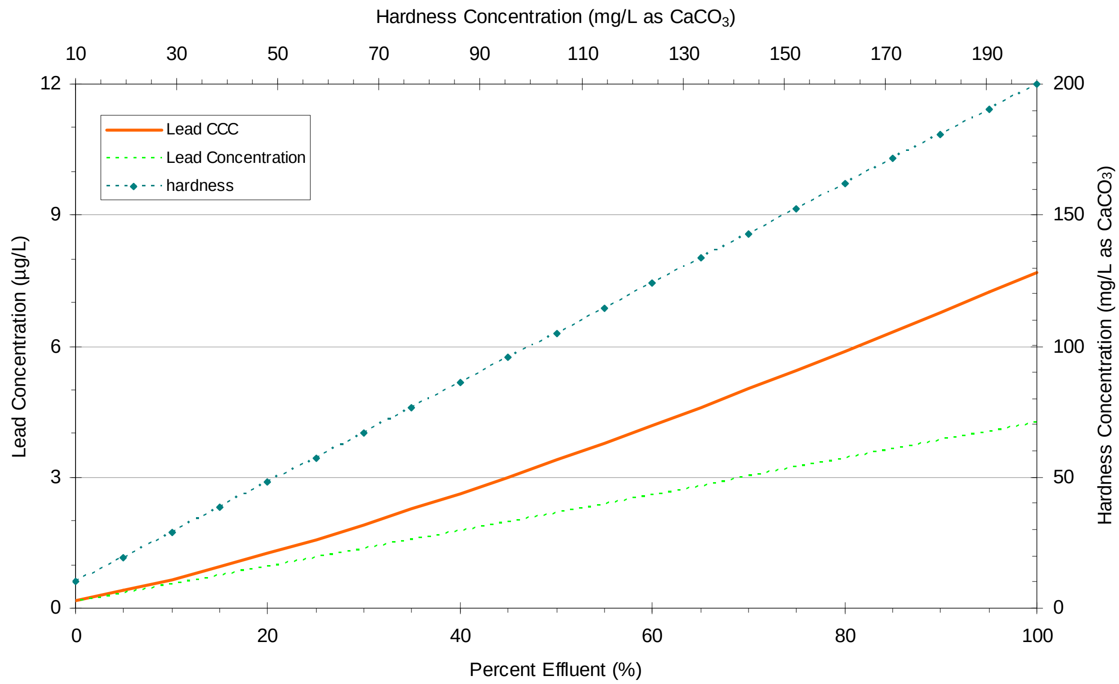

Figure 13: Lead CCC and Receiving Water Concentrations in terms of Percent Effluent using Effluent Criterion Calculated with Equation (5).

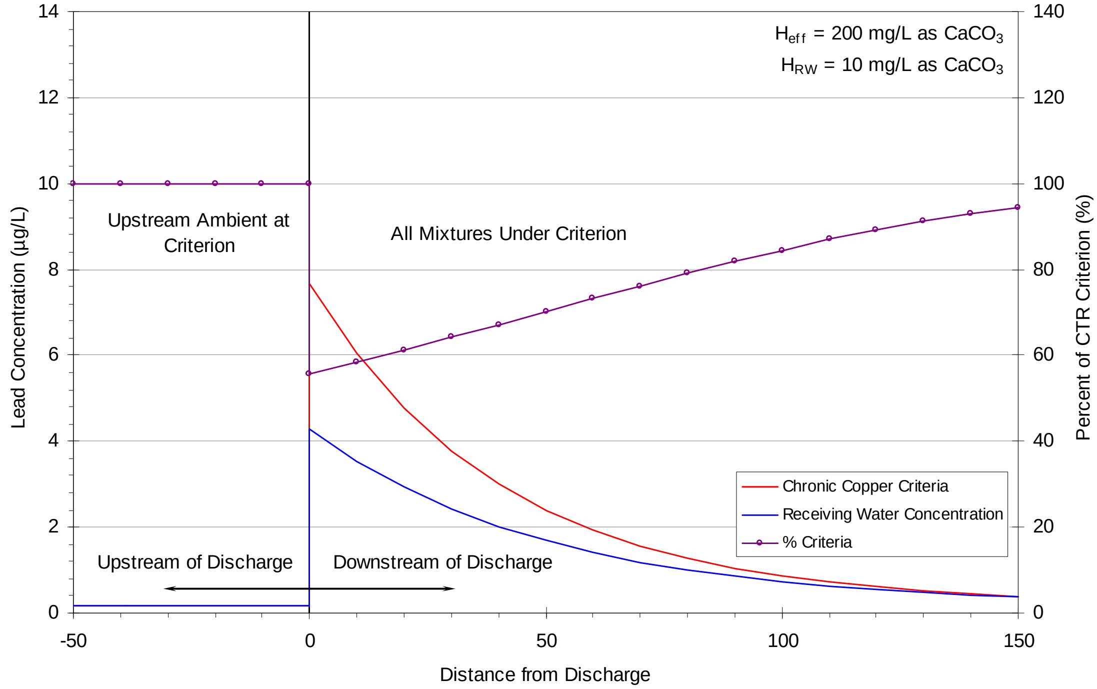

Figure 14: Discharge Schematic for a Concave Up Case with Effluent Hardness Greater than the Upstream Hardness and Upstream Metal at the CTR Criterion.

6.2.1.2 Upstream metals exceed CTR

Where the upstream metal exceeds the CTR criteria, the proper criteria to ensure the water quality standards are protected are calculated with Equation (5), just as in the case where upstream metals concentrations comply with CTR criteria. As with the corresponding case for concave down metals criteria (Section 4), using the curve method results in criteria such that the effluent will not cause or contribute to an exceedance of water quality standards. The curves for the case where a concave up metal concentration in upstream waters exceed CTR criteria by 140% are presented in Figure 15. The discharge schematic is presented in Figure 16, where the conditions downstream are improved over the pure upstream conditions, demonstrating the effluent does not cause or contribute to exceedances of water quality standards.

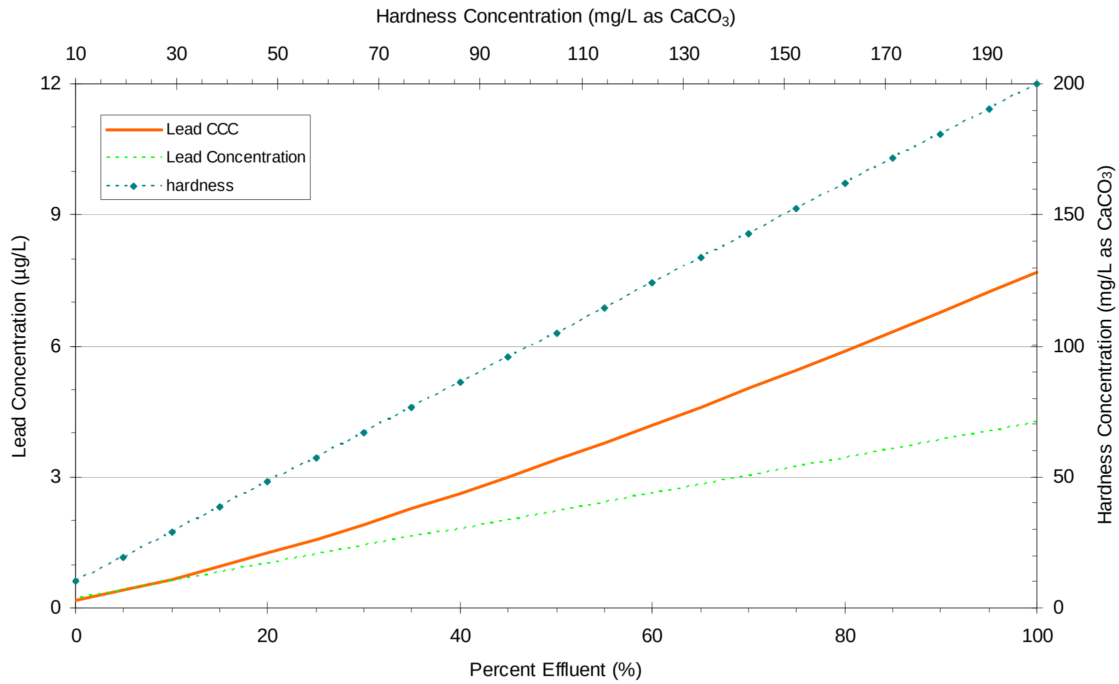

Figure 15: Lead CCC and Receiving Water Concentrations where Upstream Exceeds CTR Criterion by 140%.

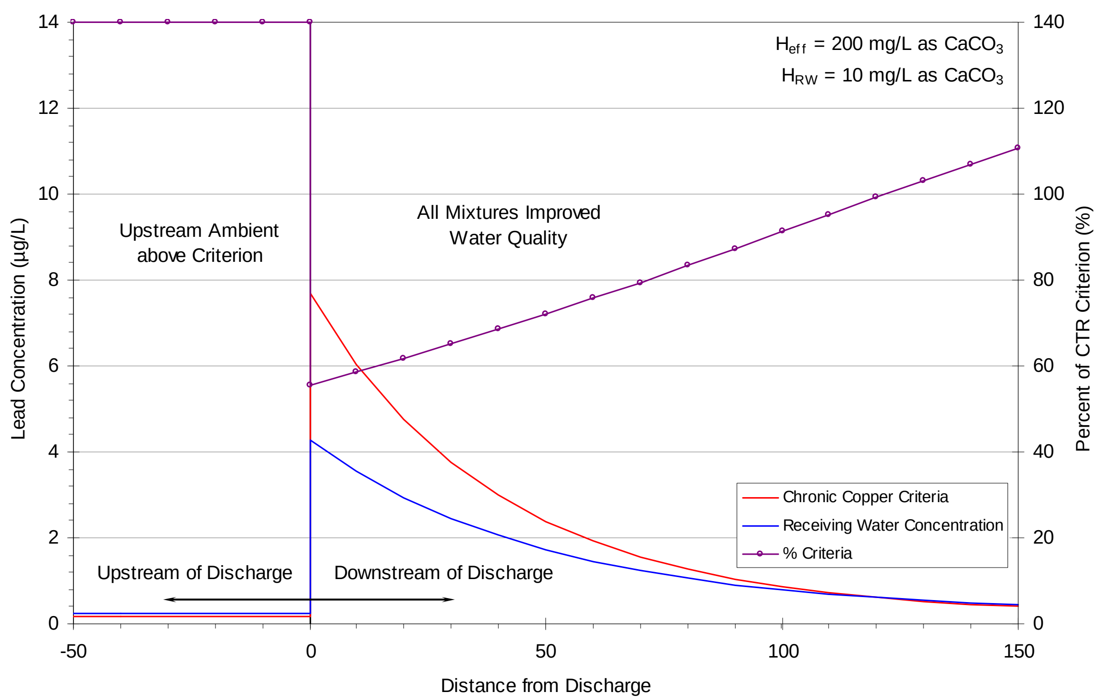

Figure 16: Discharge Schematic where upstream Metals Concentration Exceed CTR Criteria by 140%.

6.2.2 Effluent hardness less than upstream hardness

For trace metals with concave up criteria curves and where the effluent hardness is less than the upstream hardness, the application of Equation (5) will generally result in appropriate criteria. However, if the upstream hardness is far greater than the effluent hardness the equation will calculate a negative number for the criteria, or unreasonably low criteria. As discussed below in Sections 6.2.2.1 and 6.2.2.2, where this situation occurs, the reasonable worst-case assumptions for the ambient metals concentrations should be considered in the determination of the appropriate criteria to establish WQBELs such that the water quality standards are protected.

6.2.2.1 Upstream metals meet CTR

Where upstream metals concentrations meet the CTR criteria and upstream hardness is not too much greater than the effluent hardness, Equation (5) will result in appropriate criteria, as displayed in Figure 17. In the example depicted in Figure 17, the upstream hardness is 200 mg/L as $CaCO_3$ and the effluent hardness is 100 mg/L as $CaCO_3$. As the difference between upstream and effluent hardness grows, there is a possibility that a negative criterion will be calculated with Equation (5). The reason for the negative criterion is the tangent drawn from the receiving water criterion is too steep and is an artifact of assuming an unreasonably high upstream metals concentration. When such a value is calculated, the actual receiving water conditions need to be considered. The situation only occurs when the upstream hardness is quite high, resulting in high upstream CTR criteria so the assumption that the receiving water metals concentration is equal to the criteria may not be appropriate. In fact, the calculated CTR criteria under these conditions are generally much higher than metals concentrations typically observed in natural receiving waters.

An example of a negative criterion calculated by Equation (5) is where the upstream hardness is 250 mg/L as $CaCO_3$ and effluent hardness is 50 mg/L as $CaCO_3$, for lead and is presented in Figure 18. In these situations, the 2006 study suggests modifying the procedure for calculating the criteria. In the 2006 study, an iterative procedure is shown that can be used to determine the criteria for establishing the WQBELs by assuming some assimilative capacity in the receiving water, based on consideration of the actual observed metals concentrations in the receiving water. However, a simpler approach can be used to determine the appropriate criteria without assuming any use of assimilative capacity.

The receiving water assumptions need to be reconsidered in these situations. Rather than using the maximum observed upstream hardness and assuming the upstream metals concentration is equal to the CTR criterion[10], the maximum upstream metals concentration is used to calculate the corresponding hardness that would result in the CTR criterion equaling the maximum observed metals concentration (i.e., the CTR equation, Equation (1) or (2), for acute or chronic criteria, respectively, is used to back calculate the corresponding upstream hardness). The calculated hardness represents the reasonable worst-case maximum upstream hardness for the receiving water (where there is no assimilative capacity) and can be used as the receiving water hardness in Equation (5) to determine the criteria for effluent limit calculations. If the hardness determined

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[10] At an upstream hardness of 250 mg/L as $CaCO_3$, the assumed lead concentration, such that there would be no assimilative capacity, using the CTR equation would be 10.2 µg/L. For most natural water, this is an unreasonably high assumption for the metals concentration, considering the case under consideration can only occur with lead, cadmium, and silver.

using the upstream metal concentration is greater than the effluent hardness, it is possible that Equation (5) may still result in a negative criterion. This is a situation where the discharge would cause toxicity due to the low effluent hardness, even if there was no metal in the discharge. These conditions would be extremely rare and should be considered on a case-by-case basis.

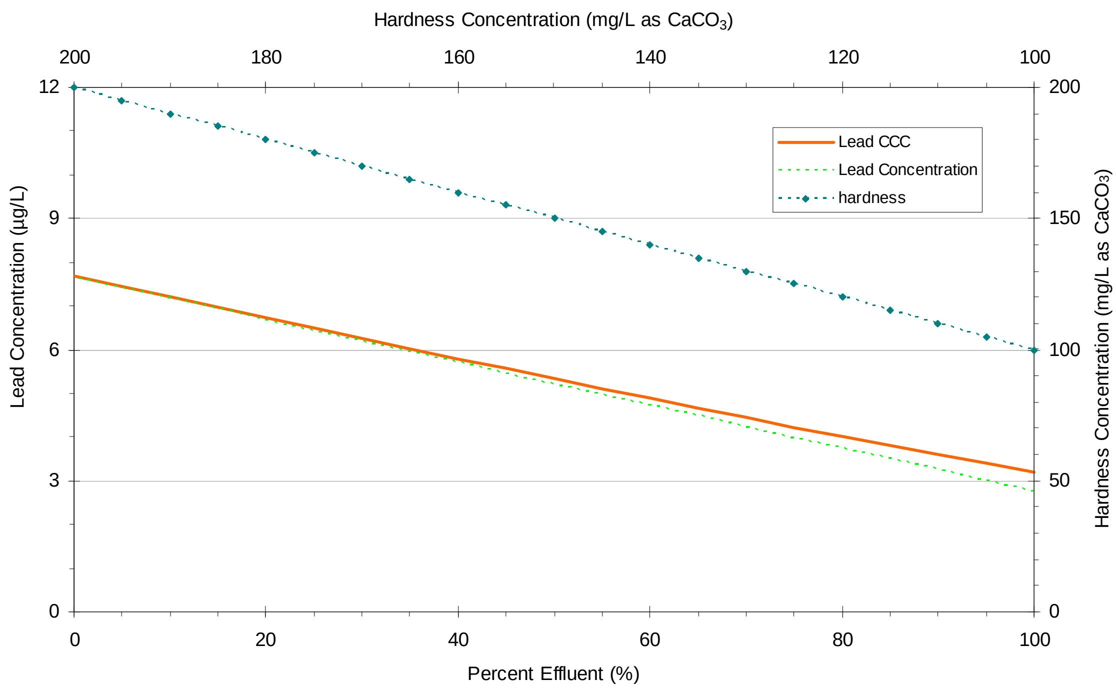

Figure 17: Lead CCC and Receiving Water Concentrations where Upstream Hardness is Greater than Effluent Hardness.

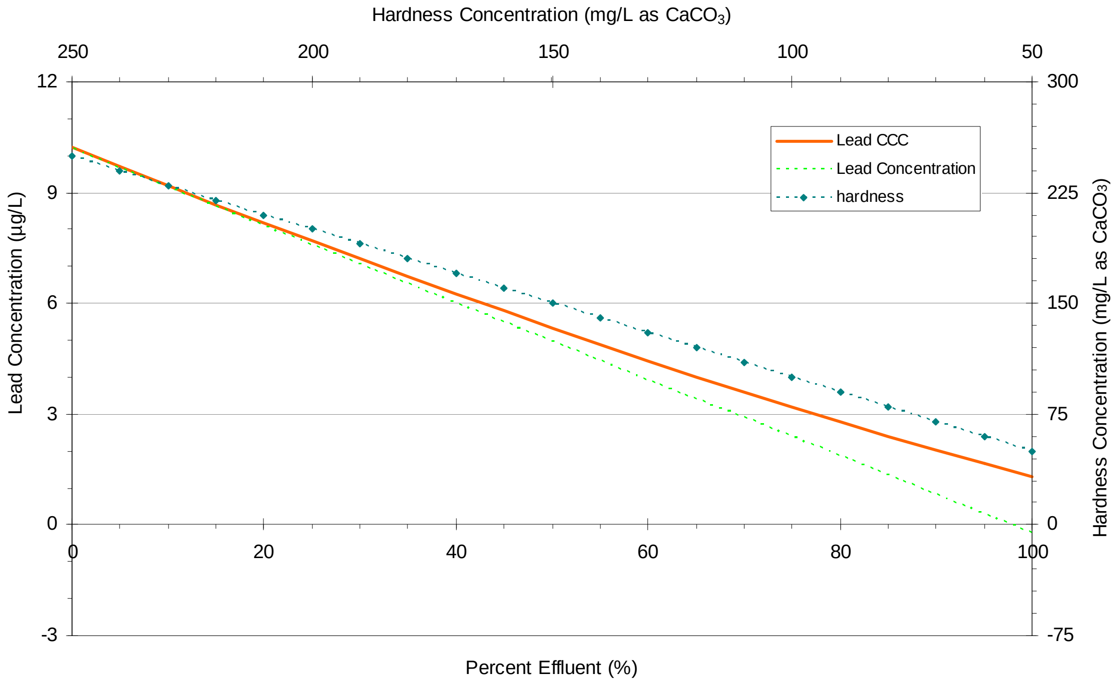

Figure 18: Lead CCC and Receiving Water Concentrations where Upstream Hardness is Significantly Greater than Effluent Hardness.

6.2.2.2 Upstream metals exceed CTR

Generally, when the upstream hardness exceeds the effluent hardness, the upstream criteria far exceed ambient metals concentrations observed in natural waters. The discharge schematic of the case where the upstream metals concentrations exceed the CTR criteria and upstream hardness is greater than the effluent hardness is presented in Figure 19. Under the conditions of upstream hardness equal to 200 mg/L as $CaCO_3$ and effluent hardness of 100 mg/L as $CaCO_3$ for lead, using Equation (5) to determine the criterion will result in improved water quality downstream of the discharge. However, if the effluent hardness is too low, Equation (5) may result in a negative criterion, so that all points downstream would be worse than the upstream, and theoretically the discharge would not be allowed. In practice, the combination of upstream hardness much greater than effluent hardness and upstream metal concentration exceeding CTR criteria is extremely uncommon. If such a rare situation is encountered, the discharge would cause toxicity due to the low effluent hardness, even if there was no metal in the discharge. These conditions would be extremely rare and should be considered on a case-by-case basis. It is important to note that the result under this extremely uncommon case is not due to the curve method, it is a result of the local chemistry that is identified using the curve method.

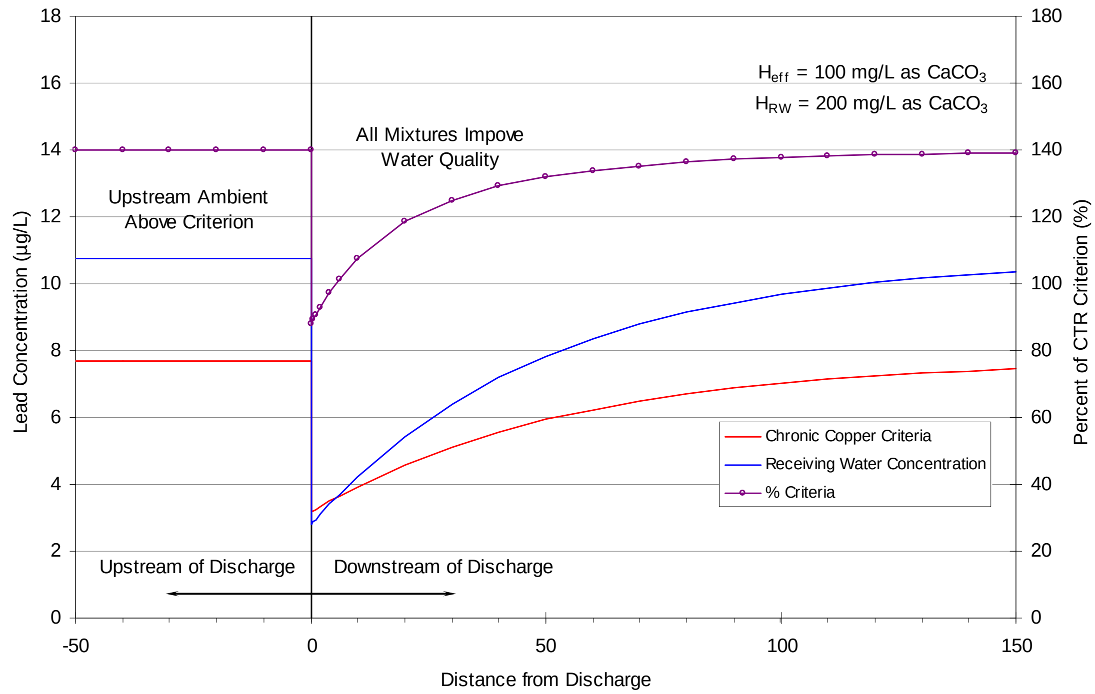

Figure 19: Discharge Schematic for Concave Up Criterion Curve and Upstream Metal Concentration Exceeding CTR Criterion.

6.3 Dilution Calculations

The curve method considers all receiving water flow conditions (i.e., high flows to no flow), and no dilution is assumed. The criteria are calculated for the end of pipe such that all mixtures of the effluent and receiving water downstream of the discharge do not exceed the CTR criteria. If the discharge is to an effluent dominated waterway (EDW) during a period without upstream flow, then the percent effluent would be 100% and only the effluent hardness would matter. If there is upstream flow, but no dilution is applied to the effluent limit calculations, the curve methods will provide the proper calculation of criteria to protect the water quality standards.

Where dilution does exist and it is applied to effluent limit calculations, "edge of mixing zone" can be substituted for "effluent" in the curve method. First, the dilution would be used to calculate the hardness at the edge of mixing zone. The criteria for the edge of mixing zone would then be calculated using the above curve method. Finally, the criteria would be calculated using the criteria at the edge of the mixing zone (C), assimilative capacity (C-B), and available dilution (D) in the standard ECA equation in Step 2 of Section 1.4 in the SIP.

7 CONCLUSIONS

All possible scenarios of site specific conditions have been addressed for the curve-based methodology described in this paper, ensuring that the resulting effluent limits will be consistent with the CTR and SIP, and will not cause or contribute to a violation of receiving water standards. For concave down criteria curves, the criteria calculated with the hardness of the downstream receiving water under effluent dominated conditions will protect the water quality standards regardless of whether upstream hardness is higher or lower than the effluent or whether or not the upstream metals concentrations meet or exceed the CTR criteria. For concave up criteria curves, Equation (5) will calculate criteria that are protective of the water quality standards. If receiving water hardness is, at times, higher or lower than the effluent hardness, both cases need to be considered in determining the appropriate criteria. If upstream hardness is significantly greater than effluent hardness, site specific assumptions of the reasonable worst-case upstream metals concentration may need to be considered in calculation of the appropriate criteria.

Using the concave up/concave down method results in criteria that provide the intended level of protection to aquatic life and ensure the discharge will not cause or contribute to exceedances of water quality standards. If the upstream ambient exceeds water quality criteria, the downstream may exceed water quality criteria even when there is no metal in the discharge. The curve method ensures the effluent does not cause or contribute to a water quality standard exceedance whether the upstream hardness is greater or lower than the effluent hardness or whether the upstream ambient is above, at, or below the CTR criterion.

8 APPENDIX

Because the hardness-dependent metals criteria form a log-log relationship with hardness, the criteria have special mathematical properties. The function for the slope of the CCC is presented as Equation (6). The slope of the CMC is the same as Equation (6) with m_C and b_C replaced with m_A and b_A, respectively. Both CMC and CCC are functions monotonically increasing with hardness, meaning greater levels of hardness will always return greater values of CMC and CCC. Each criterion is increasing because the m_A and m_C values in Table 1 are all positive, and hardness values and the exponent of any number is greater than zero.

$$\frac{dCCC}{d(\text{hardness})} = \text{slope of CCC} = \frac{m_C}{(\text{hardness})} \mathit{exp}\{m_C \cdot \mathit{ln}(\text{hardness}) + b_C\} \quad (6)$$

Due to the properties of the equation describing the criteria, the curvature will not change regardless of the hardness. Positive curvature criteria plot like the right half of a “U” (convex) and negative curvature is the opposite (concave). The equation for the curvature of CCC is presented in Equation (7). Because hardness and the exponent of any number can only be greater than zero, the value used for m_C completely determines the curvature of CCC (and m_A completely determines the curvature for CMC). If m_C is greater than 1.0, the CCC will have positive curvature for all values of hardness, and for m_C less than 1.0, CCC will have negative curvature for all values of hardness.

$$\frac{d^2CCC}{d^2(\text{hardness})} = \text{curvature of CCC} = (m_C^2 - m_C) \cdot \frac{1}{(\text{hardness})^2} \cdot \mathit{exp}\{m_C \cdot \mathit{ln}(\text{hardness}) + b_C\} \quad (7)$$

Tri-TAC BIOSOLIDS LAND COMMITTEE

AGENDA
May 9, 2013
Orange County Sanitation District

Item No.	Topics	Lead Person	Est. Time (minutes)	Attachments
1.	**Regulatory/Legislative/Legal Updates**			
	▪ Ordinances Update - Imperial - San Luis Obispo - Solano (+Measure E) ▪ Kern (Measure E) (Litigation/AB 371) ▪ AB 997 Composting – Anaerobic Digestion	G. Kester/L. Baroldi D. Gilbert/G. Kester G. Kester	20	
2.	**State and Regional Updates**			
	▪ CalRecycle FOG/Food Waste Digestion ▪ CalRecycle 75% Diversion Plan ▪ CDFA Regulations on Rendering	G. Kester G. Kester/V. De Lange G. Kester	5 5 5	
3.	**EPA and Nationwide Updates**			
	▪ EPA-Fiscal Years 2013-2015 – Biosolids ▪ Ferrous Chloride Use on Biosolids ▪ EPA Disinvestment in Biosolids ▪ Biosolids Solid Waste Definition/EPA MACT Standards ▪ Arsenic Cancer Slope Factor ▪ New Proposed FDA	T. Meregillano T. Meregillano G. Kester G. Kester G. Kester	5 5 5 5 5	
4.	**Regional Facilities Updates**			
	▪ Bay Area Agencies ▪ So. Cal. & C.V. ▪ IERCF ▪ Westlake Farms ▪ TIRE	V. De Lange, B. Jones T. Meregillano/E. Have M. Bao M. Bao D. Gilbert	5 5 5 5 5	
5.	**Industry Association Updates**			
	▪ WEF ▪ CASA ▪ CWEA ▪ SCAP ▪ BACWA ▪ CVCWA	G. Kester/V. De Lange G. Kester J. Hay M. Bao M. Krupp B. Gillette	5 5 5 5 5	
6.	**Emerging Contaminants**			
	▪ Pyrethroid Working Group ▪ Trace Organics Activities	G. Kester G. Kester	5 5	
7.	**Biosolids Research**			
	▪ WEF Biogas Study ▪ Other	G. Kester G. Kester	5 5	
8.	**Conferences/Webinars** ▪ WEF ▪ California Bioresources Alliance Symposium, September 18-19, 2013	All G. Kester	5	

Tri-TAC BIOSOLIDS LAND COMMITTEE

AGENDA
May 9, 2013
Orange County Sanitation District

Item No.	Topics	Lead Person	Est. Time (minutes)	Attachments
9.	**Climate Change Legislation**	G. Kester	5	
10.	**Information Sharing** ▪ CASA Biosolids Strategic Planning 2013	All G. Kester	10 5	

Tri-TAC Water Committee Key Issue Summary

(as of
April 03, 2013)

DRAFT

Item No.	Description	Issues for POTWs	Meeting Notes/Updates	Links	Lead(s)	Next Steps	Due Date
1	**Whole Effluent Toxicity** • State is developing a new Toxicity Polity that will dictate how toxicity is reported and enforced.	• Draft State Toxicity Policy issued in 2011 would establish/ require: o numeric limits for chronic toxicity o use of Test of Significant Toxicity (TST) as statistical method to determine toxicity (concerns it will lead to more false positive results); o use of marine organisms in >1,000 mg/L salinity waters which affects current use of flow-though testing for acute-toxicity o single test failure triggers violation and accelerated monitoring o RWQCB discretion on inclusion of acute toxicity in permits and whether to allow for dilution	• State Board held a workshop late August. Stakeholders thought that the proposed policy would initiate too many changes at once. Instead, it might be easier to breakdown the changes into phases, thus reducing impacts on stakeholders. The phasing logistics still need to be discussed and other board members need to be introduced to the idea. • The initial ideas on phasing would focus on gathering a data set with the new TST without having penalties associated with the results. Stakeholders could use this data to determine the real effect of the TST in the regulatory setting. We should define the successful criteria needed to move from phase 1 to phase 2. • Running the “test” of phase 1 would be expensive for POTWs, and we may want to consider running phase 1 test on POTWs over a certain size. • We need to address the potential issue of anti-backsliding and the differences between acute testing versus chronic testing. • Tri-TAC voiced concern with uncertainty in the WET Policy and SB plans to address our concerns to a certain degree. • Storm Water representatives weren’t interested in our proposed phasing approach.	State Board Page	Bobbi Larson, Phil Markle	• Work group is looking at numeric water quality standard impacts on discharges to erroneously (based on false positive tests) listed 303(d) water bodies. • We may have to write a proposal for phasing the policy and present it to the Board at the hearing. Jon recommended that our proposal be specific on the phasing—it may take a lot of work to create this document. • We should create a document that highlights the comments received in the comment letters and how the phased approach would address those comments (this would explain why the phasing approach is the best way to move forward.) • We need to reach out to POTWs to see if they are OK with our proposal.	
2	**Recycled Water Policy** • State Water Board is modifying the monitoring requirements for CECs in the policy to implement the Expert Panel’s recommendations.	•	• State Board revised the water monitoring requirements for recycled water. Comments are due in July on the most recent draft. • State Water Board is amending the recycled water policy to address monitoring for CECs. An expert panel informed the Board and it seems that they will focus on ground water recharge and not irrigation uses of the recycled water. • It seems that the policy on CECs is getting close to closure and a majority of our concerns are being addressed.		Bobbi Larson	• Work on draft comment letter (possibly joint letter with other associations)	
3	**Nutrient Policy** • This effort is part of a statewide initiative, supported by the U.S. EPA Region IX and the SWRCB, to establish numeric water quality standards, expressed as NNEs, for State Waters	• Any POTW that discharges to inland surface water will be affected under the policy. • Adoption of a statewide approach to nutrient control will affect NPDES permitting, 303(d) listings, and TMDL development. • Possible outcomes associated with the policy include stringent numeric endpoints for total nitrogen and phosphorus.	• Small group of stakeholders met with the State Board to discuss possible approaches to the statewide nutrient policy. Stakeholders advocated for a policy that is based in science, doesn’t have predetermined low limits, and an open process. • The QUAL-2 model will likely result in very low nutrient numbers that are very conservative and unlikely to be regularly attainable by POTWs. . • Restarting process for the SF Bay, led by R2. Will look at relationship between nutrient concentrations and harmful algal blooms. Will also look at DO, which is becoming increasingly important. • Nutrient conference is being proposed for SFBay		Tom Grouvhog	• Develop a strategy • Possibly investigate how the State of Utah (or other states) have addressed the nutrient standard changes.	

Tri-TAC Water Committee Key Issue Summary
(cont'd)

Item No.	Description	Issues for POTWs	Meeting Notes/Updates	Links	Lead(s)	Next Steps	Due Date
			estuary.				
4	**CECs** • Pharmaceuticals and other trace constituents of emerging concern (CECs) are ubiquitous in wastewater at low concentrations and have unknown effects on aquatic organism	• The State Board, along with Southern California Coastal Water Research Project (SCCWRP), has been working with the Ecosystems Advisory Panel to determine next regulatory steps. • The panel will recommend monitoring wastewater for CECs, and possibly bioanalytical assays to test for toxic effects	• The Water Board is trying to decide how to implement the Ecosystem Advisory Panel report on CECs. The panel created an initial list of CECs for monitoring. However, a study needs to be done to evaluate the different types of receiving water and treatment types. There are options to pay for this study: SWAMP surcharges could increase in NPDES permit fees, state board could direct certain POTWs to pay for the study, the state board could not do the study, or stakeholders could volunteer to participate and fund the study. • WERF may be a source of funding if stakeholders decide to manage the study. • Jon Bishop will likely recommend that the Board accept our recommendation that POTWs initiate studies on their own accord. • CECs may be an important topic for Board Member Felicia Marcus.	Draft Report	Chris Stacklin	• Wait for final report and await Determine our preference for how this study should be conducted and funded.	
5	**Statewide Mercury Policy** • Policy will likely incorporate methylmercury objectives being developed along with control plans for mercury impaired waterbodies • Mercury Control Program for Reservoirs will be developed first and will address all mercury impaired reservoirs included on the 2010 303(d) list • Future elements of the policy could include control programs for future impaired reservoirs, rivers/creeks/streams/enclosed bays/coastal bays/estuaries/lagoons impaired by mercury, NPDES permitted sources, and nonpoint sources	• Any wastewater that discharges to a mercury-impaired waterbody will eventually be included under the policy • The State Board is considering ways to harmonize efforts with existing TMDLs • If control program for NPDES permitted sources is developed implementation measures such as mercury-specific pollution prevention, installation of amalgam separators for dental offices, and improving wastewater treatment may be required.	• State Board will be holding CEQA Scoping Meetings: Sacramento- March 5, Oakland- March 6, Redding- March 8, and Riverside- March 12 • Tri-TAC provided comments urging them to harmonize with existing TMDLs and link implementation to impairment • Existing TMDLs will likely be grandfathered in	State Board Mercury Page	Tom Grovhoug	• Continue to provide input at public meetings and submit comments	
6	**Methylmercury Objectives** • State Board is developing methylmercury fish tissue objective • The scientific underpinnings for the criteria development are still under consideration	• If point source dischargers cannot comply with criteria, then an implementation strategy would be included in permits	• State Board is restarting this effort continuing from the alternatives developed in 2006. The project will move in parallel with the Statewide Mercury Policy • The objectives will likely be a part of the final Statewide Mercury Policy	State Board Mercury Page	Tom Grovhoug	• Working with State Water Board and to iron out issues	
7	**Biological Objectives** • The State Board is developing a framework to develop biological objectives	• If biological impairment is found to be caused by a pollutant, it could impact how NPDES permits are written and permit limits.	• The current evaluation will focus on invertebrates but they may add algae criteria in the future. • Tri-TAC sent a letter in February to State Board with	State Board Biological Objectives Page	Phil Markle	• Finalized BO documents were not available at the time of the	

Item No.	Description	Issues for POTWs	Meeting Notes/Updates	Links	Lead(s)	Next Steps	Due Date
	(biocriteria) that assign narrative or numeric benchmarks to protect aquatic life beneficial uses.		comments on the Scientific Basis for development of Biological Objectives. • John Bishop talked to CVCWA about focusing comments on the "no project" alternative as the way to proceed with this policy. If we can comment that there are no "reference" streams in certain regions, we might show that this idea won't work. • Based on conversations with the regulators, it seems that their intent is to protect high quality streams. If this is the objective, we should try to steer the BO towards that goal. • Central Valley ecoregion has almost no area that can be considered "reference" and south coast has very little, so they need way to deal with this. Highly modified channels are also a problem. • Science Advisory Panel believes they can apply a statistical method to develop biological objectives in these areas. • Everyone will have to prevent degradation of the stream that has no reference condition.			February comment letter, so Tri-TAC needs to monitor the BO process to see when formal documents are available for review. • Tri-TAC should form a workgroup – SRCSD will be involved, Dan Jackson from EBMUD.	
8	**SSS WDR** • The Monitoring and Reporting Program for the SSS WDR is being revised by the State Board	• State Water Board held a public workshop on January 24, 2012 to discuss the SSS WDR next steps. They have indicated that the next draft will contain the following revisions: o Removed some reporting requirements o Remove mandatory reporting of Private Lateral Spills, and require enrollees to keep internal records of them • State Board is proposing updates to the MRP in lieu of updating the entire WDR. • Require private collection systems that discharge to private treatment works to enroll, but do not require private collection systems tributary to other sanitary sewer systems to enroll	• A small group of stakeholders held meetings with the State Board to discuss the changes to the MRP. The group is making progress towards a finalized MRP. • The new MRP will likely have three categories of SSOs.State Board wants to have the updated MRP finalized by May 2013.	Draft SSS WDR	Bobbi Larson, Monica Oakley	• Stakeholder group submitted their latest MRP proposal to the State Board on March 6, 2013. We are waiting to hear back from their staff.	

Tri-TAC Water Committee Key Issue Summary
(cont'd)

Item No.	Description	Issues for POTWs	Meeting Notes/Updates	Links	Lead(s)	Next Steps	Due Date
9	**Delta Issues** • Standing topic to discuss issues in the Delta that can have statewide impact. • Delta plan is moving forward, 6th draft should be out in next week. Key issues is that water quality authority should reside with State and Regional Board • Notice that longfin smelt is ESA smelt. Threat is low flow in SF Bay estuary and ammonia. • State Board is updating Bay Delta Plan	• Ammonia discharged from POTWs has been suggested to be disrupting the food-web, and ultimately contributing to the decline of pelagic fish populations in the Bay-Delta estuary • This rational was used by the Central Valley RWQCB to support requiring Sacramento Regional County Sanitation District to upgrade to nitrification, at an estimated cost of $800 million • Various studies to resolve uncertainties related to the impacts of ammonia are underway • SRSD has very tight pathogen limits that can't be met by disinfection that may be precedent setting for other POTWs	• Water Agencies submitted comments on draft permits for CCCSD and Vallejo, citing ammonia research and requesting nitrification • In permit adopted Feb 2012, Regional Board required CCCSD to perform nutrient studies • The Delta Stewardship Council released the final draft of the Delta Plan in September 2012. • State Water Board is holding a hearing on the potential changes to San Joaquin River flows and Southern Delta WQ on March 20 and 21.		Terrie Mitchell	• Continue to track issues as they emerge and act on those with state-wide significance	
10	**Ocean Plan Amendment** • A California Ocean Plan amendment is proposed to address designation of, and implementation provisions for, State Water Quality Protection Areas, including both ASBS and non-ASBS (called "General Protection") SWQPAs	• The Resolution specified that no new limiting conditions or prohibitions are to be imposed on wastewater outfalls as a result of a SWQCB-General Protection or as a result of non-ASBS SWQPAs themselves. • The Resolution stated that no conditions are to be included in permits that require the removal or relocation of municipal wastewater outfalls, in recognition of the public service and investment that these facilities provide.	• Comment letter submitted and Tri-TAC testified at State Water Board hearing • The State Board seems to recognize the importance of the existing sewer infrastructure and the potential impacts of Ocean Plan changes. • State Board may adopt the amendment at the second October board meeting. • California Ocean Plan amendment specifies that no new regulatory requirements will be imposed on existing POTW outfalls • The State Board indicated that they won't write NPDES permit requirements based only on the MPAs. Does this mean that they can find other reasons to write limits in the permit to address MPA issues?		Sharon Green	• Await for response to comments from State Water Board	
11	**EPA Ammonia Criteria** • EPA is in process of updating the current WQC for ammonia to incorporate new data and sensitive freshwater mussel ammonia toxicity data. This latest update is intended to eventually replace their current WQC for freshwater (marine criteria are unaffected by this update) and will result in much lower WQC than the previous update.	• In a 2009 update, EPA proposed a single national criterion for ammonia assuming freshwater mussels are present • The mussels present assumption results in extremely low objectives and is not appropriate for the majority of CA waters where freshwater mussels are not present	• EPA's request for Scientific Views "closed" in April 2010, final adoption of the criteria has not been proposed at this time.		Tom Grouvhog/ Phil Markle	• Track and provide comments when necessary	

12	**EPA Water Quality Criteria**
	• EPA is proposing changes to the water quality criteria regulations regarding administrator determinations, attainable uses, triennial reviews, compliance schedules, antidegradation, and variances.
		• Key elements likely to be included in the regulation:
		  • Antidegradation- States must adopt binding anti degradation requirements and minimum implementation methods
		  • Attainable uses- when use is not attainable, State must specify next highest attainable use
			• The regulation is being reviewed by the Office of Management and Budget and will be released in Spring 2012 for comment.		Shannon Bishop	• Track and provide comments when necessary
						• Work with NACWA on comments	

Item No.	Description	Issues for POTWs	Meeting Notes/Updates	Links	Lead(s)	Next Steps	Due Date
		• Triennial review- current criteria should be examined • Variance- requirements will be specified					
13	**EPA Integrated Permitting** • EPA effort to integrate municipal stormwater and wastewater plans in relation to the CWA. The integrated planning process will potentially identify efficiencies in implementing overlapping and competing requirements that arise from separate wastewater and stormwater projects, including capital investments and operation and maintenance requirements.	• The integrated permitting approach could be beneficial for POTWs because it is intended to help municipalities meet their CWA obligations by optimizing their infrastructure improvement investments through the appropriate sequencing of work. • Is there a way to harmonize with Porter Cologne in California? • EPA integrated permitting document came out as a draft. This is driven by urban mayors. There wasn't a lot of substance, although one issue raised was removing 5-yr permit cycle	• EPA held several listening session in January and February 2012 and is developing a draft framework document to describe the integrated planning concept, likely to be released in Spring 2012 • Had a call to set up work group to come up with list of issues that should be considered		Ben Horenstein/ Jackie Kepke	• Continue tracking this effort along with NACWA • Review draft framework document when released	
14	**Electronic Reporting** • Agencies are now required to electronically report compliance data to their regional boards via CIWQS • State Board is working on eSMR 2.5 that will allow for electronic submittal of EPA required self-monitoring data	• Errors are often propagated when the data are made public, and they are also often presented out of context (e.g. presenting exceedences as violations) • Errors are difficult to correct • Finalization of eSMR 2.5 will require a different data file type to be submitted electronically	• State Board is beta-testing eSMR 2.5 • Full implementation likely required by Summer 2012 Once released, State Board will provide training for the new program		Shannon Bishop	• Working with State Water Board to beta test system • Participate in State Board CIWQS User Group	
15	**EPA Dental Amalgam** • October 26, 2011 - EPA released its 2010 Effluent Guidelines Program Plan announcing its intent to adopt guidelines on the use of dental amalgam by dentists	• Agencies are concerned that dentists' offices will be regulated as part of POTWs' pretreatment program • EPA will likely create a new category so that dentists will not be categorized as SIUs • They may also grandfather in existing regional dental amalgam programs	• EPA had planned to propose a rule in 2011 and finalize in 2012, but they appear to be behind schedule. Expect to hear something in the fall. • EPA will likely create a new category so that dentists will not be categorized as SIUs • They may also grandfather in existing regional dental amalgam programs		Tim Potter	• Comment on draft guidelines when they are released	
16	**Pesticides** • Cross-media issue • Most pesticides, including pyrethroids, are currently unregulated in wastewater other than by narrative toxicity standards. Some pesticides are toxic to sensitive organisms at extremely low concentrations. • Nanoparticles and some biocides have potential to interfere with biological treatment processes • Some pesticides like triclosan, fipronil, and nanosilver are considered CECs	• In the future, POTWs could be regulated for pyrethroids, which they can't control and are toxic to sensitive organisms at very low levels. Engagement at this stage could steer regulators to adopt strategies favoring source control • Other pesticides may contribute to levels of regulated pollutants (e.g., copper, silver), cause or contribute to effluent toxicity, interfere with biosolids management options, challenge water recycling programs, or cause process interference. • POTWs are participating in a long-term joint program with stormwater and the water boards to work cooperatively with pesticide regulators to use their pesticide regulatory authorities prevent pesticide-related POTW compliance and operational problems.	• Pesticide Work Group is continuing to work with pyrethroid manufacturers and DPR toward conducting a statewide survey of pyrethroids in POTW influent, effluent, and biosolids.		Pesticide Work Group: Greg Kester, Linda Dorn, Preeti Ghuman, Phil Markle, Dave Snyder, Melody LaBella, Karin North, Kelly Moran	• Comment on upcoming EPA review work plans for two pyrethroids (Resmethrin, Prallethrin).	

Tri-TAC Water Committee Key Issue Summary
(cont'd)

DRAFT

Item No.	Description	Issues for POTWs	Meeting Notes/Updates	Links	Lead(s)	Next Steps	Due Date
17	**DTSC Safer Consumer Products Regulation** • The Department of Toxic Substances control is developing new regulations that will allow chemicals to be controlled without recourse to the legislature.	• This could be an important tool for POTWs to prevent the discharge of toxic substances to their influent.	• BAPPG commented on DTSC's draft Green Chemistry regulations in December 30, 2011, and Tri-TAC and CASA issued letter of support for these comments • Green Chemistry workshop was held in early September and comments are due by October 11th.	Draft DTSC Regulations	Karin North, Melody LaBella, Kelly Moran	• Comment on Green Chemistry regulations due on October 11th. BACWA will write letter and Tri-TAC may sign on the letter if warranted.	

Tri-TAC Land Committee Key Issue Summary

(as of April 26, 2013)

Item No.	Description	Issues for POTWs	Meeting Notes/Updates	Lead(s)	Next Steps	Due Date
Goal: Support Long-term Viability of Land Application Options						
1.	**Local County Ordinances** ▪ Imperial	▪ Potential loss of existing and future land application practices. ▪ Increased biosolids management costs (e.g., longer hauling distances, more expensive alternative practices).	▪ Imperial: Advocacy efforts to challenge ordinance ban on biosolids is placed on hold until a final decision on Kern County Measure-E case is made.	G. Kester D. Gilbert L. Baroldi	▪ Imperial: No updates.	
	▪ San Luis Obispo: Ordinance placing restrictions on Class B Biosolids land application.		▪ San Luis Obispo: ▪ On 3/12/13: San Luis Obispo County Board of Supervisors (BOS) unanimously approved the extension of the existing interim biosolids ordinance until March 2017 as requested by County staff and supported by wastewater agencies and CASA. By extending the interim ordinance until 2017, the County is provided time to review the science and the issues, and consult with others, while drafting a new ordinance. The BOS committed to provide funding as they go through their budget process to allow the Department of Health the ability to perform due diligence as they work on a new ordinance. ▪ Jeff Ziegenbein, Inland Empire Composting Regional Authority Project Manager, confirmed that Kellogg is no longer selling and marketing compost products containing biosolids.		▪ San Luis Obispo: G. Kester will provide technical support to San Luis Obispo's Department of Health during development of new ordinance.	
	▪ Solano Ordinance: Ordinance requires agencies to divert a portion of biosolids to Class A or B2E facility by 2012; annual progress reporting. ▪ Solano Measure E (1984): This measure restricts waste imported from other counties and is currently in litigation. If upheld and enforced, 90% of imported waste (up to 820,000 tpy) would be banned. ▪ AB 845, Ma, Solid Waste Place of Origin – This bill prohibits an ordinance enacted by a city or county from otherwise restricting or limiting the importation of solid waste into a privately owned solid waste facility in that city or county based on place of origin.		▪ Solano: Board of Supervisor would like a court decision if Solano's Measure-E is moot under AB 845. ▪ No decision on pursuing a summary judgment has been decided.			
	▪ Kern (Measure E): A voter-approved ordinance that would prevent land application of biosolids in unincorporated parts of the county. ▪ AB 371 Salas – Sewage Sludge Kern County		▪ Kern (Measure E): Kern filed a petition to the California Supreme Court to review a recent ruling from the Fifth Appellate District, which granted to publish its opinion affirming the preliminary injunction against the Kern County ordinance banning the land application of biosolids. ▪ AB 371 Sewage Sludge was introduced by Assembly member Rudy Salas-Democrat Bakersfield). This bill authorizes the Kern County Board of Supervisors to prohibit, by ordinance, the land application of sewage sludge in unincorporated areas in the county. The bill essentially circumvents what has been litigated over the past seven years in response to the voter approved Measure E which attempted the same ban. The bill was heard in committee on April 2nd and re-referred to Local Government Committee to be heard in May. CASA, POTWs, and Regional Sanitation Associations sent opposition letters and		▪ Kern (Measure E): Track Kern's petition and continue to work with local representative oppose the bill.	

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			provided testimony against this bill. If passed, the bill would set a precedent for other counties in California to ban biosolids, which would reduce biosolids management options in California and increase management cost.			
Goal: Sustain and Develop Biosolids Management Options with Focus on Sustainability						
2.	**FOG/Food Waste Digestion Program Regulation** ▪ CalRecycle vs. State/Regional Board oversight	▪ Ensure that existing and future programs are regulated under NPDES permit framework by Water Boards rather than under SW regulations by CalRecycle. ▪ Review and comment on draft/proposed regulations that may impact existing and planned programs.	▪ CASA and Tri-TAC member agencies continue to work with CalRecycle and SWRCB to develop language to exempt POTWs from processing/storage permits. CalRecycle is reviewing the proposed draft exemption language and will be scheduling several informal workshops with interested parties to discuss issues. ▪ Informal Workshops scheduled on April 11th and 16th on CalRecycle's draft regulations for compost and anaerobic digestion (including the exclusion language for hauled in organic waste at POTWs). Comment period extended.	G. Kester	▪ Continue to work with CalRecycle SWRCB staff to incorporate POTW exclusionary language. ▪ G. Kester to submit written comments.	
	▪ AB 997 Composting – Anaerobic Digestion: Amends the California Integrated Waste Management Act of 1989. Defines the term anaerobic digestion, for the purpose of the act, as a process using the bacterial breakdown of compostable organic material in a controlled environment that meets the parameters that may be established. This would revise the definition of the term "composting" to include anaerobic digestion.	▪ May impact POTWs that have co-digestion projects.	▪ CASA is working with Waste Management and Bioenergy Association of California to amend the definition of "Anaerobic Digestion" and to retain all benefits of the bill such as diversion and recycling credits.		▪	
3.	**CalRecycle 75% Recycling, Composting or Source Reduction of Solid Waste by 2020**	▪ May prohibit agencies from claiming recycling credits for utilizing biosolids as an alternative daily cover (ADC) for landfills.	▪ CASA/Tri-TAC members to work with CalRecycle on ADC issue.	G. Kester G. Kester	▪ G. Kester to provide an update on Caroll Mortensen's presentation at the CASA conference.	
4.	**Rendering Facility Regulations** ▪ California Department of Food & Agriculture (CDFA)	▪ Ensure that existing and planned FOG acceptance programs are not subject to rendering facility permitting requirements by CDFA.	▪ New rendering regulations effective April 1, 2013 from CDFA governing inedible kitchen grease (FOG) and manifests to track it. Some highlights of the new regulations include and require: - An exemption from rendering requirements for wastewater plants accepting inedible kitchen grease from grease traps or interceptors. - A requirement that the transporter be licensed by CDFA and maintain a manifest system. - Receiving facilities may now accept manifest information electronically, can enter into an agreement to allow the transporter to sign manifest on their behalf, but must maintain a copy of the manifest for two years.	G. Kester	▪ Support CDFA regulations ▪ G. Kester to follow up with CDFA regarding slaughter house exemption.	
5.	**Biosolids Solid Waste Definition**	▪ CISWI rules could have applied to POTWs utilizing methane in an internal combustion (IC) engine.	▪ EPA released a clarification letter that it did not intend to define methane transported in a pipe for combustion in an IC engine as a solid waste.	G. Kester	▪ Ensure clarification letter is widely distributed.	

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6.	**FDA – Proposed Food Safety Rule**	▪ Proposed rule may spur potential controversy.	▪ On 1/16/13, FDA published (in the Federal Register) proposed rules for the handling, storage, and safety of produce in the U.S. The use of biosolids is mentioned in the proposed rule; use is permissible as long as it is in compliance with EPA regulations (CFR503). B. Bastian and B. Brobst (EPA staff) have offered their services in providing responses to comments received. Comments are due 5/16/13.	G. Kester	▪ Support proposed rule. ▪ G. Kester reviewing proposed regulations.	
7.	**EPA Disinvestment in Biosolids**	▪ May reduce EPA's oversight on Biosolids Management Programs.	▪ EPA has reconsidered its original intent to disinvest in biosolids program oversight. EPA is proposing to hire two full-time personnel in Region 7 who will be handling all biosolids compliance issues and may oversee annual report review. ▪ G. Kester discussed disinvestment issues with EPA during D.C. Conference.		▪ Support EPA staffing in Region 7.	
8.	**WEF – NBP Update**	▪ May impact EMS Certification Program.	▪ The NBP has been moved under the WEF Water Science & Engineering Center. WEF hired a new Biosolids Program Manager in February. Despite the reorganization, WEF intends to support the EMS certification program. ▪ Ned Beecher was hired to support the EMS certification program.	G.Kester/ V. De Lange	▪ Continue to track and monitor.	
9.	**Legislation** **Congressman Serrano – Labeling Bill**	▪ May impact biosolids land application.	▪ Introduced on 1/4/13, H.R. 213 Serrano - A bill to amend the Food, Drug, and Cosmetic Act and the egg, meat, and poultry inspection laws to ensure that consumers receive notification regarding food products produced from crops, livestock, or poultry raised on land on which sewage sludge was applied.	L. Baroldi	▪ Continue to track and monitor.	
10.	**EPA Maximum Available Control Technology (MACT) Standards**	▪ Ability to comply with new regulations is currently uncertain. NACWA and NRDC filed a request for reconsideration and advance notice of possible litigation.	▪ There is no real change in the rule, but there is some easing of the standard as it relates to biosolids energy projects that do not want to classify biosolids as a solid waste under the legitimacy criteria (>5000 btu, considered a valuable commodity, and meet a certain contaminant level). Agencies can appeal to EPA that they have satisfied the criteria. ▪ WEF Webinar on 4/8/13 to discuss MACT standards.	G. Kester/L. Baroldi	▪ Continue to track and monitor litigation if filed.	
11.	**Arsenic Cancer Slope Factor** ▪ In Feb 2010, EPA proposed a 17-fold increase in the cancer slope factor for inorganic arsenic based on questionable interpretations of available data.	▪ If adopted, the new cancer slope factor would likely impact recycled water, effluent and biosolids limits.	▪ National Academy of Sciences is reviewing the process in which EPA used to develop the arsenic slope factors (IRIS) and the research that supported the slope factor.	G. Kester	▪ Continue to track, monitor, and comment as efforts proceed.	
12.	**South Coast AQMD Rule 1110.2** ▪ Upon adoption in 2008, the rule included a requirement that a technology assessment (TA) be completed by 7/1/10 to demonstrate that commercially-available technologies exist to cost effectively allow compliance with NOx, VOC, and CO limits.	▪ Emission limits would jeopardize ability of IC engines to utilize methane,	▪ 2/7/13 Meeting – SCAQMD – Biogas Impacts on Rule 1110.2 ▪ There is a need to work with power companies and negotiate a fair process to accept biogas.	G. Kester	▪ Initiate conversation with power companies on a fair process to accept biogas.	
Goal: Share Information						
13.	**Regional Facilities** ▪ <u>Bay Area Agencies</u>: A coalition of 18+ agencies is developing a regional biosolids management facility. ▪ <u>Southern CA & Central Valley</u>: Biosolids projects and facilities in Southern and Central Valley regions. ▪ <u>Inland Empire Regional Composting Facility (IERCF)</u>: Indoor composting facility located in	▪ Maintain awareness of collaborative efforts to develop regional biosolids management facilities. ▪ Understand challenges and lessons learned from new facilities in startup or operation.	▪ <u>Bay Area Agencies</u>: Bay Area Biosolids to Energy: RFP currently being developed and is scheduled to be released this summer. A pilot project with Lawrence Livermore is being planned. ▪ <u>Southern CA & Central Valley</u>: o <u>OCSD</u>: A temporary halt on hauling biosolids to the Prima Deshecha Landfill. A bid for hauling services will be released sometime in the end of April or early May.	V. De Lange B. Jones T. Meregillano M. Bao D. Gilbert	▪ Continue to provide regional biosolids management updates.	

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	Rancho Cucamonga, owned by LACSD/IEUA. ▪ Westlake Farms: Covered ASP composting facility located in Kings County, CA developed by LACSD. ▪ Terminal Island: The City of Los Angeles and its partners operate the Terminal Island Renewable Energy (TIRE) biosolids injection project, which is designed to reduce greenhouse gas emissions and create renewable energy.		o Encina Wastewater Authority: - EWA will hit its Biosolids Management Plan's 5 year diversification goal (2,300 Tons sold to Tier II markets) this month. (1 year early) - EWA conducted a Pyrolysis trial on PureGreen pellets. The results were very positive. - EWA Biosolids Executive team is continuing negotiations with Pharmgrade for a long term partnership/commitment. K-mart retail deal is still dealing with logistics but progress is being made. - Mellano Flowers & Co has taken 150,000 lbs of PureGreen this year and is a major supplier for the Rose Parade in Pasadena. EWA initial research trials at the Center for Agricultural & Horticultural Research showed that PureGreen worked extremely well for Roses. ▪ IERCF: Facility continues to operate within its permitted capacity. Modifications to material conveyance are currently in design. Construction is anticipated for summer 2012 and completion in 2013. ▪ Westlake Farms: Facility is currently in construction with an anticipated startup date in 2013. ▪ Terminal Island: The City of Los Angeles approved a Subsequent Negative Declaration for the TIRE biosolids injection project, which addresses project changes. The current project is operating under an existing Underground Injection (UIC) permit, pending approval of a new UIC permit application that was submitted to EPA in Aug 2011.			
14.	**Regional Associations Report**	▪ Foster partnerships between regional associations by sharing info regarding new issues of concern, lessons learned, project updates, training and educational programs, and public outreach efforts.	▪ SCAP: Joint SCAP/Tri-TAC meeting at OCSD. ▪ BACWA: Joint meetings held w/Tri-TAC meetings in San Leandro. ▪ CVCWA: Joint meetings held w/Tri-TAC meetings in Sacramento. ▪ CWEA: 2013 Annual Conference (Palm Springs) April 2013	M. Bao V. De Lange B. Gillette G. Kester J. Hay		
15.	**Conferences/Webinars**	▪ Stay abreast of upcoming conferences, local seminars, and webinars.	▪ 8th Annual California Bioresources Alliance Symposium, "A Call to Action", September 18-19, 2013	All		
Goal: Address Emerging Issues of Concern						
16.	**Pyrethroids** ▪ Pyrethroid Working Group (PWG)	▪ Potential impacts (positive/negative) to existing programs, public perceptions. ▪ May provide opportunities for direct participation in research/studies to address local concerns/issues.	▪ All three phases of sampling is completed. Results will be shared shortly.	G. Kester	▪ Continue to work with PWG, DPR, U.S. EPA, and others to make the survey possible. Will need to solicit voluntary survey participation from 20 to 30 POTWs.	
17.	**Trace Organics Activities** ▪ Recognized need to fill data gaps to provide U.S. EPA data to conduct credible risk assessment on trace organics that may be present at low	▪ Potential impacts (positive/negative) to existing programs, public perceptions. ▪ May provide opportunities for direct participation in research/studies to	▪ The Phase 2 report is complete and set for release by early summer. Phase 2 examined unpublished data (largely from manufacturers) to help fill data gaps for 62 constituents identified by U.S. EPA as high priority. Data was found for 29 of them.	G. Kester	▪ Phase 3 will be scoped with an RFP developed by this fall. Will need to solicit funding from across the country, because this phase will involve actual research.	

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	concentrations in biosolids.	address local concerns/issues.				
18.	**Climate Change Legislation**	▪ Ensure development of strategic approach to climate change issues.	▪ CWCCG is focused on resolving the pricing structure approach to renewable feed-in-tariffs with the CPUC. An alternative proposal has been submitted (waiting for response from CPUC).	G. Kester Z. Erdal	▪ Meet with the CPUC to discuss the pricing structure approach to feed-in-tariffs.	
Goal: Maintain Awareness of Key Research Initiatives						
19.	**Biosolids Research** WEF Biogas Study: Create a robust, consensus data set regarding the current and potential production of biogas from anaerobic digestion at WWTPs in the U.S.	▪ Potential impacts (positive/negative) to existing programs, public perceptions. ▪ May provide opportunities for direct participation in research/studies to address local concerns/issues.	▪ WEF Biogas Study: Project team has distributed a data survey and is currently incorporating this information into a database.	G. Kester		