SEPTEMBER 26, 2005

Recalculation of the National Nickel Marine Criterion

DRAFT

Prepared by:
Larry Walker Associates

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GLOSSARY OF ACRONYMS

ACR	Acute-to-Chronic Ratio
CCC	Continuous Criterion Concentration
CMC	Criterion Maximum Concentration
CTR	California Toxics Rule
CV	Coefficient of Variance
CWA	Clean Water Act
EC50	50% Effect Concentration
FACR	Final Acute-to-Chronic Ratio
FAV	Final Acute Value
GMAV	Genus Mean Acute Value
LC50	50% Lethal Concentration
LOEC	Lowest Observable Effect Concentration
LSSFB	Lower South San Francisco Bay
LWA	Larry Walker Associates
mg/L	milligrams per liter (aka: ppm)
ng/L	nanograms per liter (aka: ppt)
Ni	Nickel
NOEC	No Observable Effect Concentration
NPDES	National Pollutant Discharge Elimination System
POTW	Publicly Owned Treatment Works
ppb	parts per billion
ppm	parts per million
ppt	parts per thousand (salinity)
SMAV	Species Mean Acute Value
SSO	Site-Specific Objective
TMDL	Total Maximum Daily Load
UCSC	University of California, Santa Cruz
ug/L	micrograms per liter (aka: ppb, parts per billion)
USEPA	United States Environmental Protection Agency
WER	Water Effect Ratio
WQO	Water Quality Objective

1 Introduction

The United States Environmental Protection Agency (US EPA) National Water Quality Criteria for the protection of aquatic species are calculated from laboratory-derived toxicity data. The USEPA compiles data from acceptable toxicity tests, which have been conducted in laboratory dilution water, from a wide range of species. Then, using the approach outlined in *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses* (Guidelines) (USEPA, 1985), criteria are developed from this compilation of data.

The Guidelines provide methods for calculating both acute and chronic criteria. However, a minimum number of toxicity tests meeting specific requirements for number and type of genera tested must be met in order to calculate a criterion. If those requirements are met for calculating an acute criterion, but not met for calculating a chronic criterion, an Acute-to-Chronic Ratio (ACR) can also be used to develop a chronic criterion. An ACR is developed by dividing the results of acute toxicity tests by the results of chronic toxicity tests for the same species to determine the ratio of the concentration of a constituent that is acutely toxic to that which results in chronic toxicity. ACRs are calculated for all species/genera for which both acute and chronic toxicity data are available. Then, the geometric mean of the ACRs is calculated and used to develop the chronic criteria by dividing the final acute value (FAV) by the final ACR. The resulting criterion continuous concentration (CCC) should not adversely affect species exposed to that concentration on average for four days every three years.

The national nickel saltwater California Toxics Rule (CTR) criteria were developed through the procedure discussed above. An ACR, calculated based on tests conducted on two freshwater and one saltwater species, was used to develop the chronic criteria for nickel. This document discusses methods for adjusting national criteria, a study done to recalculate the national nickel saltwater CTR criteria by increasing the number of toxicity tests available for calculation of the nickel ACR, and the study's applicability to the Calleguas Creek watershed. The recalculation discussed here is specific to the nickel saltwater CTR criteria and is not proposed for adjusting the freshwater criteria.

2 Methodology

Because a national aquatic life criterion might be more or less protective than intended for the aquatic life in most bodies of water, the US EPA has provided guidance concerning three procedures that may be used to derive a site-specific criterion (USEPA, 1994):

1. The Recalculation Procedure is intended to take into account relevant differences between the sensitivities of the aquatic organisms in the national dataset and the sensitivities of organisms that occur at the site.

2. The Indicator Species Procedure provides for the use of a water-effect ratio (WER) that is intended to take into account relevant differences between the toxicity of the metal in laboratory dilution water and in site water.

3. The Resident Species Procedure is intended to take into account both differences in sensitivities of aquatic organisms and differences in toxicity of site water and lab water.

The adjustments to the nickel criteria discussed in this document are based on the recalculation procedure. The concept of the Recalculation Procedure is to create a dataset that is appropriate for deriving a site-specific criterion by modifying the national dataset in some or all of three ways:

A. Correction of data that are in the national dataset.
B. Addition of data to the national dataset.
C. Deletion of data that are in the national dataset.

The recalculation procedure can rely on existing tests and result in modifications to the criteria by deleting species that are not present at a site, or can update the national dataset with additional, laboratory water tests that meet the requirements for use in calculating national criteria. In order to add additional data to the national dataset, the testing must be conducted so that results meet the USEPA requirements for consideration in development of national criteria. Since any revisions to the national criteria the USEPA considers at a future date would need to consider new toxicity data developed since the original criteria were developed, testing used for site-specific recalculation of the criteria would be included in the revised national criteria.

3 Lower South San Francisco Bay Nickel Recalculation Study

The national water quality criterion for nickel was established by US EPA methods in 1986 (US EPA, 1986). The current CTR criterion for nickel is based on ACR values for two freshwater species and one marine species. Because the ACR for nickel was developed based on only three species and only one saltwater species, additional chronic toxicity testing could be used to expand the dataset and develop a more accurate ACR for nickel. Therefore, chronic toxicity testing with additional marine species [topsmelt, abalone and mysid] was performed by researchers at the Institute of Marine Sciences at the University of California, Santa Cruz (UCSC) to develop a more effective way of determining marine water quality criteria for nickel and to support nickel criteria evaluation in Lower South San Francisco Bay (UCSC, 1998).

As stated in the 1998 UCSC Report that summarized the technical basis for recalculation of the nickel criterion:

> "This study was designed to obtain acute and chronic nickel toxicity data for three west coast marine species, so that additional marine ACR values could be calculated. Sensitive, ecologically important species were selected from three diverse phyla, and critical life stages of these organisms were exposed to nickel for extended periods to estimate chronic toxicity. The primary objective of this study was to compare these chronic toxicity values to acute endpoints derived from concurrent tests with the same species to provide data useful in the evaluation of site-specific nickel criteria for west coast marine waters, including San Francisco Bay."

For the work performed in the Lower South San Francisco Bay (LSSFB) study, the Recalculation procedure was used to develop a new national water quality criterion for nickel. Furthermore, the Indicator Species Procedure was also used to further modify this new national water quality criterion into a site-specific criterion for LSSFB. US EPA criteria experts reviewed this work (Thursby, 1998, Appendix 1) and found the species and methodologies used were appropriate for developing site-specific modifications to the national water quality criterion for nickel. The results of the LSSFB work produced two new nickel criteria:

1. National Water Quality Criterion
2. Lower South San Francisco Bay Site-Specific Criterion

The remainder of the document focuses on a discussion of the National Water Quality Criterion.

3.1 Toxicity Testing

Toxicity tests were performed by UCSC on three saltwater species (topsmelt, abalone, and mysid) to supplement the data available during the 1986 derivation of the saltwater nickel criterion.

3.1.1 Species

The topsmelt (*Atherinops affinis*) is an ecologically important atherinid. Like other atherinids used for toxicity testing, embryonic and larval stages of this species have been demonstrated to be relatively sensitive to a variety of toxicants, including metals (as cited in UCSC, 1998).

The red abalone (*Haliotis rufescens*) is an economically and ecologically important gastropod mollusk that is native to the coast of California, where it is also grown commercially. Like other mollusks used for toxicity testing, this species has been demonstrated to be sensitive to a variety of toxicants, particularly metals (as cited in UCSC, 1998). Unlike many bivalve mollusks, abalone larvae do not feed, and they develop relatively quickly in laboratory culture. Larval development from fertilization through metamorphosis takes approximately 10 days at 15 °C. Analysis of acute toxicity data used to establish water quality criteria for nickel indicates that marine and freshwater mollusks are sensitive to this metal (as cited in UCSC, 1998). The relatively long-life of abalone makes lifecycle tests impractical. Given their sensitivity to metals, however, it is important that measures of chronic nickel toxicity include data from this group. Chronic toxicity of nickel to abalone was estimated using early life-stage toxicity tests with sensitive sublethal endpoints.

The marine mysid (*Mysidopsis intii*) is an ecologically important epibenthic mysid species which occurs in coastal eastern Pacific waters (as cited in UCSC, 1998). This species has demonstrated sensitivity to toxicants and is an appropriate marine species for assessing the toxicity of nickel. The UCSC study focused on a longer-term, full life-cycle exposure. The life cycle of this species (hatching to first brood production) takes approximately 20 days in laboratory culture. The mysid has also been the focus of US EPA-supported toxicity test development efforts.

Both topsmelt and abalone are also currently used in California for whole effluent toxicity testing (UCSC, 1998). Acute toxicity tests were performed as 48- to 96-hour exposures measuring mortality for the topsmelt and mysid and larval development for the abalone.

3.2 Results

The ACR value for each species was calculated by dividing the acute value (LC50) from each acute test by the chronic value (geometric mean of the NOEC and LOEC) from the chronic test for the same species. Abalone and mysids were far more sensitive to nickel than were topsmelt. Chronic values for abalone and mysids were 26.43 and 22.09 ug/L, respectively, and were lower than available literature values. Chronic values for topsmelt were 4,270 ug/l. Acute-to-chronic ratios for all three species ranged from 5.50 to 6.73 and were comparable to the ACR value previously derived for *Mysidopsis bahia* (5.48; US EPA, 1986). A FACR derived solely from a geometric mean of these four marine species ACRs would be 5.959. A FACR of 10.50 can also be derived, using a combination of the four marine ACRs plus the two US EPA freshwater

ACRs. Results from the UCSC toxicity studies have been excerpted and are provided here in Table 1.

Table 1. University of California, Santa Cruz Saltwater Toxicity Study Results (from UCSC, 1998)

Species	Endpoints	Values
Atherinops affinis (topsmelt)	Acute Endpoint: 96-h Survival	
	Acute Value, LC50 (ug/L):	26,560
	Chronic Endpoint: 40-d Survival[1]	
	Lower Chronic Limit (ug/L):	3,240
	Upper Chronic Limit (ug/L):	5,630
	Chronic Value[2] (ug/L):	4,270
	Acute-to-Chronic Ratio:	6.22
Haliotis rufescens (abalone)	Acute Endpoint: 48-h Development	
	Acute Value, EC50 (ug/L):	145.46
	Chronic Endpoint: 20-d Juvenile Growth[1]	
	Lower Chronic Limit (ug/L):	21.5
	Upper Chronic Limit (ug/L):	32.5
	Chronic Value[2] (ug/L):	26.43
	Acute-to-Chronic Ratio:	5.50
Mysidopsis intii (mysid)	Acute Endpoint: 96-h Survival	
	Acute Value, LC50 (ug/L):	148.60
	Chronic Endpoint: 28-d Survival[1]	
	Lower Chronic Limit (ug/L):	10.0
	Upper Chronic Limit (ug/L):	48.8
	Chronic Value[2] (ug/L):	22.09
	Acute-to-Chronic Ratio:	6.73

[1]*most sensitive* chronic endpoint
[2]geometric mean of upper and lower limits

To recalculate the nickel criteria, the new data were incorporated into the national dataset and the criteria recalculated based on the Guidelines. The process outlined in the Guidelines for calculating criteria is driven, in most cases, by the toxicity results for the four lowest tested genera. The process for calculating a national acute criterion for any constituent is summarized below.

1. Calculate the genus mean acute value (GMAV) for each genera where more than one toxicity test exists.
2. Order the GMAVs from lowest to highest.
3. Assign ranks (R) from 1 to n (number of test results) to the ordered data.
4. Calculate the cumulative probability (P) for each data point as R/(N+1).
5. Select the four data points that have cumulative probabilities closest to 0.05.
6. Using those values, calculate the final acute value (FAV) based on equations specified in the Guidelines.
7. Compare the FAV to the species mean acute value (SMAV) for any commercially or ecologically important species.
8. If the SMAV for commercially or ecologically important species is lower than the FAV, lower the FAV to the SMAV for the commercially or ecologically important species.
9. The acute criterion is equal to the FAV divided by two (CMC=FAV÷2).
10. The chronic criterion is equal to the FAV divided by the ACR (CCC=FAV÷FACR).

The current nickel saltwater CTR criteria were calculated using the steps outlined above. The FAV used to calculate the CTR criteria is equal to 149.2 ug/L. The acute dissolved nickel saltwater CTR criterion is therefore 74 ug/L (based on step 9 above). The chronic CTR criterion is calculated using a FACR developed using data from two freshwater and one marine species. The two freshwater ACR values are 29.86 and 35.58, whereas the one available marine ACR value (for the mysid *Mysidopsis bahia* [species evaluated and renamed as *Americamysis bahia*]) is 5.48 (EPA, 1986). All three ACR values were used to create a final ACR (FACR) of 17.99, because the individual values are within a factor of 10 of one another. The chronic dissolved nickel saltwater CTR criterion is 8.2 ug/L (the FAV divided by the FACR of 17.99).

A number of alternatives are available to recalculate the national nickel saltwater criteria. The recalculation depends on which acute data are used to calculate the acute criteria for nickel and which ACR values are averaged to derive a Final Acute-to-Chronic Ratio. The acute criteria can be calculated with or without the new toxicity data. The FACR could be either the marine only ACR or the combined freshwater/marine ACR. As discussed in the recommendations section, the alternatives chosen for use in the Calleguas Creek Metals TMDL use the most conservative approaches of the options discussed below.

Since abalone is a commercially important species, the calculated Final Acute Value (FAV) that would normally be used for criteria derivation (149.2 ug/L) was replaced in the national dataset by the lower (more conservative) abalone Species Mean Acute Value (145.5 ug/L) in order to protect this species (based on step 8 listed above). Thus, the recalculated national FAV was determined to be 145.5 ug/L. The CMC value based on the abalone FAV of 145.5 ug/L would be 72.75 ug/L (CMC = FAV/2).

Using the recalculated national FAV and the two updated FACRs (combined freshwater/marine and marine), two alternative CCCs can be derived using the formula: FAV ÷ FACR = CCC.

1) CCC_{cmb}=Recalculated National FAV ÷ Recalculated Freshwater/Marine FACR:
145.5 ug/L ÷ 10.50 = 13.86 ug/L

2) CCC_{mar} =Recalculated National FAV ÷ Recalculated Marine FACR:
145.5 ug/L ÷ 5.959 = 24.42 ug/L

In order to ensure that the recalculated chronic criteria are protective of the newly tested, sensitive species, the two possible recalculated criteria were compared to the toxicity data. The chronic values of 22.09 and 26.43 ug/L for mysids and abalone, respectively, indicate that option 2) of the above potential nickel SSOs would not be protective (in clean laboratory water) of the more sensitive mysid. However, option 1) is protective of all species tested.

Dr. Glen Thursby of the US EPA's Narragansett, R.I. Laboratory, reviewed results of the work completed by UCSC in detail. In his report to EPA Region 9, he found the species and methodologies used in this work were appropriate for developing site-specific modifications to the national water quality criterion for nickel (Thursby, 1998) [Appendix 1]. The nickel recalculation procedure has been implemented in the California Regional Water Quality Control Board San Francisco Bay Region Resolution R2-2002-0061, "Amending the Water Quality Control Plan For the San Francisco Bay Region to Adopt Site-Specific Objectives for Copper and Nickel in the Lower South San Francisco Bay and an Implementation Plan," [Appendix 2] as well as in National Pollutant Discharge Elimination System (NPDES) permits in the San Francisco Bay area, such as Order No. R2-2003-0085 for the cities of San Jose and Santa Clara, where the nickel site-specific objective was used in assessing reasonable potential and in the development of effluent limitations.

4 Lower Calleguas Creek Watershed Nickel Recalculation and SSO

Mugu Lagoon, an estuary at the mouth of Calleguas Creek, supports a diverse wildlife population including migratory birds and endangered species; and is an area of special biological significance (ASBS). The Lagoon is comprised of a central basin which receives the flow from Revolon Slough and Calleguas Creek, and two arms (eastern and western) that receive some drainage from agricultural and industrial drains. Calleguas Creek is tidally influenced from Mugu Lagoon to approximately Potrero Road [Figure 1]. The average salinity in the lagoon is generally between 31 and 33 parts per thousand (ppt) (Granade, 2003), representative of strong oceanic salinity influence.

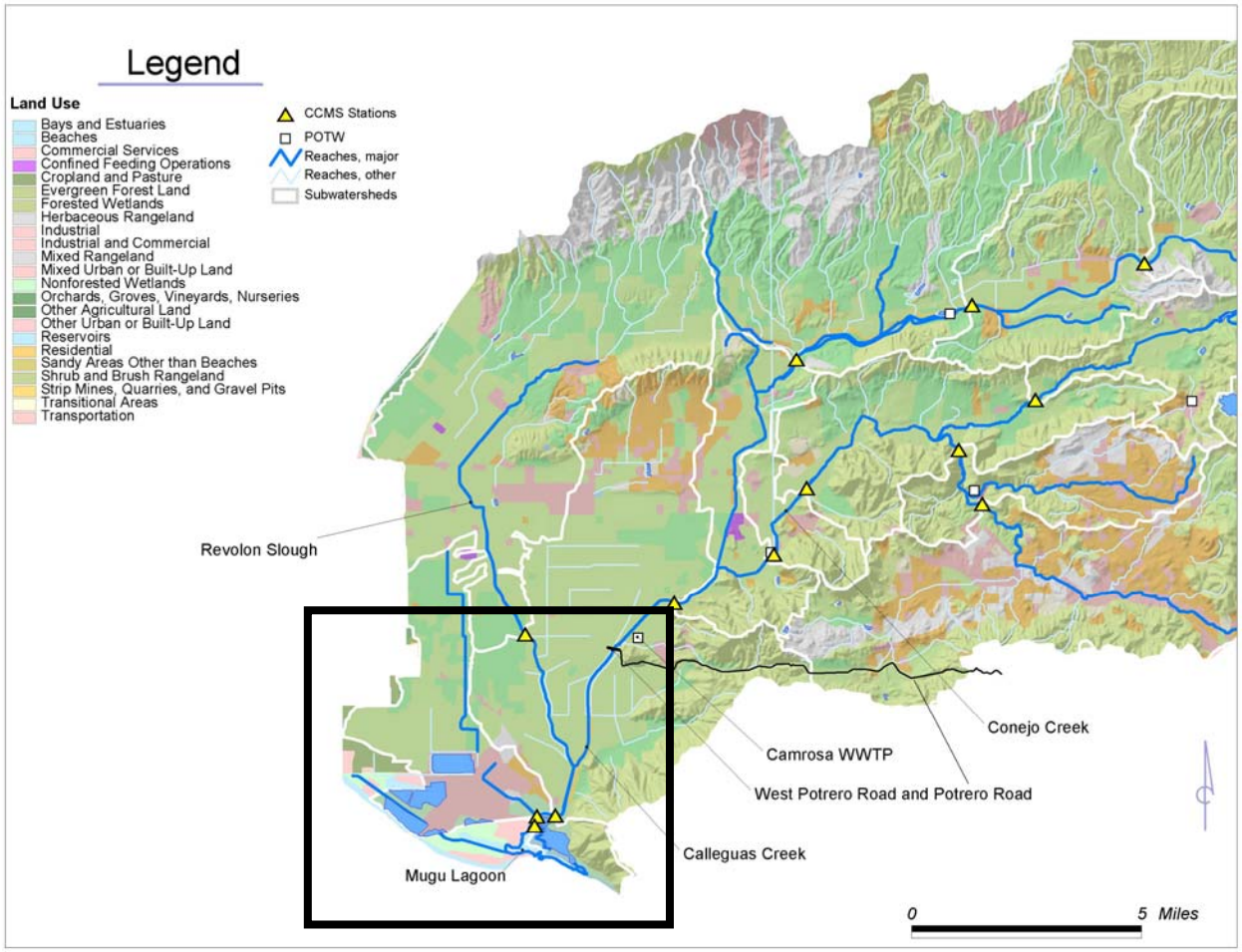

Figure 1. Area of tidal influence (inside box) in Lower Calleguas Creek Watershed

Recalculation method 1 above results in a national nickel saltwater CCC of 13.86 ug/L and CMC of 72.75 ug/L. These criteria are protective of all saltwater species tested and are the chosen SSOs for the Calleguas Creek Metals and Selenium TMDL. The recalculated saltwater nickel criteria proposed as SSOs are valid for Mugu Lagoon for a number of reasons as follows:

1. The recalculation was performed to establish a new national criterion for nickel.
2. The results of the laboratory studies used to establish the nickel saltwater criteria for LSSFB are applicable to other saline waters, such as the Lower Calleguas Creek Watershed, because the majority of species tested were chosen on the basis of being west coast marine species that are sensitive to nickel.
3. One of the species tested (topsmelt) is known to use Mugu Lagoon for spawning and feeding (Tetra Tech, 1998). The presence of topsmelt in Mugu Lagoon indicates that topsmelt are likely present in some saline areas of Lower Calleguas Creek (topsmelt are able to thrive in waters varying from 5 – 34 ppt salinity (US EPA, 1995)).

Therefore, as the current marine nickel criterion, which is based on accepted USEPA criteria development methodologies (Stephan et. al, 1985) applies to all water with salinities >10 ppt (or between 1-10 ppt more than 95% of the time), the recalculated nickel criterion also applies to these same waters.

It should be noted that these recalculated values are based on clean laboratory toxicity test results and do not include any ambient complexing capacity present in the CCW that may make nickel even less bioavailable to aquatic organisms. This may add a margin of safety to these calculated values.

5 Recommendations

The Recalculation Procedure is intended to "take into account relevant differences between the sensitivities of the aquatic organisms in the national dataset and the sensitivities of organisms that occur at the site" (EPA, 1994b). In the case of nickel, the national dataset currently contains only one marine species in the calculation of the marine Acute to Chronic ratio. The work done in LSSFB added three additional marine organisms to the chronic toxicity dataset, which are arguably more likely than freshwater organisms to occur in the saline or brackish waters of LSSFB, Mugu Lagoon, and Lower Calleguas Creek. The additions to the national dataset are summarized below:

Current Marine Nickel Criterion	Recalculated Marine Nickel Criterion
2 freshwater species:	2 freshwater species:
Pimephales promelas (fathead minnow)	*Pimephales promelas* (fathead minnow)
Daphnia spp. (cladoceran)	*Daphnia spp*. (cladoceran)
1 marine species:	4 marine species:
Mysidopsis (Americamysis)bahia (mysid)	*Mysidopsis (Americamysis) bahia* (mysid)
	Mysidopsis intii **(mysid)**
	Atherinops affinis **(topsmelt)**
	Haliotis rufescens **(abalone)**

Note: Additional species tested are shown in **bold**.

The additional data described above allows for the development of a scientifically defensible update of the Final Acute-to-Chronic Ratio (FACR) for nickel. The marine species used in the LSSFB studies included species found to be sensitive to nickel. One of the species tested (topsmelt) resides in Mugu Lagoon and Lower Calleguas Creek, one is a commercially and economically important west coast marine species (abalone), and the third (mysid) is an ecologically important west coast species recently used in US EPA-supported toxicity tests (UCSC, 1998). The goal of the recalculation performed in San Francisco Bay was to develop additional acute and chronic data on the toxicity of nickel, using *west coast* marine organisms.

The three new species, from different phyla, generated Acute-to-Chronic Ratios (ACRs) within 7% (coefficient of variation) of one another.

While Mugu Lagoon contains saltwater at all times, there is some influence from the freshwater rivers that empty into the Lagoon. Additionally, the Lower Calleguas Creek contains a mixture of fresh and saltwater due to tidal mixing with Mugu Lagoon. Using California Toxics Rule (CTR) guidelines, the more sensitive of saltwater and freshwater criteria shall apply when salinities are typically between 1-10 ppt. To protect any species which may travel between the rivers and the Lagoon, the combination saltwater and freshwater recalculation is recommended. Therefore, it is recommended that dissolved nickel should not exceed a chronic value of 13.9 ug/L and an acute value of 72.75 ug/L to be protective of aquatic species in Mugu Lagoon and Lower Calleguas Creek.

6 References

California Regional Water Quality Control Board San Francisco Bay Region (SFBRWQCB). 2002. Resolution R2-2002-0061: Amending the Water Quality Control Plan for the San Francisco Bay Region to Adopt Site-Specific Objectives for Copper and Nickel in the Lower South San Francisco Bay and an Implementation Plan.

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Watson *et al.* 1999. Nickel Acute-to-Chronic Ratio Study. City of San Jose Water Pollution Control Plant. Environmental Service Department.

Appendix 1

Glen Thursby Letter to Dr. Winona Victery, US EPA Region 9 regarding review of "Acute and Chronic Nickel Toxicity: Development of a Site-Specific Acute-to-Chronic Ratio for South San Francisco Bay."

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

CITY OF SAN JOSÉ
Environmental Services Department
Watershed Protection Deputy Group

FAX COVER SHEET
FAX #: (408) 956-1722

TO:	Kristine Corneillie	PHONE #:	
FAX #:	(530) 753-7030		

From:	Peter Schafer	Number of pages including this page:	3
Phone:	(408) 945-5759	Fax: 408-956-1722	
Date:	10-27-03		

SUBJECT: Glen Thursby letter in support of Ni ACR work.

COMMENTS/REMARKS:

Kristine,

Please note that in his letter Dr. Thursby refers to the "bad news", the topsmelt LC50 of 26.55 µg/L. That was a typo in the draft document. The units should have been ppm (mg/L) so the fish was actually insensitive.

Hope this helps. Any questions, please give me a call.

Pete

City of San Jose, Environmental Services Department
4245 Zanker Road, San Jose, CA 95134

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT
NATIONAL HEALTH AND ENVIRONMENTAL EFFECTS RESEARCH LABORATORY
ATLANTIC ECOLOGY DIVISION
27 TARZWELL DRIVE
NARRAGANSETT, RHODE ISLAND 02882

July 28, 1998

Dr. Winona Victery
U.S. EPA, Region 9
75 Hawthorne Street/PMD-1
San Francisco, CA 94105

Dear Dr. Victery:

I was asked to review the document entitled, *Acute and Chronic Nickel Toxicity: Development of a Site-Specific Acute-to-Chronic Ratio for South San Francisco Bay,* dated June 1, 1998. This is a preliminary report, but I do not believe that my comments will change substantially once the final definitive tests are completed.

In the nickel criteria document (1986), three Acute-Chronic Ratios (ACR) are given. Two from freshwater (35.58 and 29.86) and one from salt water (5.478). Although all three values were used to create the current Final ACR (because they were within a factor of 10), the data from the present study could be used to make a case that saltwater and freshwater ACRs may be different. This could substantially lower the FACR for the calculation of a nickel site-specific for South San Francisco Bay. That's good news for the city of San Jose. Now the bad news, the topsmelt LC50 (26.55 µg/L) will substantially lower the Final Acute Value (FAV). Because it is so much more sensitive to nickel than any of the other species, the FAV is going to be very close to this value. Even if the FAV were greater than the topsmelt value, the FAV would have to be lowered to protect this economically/ecologically important species. This is particularly important since topsmelt is a resident species in the San Francisco Bay.

The species and methodologies that the authors are using are appropriate for the task. I have some slight reservations about the "10%" value for expected survival of abalone in the longer chronic test with this species. However, if it can be demonstrated that this is what might be "normally" expected in the field, then these reservations go away. The main change that should be made with respect to abalone is that the EC50 value of 144.5 µg/L should be the one used. Percentage normal development is a more appropriate endpoint that just survival.

I might have missed it, but it is not clear whether the reported nickel measured values are total or dissolved. The final report should more clearly label the tables and figures with respect to this. Although the data in Figure 1 (as well as work done here at AED), strongly suggest that total and dissolved are more-or-less equal in clean seawater.

Finally, since the final site-specific nickel values for South San Francisco Bay will depend so heavily on the topsmelt acute, I suggest that this test be rerun once or twice.

This is not essential because the current definitive test is acceptable. However, it would be nice to confirm the value since it is such a critical one.

Sincerely,

Glen B. Thursby, Ph.D.
thursby.glen@epa.gov

CC: Norman Rubinstein,
Director, AED

Steven Schimmel, Ph.D.
Branch Chief, Ecological Analysis and Simulation Branch, AED

Appendix 2

San Francisco Regional Water Quality Control Board Resolution R2-2002-0061: Amending the Water Quality Control Plan for the San Francisco Bay Region to Adopt Site-Specific Objectives for Copper and Nickel in the Lower South San Francisco Bay and an Implementation Plan.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

SAN FRANCISCO BAY REGION

RESOLUTION R2-2002-0061

7 Amending the Water Quality Control Plan For the San Francisco Bay Region

to Adopt Site-Specific Objectives for Copper and Nickel

in the Lower South San Francisco Bay and an Implementation Plan

WHEREAS, the California Regional Water Quality Control Board, San Francisco Bay Region (Regional Board), finds that:

1. An updated Water Quality Control Plan for the San Francisco Bay Region (Basin Plan) was adopted by the Regional Board on June 21, 1995, approved by the State Water Resources Control Board (State Board) on July 20, 1995, and approved by the Office of Administrative Law (OAL) on November 13, 1995.
2. The proposed Basin Plan Amendment, which was developed in accordance with California Water Code (CWC) § 13240, consists of the following: adoption of site-specific water quality objectives (SSOs) for copper and nickel in the Lower South San Francisco Bay south of the Dumbarton Bridge (Lower South SF Bay); adoption of an implementation plan for the SSOs referred to as a Water Quality Attainment Strategy (WQAS), including the selection of metal translators to be used to compute water quality-based effluent limits in permits; and minor changes and updates to Chapter 4 of the Basin Plan to reflect more accurately current conditions and Regional Board policy concerning Lower South SF Bay (collectively, the Basin Plan Amendment). The proposed Basin Plan Amendment, including specifications on its physical placement in the Basin Plan, is set forth in Exhibit A hereto. Only the SSOs for copper and nickel in the Lower South SF Bay and the selection of metal translators are regulatory.
3. On May 18, 2000, the United States Environmental Protection Agency (USEPA) promulgated the California Toxics Rule (CTR) prescribing numeric water quality criteria for priority toxic pollutants, including copper and nickel that apply to the Lower South SF Bay.
4. On March 2, 2000, the State Board adopted the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP) to be effective as of May 22, 2000. Among other things, the SIP establishes implementation provisions for priority pollutant criteria promulgated by USEPA, including the CTR.
5. The SIP authorizes the Regional Board to adopt SSOs in lieu of the CTR criteria whenever the Regional Board determines, in the exercise of its professional judgment, that it is appropriate to do so. Under the SIP, SSOs are appropriate if (a) a priority pollutant criterion or objective is not achieved in the receiving water, or a National Pollutant Discharge Elimination System (NPDES) permit holder demonstrates that they do not, or may not in the future, meet an existing or potential effluent limitation based on the priority pollutant criterion or objective and (b) there is a

demonstration that the discharger cannot be assured of achieving the criterion or objective and/or effluent limitation through reasonable treatment, source control and pollution prevention measures.

6. The proposed Basin Plan Amendment proposes SSOs in the Lower South SF Bay of 6.9 μg/l for a 4-day average and 10.8 for a one-hour average for dissolved copper and 11.9 μg/l for a 4-day average and 62.4 μg/l for a one-hour average for dissolved nickel. These SSOs are necessary and appropriate for this waterbody because: (a) despite the performance of reasonable treatment, source control and pollution prevention measures, the current objectives are not being consistently met; (b) the chemical features of Lower South SF Bay reduce the toxicity and bioavailability of copper and nickel through a variety of mechanisms; (c) an impairment assessment conducted for Lower South SF Bay demonstrated that the current water quality objectives for copper and nickel for Lower South SF Bay could be relaxed while still fully protecting beneficial uses; and (d) ambient concentrations and loading of copper and nickel to Lower South SF Bay have been significantly reduced over the last two decades and further reductions in loading will be difficult and costly and will not provide corresponding water quality improvements.

7. The proposed SSOs for copper and nickel in the Lower South San Francisco Bay were derived through USEPA-approved methods and are fully protective of the most sensitive aquatic life beneficial uses in Lower South SF Bay.

8. The proposed SSOs are currently being achieved and must be maintained. Therefore, the site-specific objectives are supported by the WQAS, which contains strong pollution prevention and source control actions designed to prevent water quality degradation and ensure ongoing attainment of site-specific objectives. The WQAS also includes a selection of metal translators to be used to calculate water-quality based effluent limits in permits. This regulatory action is necessary to avoid inefficient selection of metal translators on a permit-by-permit basis. The WQAS satisfies the requirement for a program of implementation for achieving water quality objectives under CWC § 13242.

9. The proposed SSOs for copper and nickel in the Lower South SF Bay and the corresponding WQAS comply with state and federal antidegradation requirements as set forth in the Staff Report dated May 15, 2002 (Staff Report).

10. The Board has considered those CWC § 13241 factors to be considered when establishing water quality objectives such as SSOs, as set forth in the Staff Report.

11. The Board has considered the impacts of the proposed Basin Plan Amendment on those affected by the proposed Basin Plan Amendment, namely publicly owned treatment works (POTWs) and urban stormwater runoff programs, including economic impacts. There are minimal economic impacts that would result from the proposed Basin Plan Amendment. As stated above, the SSOs for copper and nickel are currently being met in receiving waters; thus, no additional treatment measures are necessary to achieve compliance with the proposed objectives. Moreover, implementation of most of the WQAS actions is already required of POTWs and urban runoff programs such that no additional expenditures are required as a result of the proposed Basin Plan Amendment.

12. Regulatory elements of the proposed Basin Plan Amendment were reviewed and endorsed by external peer reviewers Drs. David Jenkins and Alex Horne from the University of California at Berkeley.

13. On May 22, 2002, the Regional Board held a public hearing to consider this Basin Plan Amendment. Notice of the public hearing was given to all interested persons and was published in accordance with CWC § 13244 and 40 CFR § 25.5. Additionally, on April 17, 2002, the Regional Board held a duly noticed informational workshop on the proposed Basin Plan Amendment.

14. Regional Board staff prepared and distributed a draft Staff Report, dated April 5, 2002, regarding adoption of the proposed Basin Plan Amendment in accordance with applicable state and federal environmental regulations (California Code of Regulations, §3775, Title 23 and 40 CFR Parts 25 and 131).

15. The process of basin planning has been certified by the Secretary for Resources as exempt from the requirement of the California Environmental Quality Act (Public Resources Code Section 21000 et seq.) to prepare an Environmental Impact Report or Negative Declaration. The Basin Plan Amendment package includes a staff report, an Environmental Checklist, an assessment of the potential environmental impacts of the Basin Plan amendments, and a discussion of alternatives. The Basin Plan Amendment, Environmental Checklist, Staff Report, and supporting documentation are functionally equivalent to an Environmental Impact Report or Negative Declaration. The Board has duly considered the Environmental Checklist, staff report and supporting documentation with respect to environmental impacts and finds that proposed Basin Plan Amendment will not have a significant impact on the environment. The Board further finds, based on consideration of the record as a whole, that there is no potential for adverse effect, either individually or cumulatively, on wildlife as a result of the proposed Basin Plan Amendment.

16. The Basin Plan Amendment must be submitted for review and approval by the State Board, the Office of Administrative Law (OAL), and USEPA. Once approved by the State Board, the amendment is submitted to OAL and USEPA. The Basin Plan Amendment will become effective upon approval by OAL and USEPA. Additionally, for the SSOs to apply over the CTR criteria for copper and nickel, USEPA must also amend the CTR to remove the applicability of the copper and nickel criteria in the Lower South SF Bay, which amendment can and should be done concurrently with USEPA approval of the Basin Plan amendment. A Notice of Decision will be filed.

NOW, THEREFORE BE IT RESOLVED THAT:

1. The Regional Board adopts the SSOs and WQAS for copper and nickel in Lower South SF Bay to the Basin Plan as set forth in the Exhibit A hereto. The Regional Board also adopts those minor changes and updates to Chapter 4 of the Basin Plan as set forth in Exhibit A hereto.

2. The Executive Officer is directed to forward copies of the Basin Plan Amendment to the State Board in accordance with the requirement of CWC Section 13245.

3. The Regional Board requests that the State Board approve the Basin Plan Amendment in accordance with the requirements of CWC Sections 13245 and 13246 and forward it to the OAL and USEPA for approval.

4. If, during the approval process, the State Board or OAL determines that minor, non-substantive corrections to the language of the amendment are needed for clarity or consistency, the Executive Officer may make such changes, and shall inform the Regional Board of any such changes.

5. Since the Basin Plan Amendment will involve no potential for adverse effect, either individually or cumulatively, on wildlife, the Executive Officer is directed to sign a Certificate of Fee Exemption for a "De Minimis" Impact Finding.

THEREFORE BE IT FURTHER RESOLVED THAT:

The Regional Board commends the Santa Clara Basin Watershed Management Initiative and its participants for their collaborative efforts and commitment of time and resources that contributed to the success of this project. Provision for stakeholder involvement, generation of high quality and reliable studies and data, and scientific peer review of findings are hallmarks of this project that serve as a model for successful resolution of complex technical and policy issues.

I, Loretta K. Barsamian, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of a Resolution adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on May 22, 2002.

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LORETTA K. BARSAMIAN
Executive Officer