BACWA
BAY AREA
CLEAN WATER
AGENCIES

August 21, 2012

Ms. Jeanine Townsend
Clerk to the Board
State Water Resources Control Board
1001 I Street, 24th Floor [95814]
P.O. Box 100
Sacramento, CA 95812-0100

Via E-mail: *commentletters@waterboards.ca.gov*

SUBJECT: Comment Letter - Policy for Toxicity Assessment and Control

Dear Ms. Townsend:

The Bay Area Clean Water Agencies (BACWA) appreciates the opportunity to comment on the State Water Resource Control Board's (State Water Board's) Draft Policy for Toxicity Assessment and Control (Policy). BACWA is a joint powers agency whose members own and operate publicly-owned treatment works (POTWs) and sanitary sewer systems that collectively provide sanitary services to over 6.5 million people in the nine county San Francisco Bay Area. BACWA members are public agencies, governed by elected officials and managed by professionals charged with protecting the environment and public health.

BACWA acknowledges the extensive effort and resources that State Water Board Staff have put into this Policy. We appreciate that State Water Board Staff have revised the Policy from previous drafts in response to comments from the POTW community. However, many elements of the Policy still need to be redrafted to become workable for both municipal agencies in California, and regional regulators. BACWA recommends that the State Board proceed cautiously to avoid highly detrimental unintended and potentially irreversible consequences resulting from California being the first State to implement the TST method for toxicity testing.

1. ***Introduction of the TST should not be concurrent with introduction of numeric toxicity limits***

BACWA recommends *that if the Policy continues to utilize the TST method, then it should continue to allow narrative objectives with numeric triggers, rather than concurrently introducing numeric objectives.*

This Policy simultaneously introduces 1) a new statistical method - the TST; and 2) a new way to implement enforcement - numeric limits whose exceedences count as violations. The TST method has not been tested in any other State, and its implementation may have unintended consequences. First, it is acknowledged that over time all agencies will be assessed violations due to false determinations of toxicity. Additionally, the State 303(d) Listing Policy specifies that if two or more of 24 measurements in a waterbody exceed the water quality objective then the water body is listed as impaired. Therefore, 34% of California's non-toxic receiving waters will be listed as toxic, assuming the minimal 5% false determination of toxicity rate that is built into the TST method. The actual percentage of water bodies that are listed as impaired may be higher due to test species variability.

There is no water quality benefit to implementing numeric objectives over narrative objectives with numeric triggers for accelerated monitoring and toxicity investigation. Use of the TST method is being tested for the first time in California, and once numeric objectives are implemented, the State Board will likely not be able to remove them due to antibacksliding considerations.

2. Use of Instream Waste Concentration is essential to using TST

BACWA recommends *the second sentence of the definition of IWC be removed from the Policy so that it reads: "In-Stream Waste Concentration (IWC) is the concentration of a toxicant or effluent in the receiving water after mixing (the inverse of the dilution factor)."*

The Policy is currently drafted with the following definition for IWC: "*In-Stream Waste Concentration (IWC) is the concentration of a toxicant or effluent in the receiving water after mixing (the inverse of the dilution factor). A discharge of 100 percent effluent will be considered the IWC whenever mixing zones or dilution credits are not authorized by the applicable Water Board*." The second sentence potentially disallows the use of a true IWC when using TST to evaluate toxicity test results, and is not appropriate since the validity of using TST for regulatory decision-making is based on its use with IWC. All documents referencing use of TST to evaluate toxicity test data, including the Policy, staff report for the Policy, and the Peer Review of the Policy, agree on this point.

The US EPA NPDES Test of Significant Toxicity Technical Document (June 2010) is particularly clear. The last sentence of the Executive Summary reads: "*The TST approach is designed to be used for two concentration data analysis of the IWC or a receiving water concentration (RWC) as compared to a control concentration*." The definition of IWC in this EPA Technical Document is: *"In-stream Waste Concentration (IWC) is the concentration of a toxicant or effluent in the receiving water after mixing. The IWC is the inverse of the dilution factor. It is sometimes referred to as the receiving water concentration (RWC)*." The EPA guidance document that sets the standards for using TST in NPDES Permit programs requires the IWC to be a true concentration of effluent in the receiving water after mixing.

If the Policy is adopted with the allowance to declare an IWC is 100 percent effluent when the true IWC is lower, the TST analysis will always overstate the true measurement of toxicity for that effluent in the receiving water. Under this scenario, a positive TST analysis will require a discharger to conduct accelerated monitoring and potentially be in violation for a positive test result that does not, in fact, cause any toxic effects within the receiving water. If all of the other elements of the Policy are retained, many municipal agencies will spend significant staff and monetary resources to respond to toxicity test results that are inherently overstated if the Policy does not require a true IWC to be used.

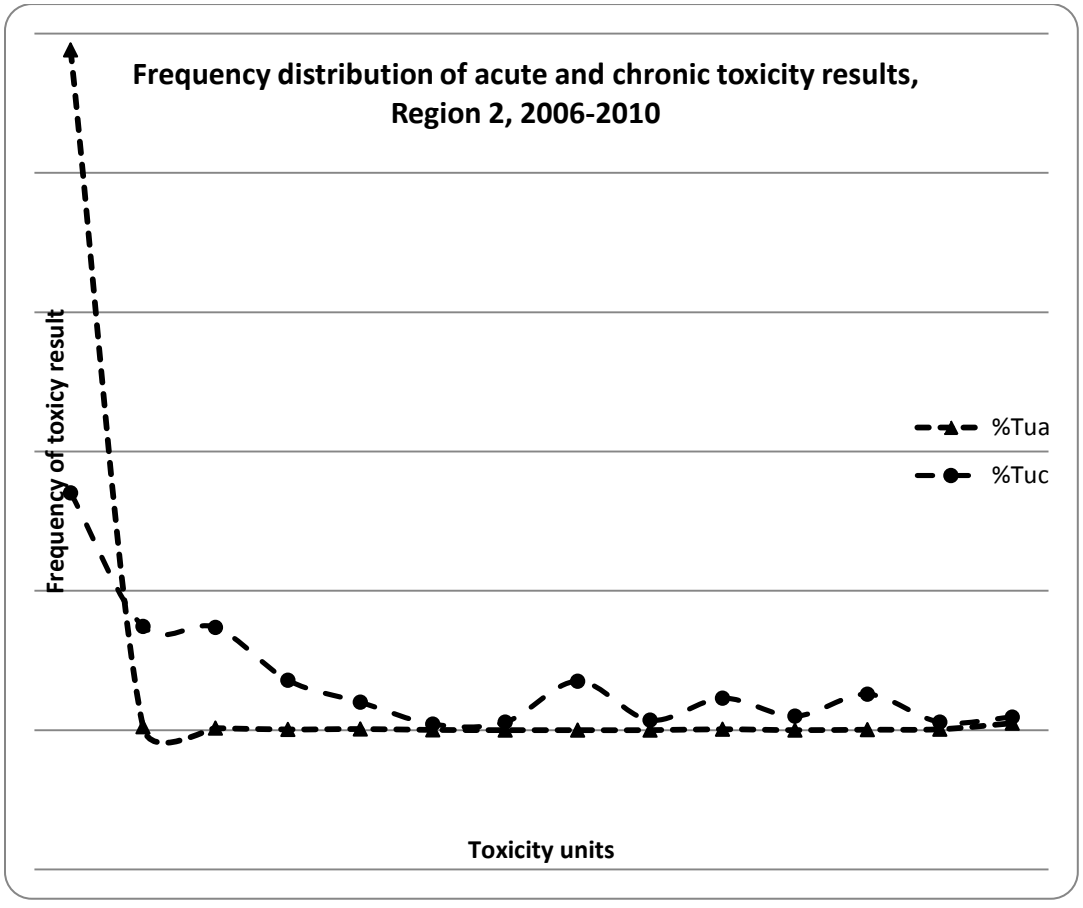
The intent of the Policy is to establish statewide consistency and reliability in the interpretation and response to toxicity test results. A true IWC when using TST is integral to meeting these objectives.

3. Acute toxicity testing is costly and does not provide additional water quality protection where chronic toxicity testing is required

BACWA recommends *that the Policy be revised to only allow Regional Boards to require acute toxicity monitoring in the absence of chronic toxicity monitoring requirements.*

One of the key assumptions of cost savings in the Economic Impacts analysis in Appendix H of the staff report is that acute testing requirement will no longer be included in permits. However, the Policy leaves acute toxicity testing requirements to the discretion of Regional Boards.

The chronic toxicity test is much more conservative than acute toxicity testing. Chronic test endpoints are more sensitive than acute endpoints. The figure below illustrates the frequency of acute and chronic toxicity detected from January 2006 through October 2010, from all San Francisco Bay Area municipal agencies who reported via the Electronic Reporting System (ERS). Over this time period, testing for chronic toxicity testing was consistently more sensitive than acute toxicity testing for all municipal agencies, and acute testing did not yield any additional insight into toxicity in discharges.



Testing for acute toxicity is burdensome for municipal agencies and does not provide additional water quality protection where chronic toxicity monitoring is required.

4. The calculation of reasonable potential is not based on science or precedent

BACWA recommends *that the method for determining reasonable potential in the Policy be reviewed and replaced with a method that allows POTWs to determine reasonable potential based on the quality of their effluent, rather than the quantity of their flow. Additionally, the Policy should assign a RP threshold on a scientific basis rather than at an arbitrary percent effect level.*

The Policy assigns reasonable potential (RP) for all POTWs with an average daily flow above 1 MGD. The rationale in the Staff Report was that "*Because POTWs accept a steady, voluminous flow of effluent from a variety of municipal discharges containing numerous unknown constituents, these facilities harbor the potential to adversely impact aquatic biota."* The rationale for this automatic RP also asserted that it "*would provide a higher level of ecological protection from the voluminous discharges of these facilities than that of an isolated test. …"*

This general statement fails to take into account the wide variety of POTW effluents that are due to differences in the types of users served, whether the POTW has implemented a pretreatment program, whether the POTW has a robust source control and pollution prevention program, the level and type of treatment, the initial dilution received by the discharge, and the quality of the receiving water. Municipal agencies should have the opportunity to demonstrate whether or not their discharge indeed has numeric RP, and requires effluent limits to protect the receiving water. Reasonable Potential should be based each agency's historical results, such as for toxic constituents as indicated in the State Implementation Plan. Agencies should not automatically be given permanent chronic toxicity limits that do not consider the quality of their discharge.

For municipal agencies who are already not presumed to have RP for chronic toxicity based on flow, the Policy assigns it if the TST detects a percent effect at the IWC greater than 0.10. In other words, a waste discharge will be determined to have reasonable potential to cause or contribute to an excursion above the water quality objectives of 25% effect for chronic toxicity, and 20% effect for acute toxicity, if a toxicity test detects a 10% effect. There are two major flaws with this approach:

- Assigning an RP threshold that is so far beneath the water quality objective is nonsensical, does not appear to be supported by any regulatory documents or precedence, and is not scientifically defensible. The Staff Report does not adequately analyze alternative RP methods for POTWs, acknowledging the EPA's Technical Support Document's methods as "accurate and comprehensive" but dismissing them as too much work for Water Board staff.
- The 10% effect is within the inherent variability of toxicity tests for some test species. This rule practically assures that waste dischargers and all waterbodies in California will eventually be determined to have RP.

5. Maximum Daily Effluent Limit (MDEL) is inappropriate

BACWA recommends *that the Policy not include numeric effluent limits. If the Policy must include numeric effluent limits, these must be expressed as median or other percentile limits that require more than one test result to assess a permit violation*

Contrary to EPA guidance, the proposed Policy includes an MDEL that would result in an effluent limit violation as a result of a single sample exceedance. It is inappropriate to assess single sample violations for WET analyses due to the variability and uncertainty in biological testing. The promulgated EPA method for chronic toxicity states that "The interpretation of the results of the analysis of data from any of the toxicity tests described in this manual can become problematic because of the inherent variability and sometimes unavoidable anomalies in biological data."

There are numerous sources of uncertainty in toxicity testing. One source is the inherent variability of individual test organism response, which leads to statistical uncertainty that can only be partially reduced by increasing the number of replicates tested. There are also numerous potential causes for organisms response that are unrelated to toxicity, including variability in batches of test organisms, the quality of food during chronic tests, the presence of pathogens, or a deficiency of necessary conditions in the sample. For example, there are well-documented toxic effects of samples with low hardness on organisms such as *Ceriodaphnia* or fathead minnows. In these cases, the apparent "toxicity" of the sample is due to the absence of essential elements in the test solution. Single sample exceedances that are not part of a pattern of toxicity should be viewed with suspicion, as they may be due to transient causes unrelated to chronic toxicity. The appropriate response to a WET test indicating the presence of toxicity is to investigate the cause, starting with follow up testing to confirm the initial result.

6. *Calculating the MMEL on a calendar month basis will cause logistical problems at contract laboratories*

BACWA recommends *the language be changed to allow the two additional tests to be conducted within 30 days of the completion of the "failed' initial toxicity test. If both additional toxicity tests "pass" and at least one test is performed in the following calendar month, it may be used as the initial monthly toxicity test for routine monitoring.*

The proposed language on Compliance Determination states that if an initial toxicity test results in a "fail", but the percent effect is below the MDEL, the discharger shall conduct two additional toxicity tests within the same calendar month in order to determine compliance with the MMEL.

To accommodate two additional tests within a calendar month, municipal agencies will have to perform routine testing during the first week of each calendar month. Viable organisms are not always available and also, since many municipal agencies do not perform chronic toxicity testing in-house, this approach would result in an undue scheduling burden on the contract laboratories, and concomitant increased costs for municipal agencies. In addition, this potentially constrains a discharger's ability to comply with NPDES Federal Standard Provision (40 CFR section 122.41(j)(1)) by reliably conducting sampling that is "representative of the monitored activity" in instances when representative discharge or treatment operations are not performed during the first part of the month. Or, if monitoring must otherwise be performed late in the month, a failed test at any percent effect will result in a violation for lack of ability to re-test.

7. *Contract laboratories will not be able to immediately accommodate the increase in workload*

***BACWA recommends** that the Policy grant Regional Water Boards discretion on how the Policy's implementation is staged.*

The Policy requires most Region 2 municipal agencies to increase the frequency of toxicity testing from quarterly, or less frequently, to monthly. There are a handful of contract laboratories that are currently equipped to perform the toxicity tests required by the Policy. Due to the high cost and effort of setting up the facilities required by these tests, it will take several years before the labs have the capacity to accommodate the increased testing load.

8. Non-continuous dischargers must have sufficient time to conduct a toxicity test during a partial-discharge month.

***BACWA recommends** that the last sentence at the bottom of page 8 in Part III.A.4.a. in the Proposed Policy be revised from <u>two</u> days to <u>six</u> days.*

A single chronic toxicity test typically requires the collection of three samples over at least a 5-day period. Therefore any minimum discharge periods should be compatible with this typical sampling requirement, including a margin for error and consistent with requirements for stormwater discharges.

9. The plant species list is inadequate. (There are no marine or estuarine phytoplankton test species listed in Table 1 on page 17 of the Policy.)

***BACWA recommends** that an alpha value be determined for the 96-hour growth test with* Thalassiosira pseudonana *and added to the list of approved test species in the current Policy.* T. pseudonana *is a ubiquitous estuarine diatom that is found in S.F. Bay and elsewhere, it is sensitive to a variety of pollutants, and it can be tested under low salinity conditions (i.e. less salt addition required for freshwater effluents and therefore presents less potential artificial (i.e. not toxicity related) impact from salinity, whether positive or negative).*

The Policy, and EPA guidance generally, requires that "… reasonable potential analyses and species sensitivity screenings for chronic toxicity shall include one vertebrate, one invertebrate, and one aquatic plant." But, Table 1 on page 17 only provides two aquatic plant test species to choose from, neither of which is desirable or completely appropriate for assessing toxicity in an estuarine environment. This is a problem for municipal agencies in the San Francisco Bay area who may be precluded from using S*elenastrum capricornutum* (freshwater, green, unicellular algae) due to its demonstrated sensitivity to the anionic and cationic matrix (saltiness) of some wastewaters. The giant kelp (*Macrocystis pyrifera*) is a coastal oceanic species not found in estuaries.

10. Toxicity testing costs will increase in Region 2

The Economic Impacts analysis in Appendix H of the Staff Report concludes that the Policy will lead to cost savings for municipal agencies. However, these results fail to take the following into account:

a) ***Increased monitoring frequency -*** The Toxicity Policy will save money for some municipal agencies. But costs will increase for most municipal agencies due to more frequent testing. Appendix H largely looked at Agencies that already have monthly chronic toxicity testing requirements, and extrapolated these results. However, only three of the 44 municipal agencies in the Bay Area currently perform monthly chronic toxicity monitoring now. If the policy is adopted, 32 agencies will increase their chronic testing to monthly frequency, and four agencies will begin monitoring for the first time. Additionally, due to the false determination of toxicity rate of at least 5% that is built into the TST method, municipal agencies will be assumed to have to pay for three monthly tests at least 5% of the time.
b) ***Acute Toxicity monitoring -***The Policy gives Regional Board's discretion in assessing Reasonable Potential (RP) for acute toxicity. Therefore, it must be assumed that regulators in any given region could decide to continue to require acute testing. If this is the case, the large cost decrease that is assumed in Appendix H of the Staff Report would not be realized in this Region. Furthermore, Region 2 municipal agencies have already invested significant resources into developing acute toxicity testing capability in-house, so even if the acute toxicity testing is not required, we will not realize the savings described in the Staff report.
c) ***Increased Violations -*** The policy assigns violations for exceedance of the MDEL or MMEL. Many municipal agencies detect low levels of episodic chronic toxicity that are never identified, which will now be classified as violations. Additionally, assuming a minimal rate for false determination of toxicity of 5%, region-wide there will still be a total of about 12 chronic toxicity violations per year in our Region based on false positives. Although mandatory minimum penalties do not apply to toxicity testing, administrative civil liability cases are still at the discretion of the Regional Water Board and the significant and demonstrated liability for third party lawsuits is created once the events are classified as violations.
d) ***Replicates to minimize the effects of variability -*** TST test is sensitive to variability. Therefore, the remedy for false determinations of toxicity, for those municipal agencies that have variable effluent quality or use a more variable test animal, is to increase replication in the toxicity tests, which also eliminates any cost savings.

BACWA performed a cost impact analysis to examine the effects of the policy on our Region. The report is provided in Attachment 1. In summary, region-wide costs are expected to increase by a minimum of $181,000, assuming municipal agencies use one sample to determine compliance, or a maximum of $ 540,000, assuming municipal agencies continue to use multiple samples to minimize the likelihood of having a violation assessed due to a false determination of toxicity. These costs do not account for a change in acute toxicity testing, nor do they include the labor costs of taking the additional samples, the consequent additional QA/QC review, and additional reporting.

11. The methodology for determining the most sensitive species needs to take additional factors into account beyond simply the greatest percent effect at the IWC during a screening test.

BACWA recommends *that the following language be added to Part III (A)(4) of the Policy for Toxicity Assessment and Control: "In cases where percent effect measured during a species selection screening does not identify a statistically significant difference in TST percent effect or*

sensitivity between species, dischargers and Regional Boards shall evaluate additional factors to determine which test species should be required for permit compliance testing. Examples of additional factors are published species sensitivity values for inorganic and organic pollutants, the nature of the discharge (i.e. detected pollutants of concern), test species sensitivity to the detected pollutants, the discharger's historical toxicity testing results, species availability, and seasonal variations in quality of test species."

In cases where treated effluent causes very little observed effect on any species during toxicity screening testing, dischargers and Regional Boards should be encouraged to consider additional factors in determining the test species to be used during a 5-year permit cycle. For example, when all percent effects of a screening study for all species are below their established Regulatory Management Decisions at IWC, and all tests pass using the TST, but the discharger still has reasonable potential, it is not possible to determine which species is truly "most sensitive." It is impossible to discern sensitivity because no species exhibits sensitivity. At such low percent effect levels, the calculated percent effect for a passed test is simply the result of test variability and not an indication of a toxic effect or a significant difference in sensitivity. In short, it is mathematical noise, which should not be a basis for species selection due to sensitivity.

12. General Comment: The Policy will not enhance statewide consistency

A major project goal for the development of this policy is to attain statewide consistency. This goal will not be achieved if significant elements are left to the discretion of the Regional Boards. Regional regulators tend to be conservative. Given a mission to protect the waters of the State, they will generally be inclined to err on the side of greater protection. This is understandable. But, this operating philosophy will not mesh well with a Policy for toxicity that already imposes violations for detections of toxic effects and an acceptance that as much as 5% of those detections are probably false.

In many respects, the Policy allows discretion of Regional Boards on the wrong issues. Discretion is allowed for assignment of broad general factors that will influence, even bias, toxicity testing results: determination of Instream Waste Concentration (IWC), and requirement for acute toxicity testing in addition to chronic testing. Ironically, these two factors require fairly detailed knowledge of the limitations of toxicity testing, statistical theory, and the EPA guidance documents. On the other hand, no regional discretion is allowed for interpretation of toxicity testing results where common sense and local knowledge could be beneficial: MDEL and MMEL violations are mandatory apparently even if a discharger can clearly demonstrate that the toxic result was an artifact of the test or that the receiving waters were not impacted. This policy will unfortunately encourage a few to several of the nine Regional Boards to routinely assign greater stringency. The ultimate result will be numerous toxicity MDEL and MMEL violations based on increasingly dubious test results.

13. General Comment: The Policy imposes a new definition of "Toxicity" that will result in unintended consequences.

By implementing the Test of Significant Toxicity (TST) method, this Policy changes the paradigm that defines toxicity. The TST is, in part, a comparison of coefficients of variation and

therefore penalizes variability. With the Policy's adoption, variability rather than a concentration response will become the determining factor. This alone suggests that future toxicity monitoring results will be different.

The range of variability that is experienced in toxicity testing depends in part on the type of test and test species that is used. Using the TST, the rate of false determinations of toxicity increases as test variability increases. Therefore, a likely unintended outcome is that eventually most municipal agencies will determine from Effluent Characterization and RPA studies that the highly variable test animals are the most sensitive. It then follows that toxicity testing will increasingly become an evaluation of effluent variability as opposed to an evaluation of the magnitude of toxicity that may be present. On the one hand, this policy will encourage municipal agencies and testing laboratories to take steps to reduce test variability. On the other hand, over time reasonable potential analyses and species sensitivity screenings will determine that the inherently variable test species are more sensitive and therefore will become the selected species. Overall, it is not possible to determine whether this new paradigm will benefit the waters of the State.

14. Conclusion

Even if the cost savings in the Staff Report were realized by agencies, municipal agencies do not want to trade a few thousand dollars in test cost savings for an increase in assessed violations. POTWs often have limited ability to prevent toxic events. Having toxicity exceedences labeled as violations before a POTW has a chance to investigate and address the event has significant costs in terms of public trust and goodwill.

On the whole, while this draft of the Policy contains some improvements compared to previous versions, it still needs significant revision to ensure the proposed requirements are based on sound science, and to make it workable for municipal agencies. BACWA appreciates the State Water Resources Control Board's close attention to the comments made herein, and to those submitted by CASA. Representatives of BACWA would be more than happy to discuss our comments and concerns with you in more detail if necessary.

Respectfully Submitted,

James M. Kelly
Executive Director
Bay Area Clean Water Agencies

cc: BACWA Executive Board
San Francisco Bay Regional Water Quality Control Board

ATTACHMENT 1

BACWA
BAY AREA
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AGENCIES

Summary of Estimated Cost Impacts of Proposed WET Policy on Region 2 POTWs

Prepared by:

RMC
Water and Environment

August 8, 2012

Summary of Estimated Cost Impacts of Proposed WET Policy on Region 2 POTWs

August 8, 2012

Option 1 – Current Costs Using Agency Data vs. Future Costs Using SWB Unit Costs for TST Method

Permit Cycle: **$ 796,000** Annual Basis: **$ 159,000**

This amount is the difference between the current actual costs for multiple concentration tests (for point estimates) in the San Francisco Bay Area (which are about 13% higher on average than the multiple concentration test costs in Staff Report) for current monitoring frequencies, and the cost for single-concentration test (for TST test) computed using the State Water Board unit costs indicated in the Staff Report under the proposed toxicity policy.

Option 2 – Same as Option 1 Except Using SWB Unit Costs for Current Costs

Permit Cycle: **$ 907,000** Annual Basis: **$ 181,000**

This amount is the difference between the cost for multiple concentration tests (for point estimates) in the San Francisco Bay Area calculated using State Water Board unit costs in the Staff Report for current monitoring frequencies, and the cost for single-concentration test (for TST test) computed for the conditions under the proposed toxicity policy using the State Water Board unit costs indicated in the Staff Report.

Option 3 – Cost of Continuing to Use Multiple Concentration Tests, or an Equivalent Number of Replicates, Under Proposed Toxicity Policy

Permit Cycle: **$ 2,911,000** Annual Basis: **$ 582,000**

This amount is the difference between the current actual costs for multiple concentration tests (for point estimates) in the San Francisco Bay Area (which are about 13% higher on average than the multiple concentration test costs in Staff Report) for current monitoring frequencies, and the cost for multiple-concentration tests computed for the conditions under the proposed toxicity policy using actual costs for multiple concentration tests currently experienced in the Bay Area.

Option 4 – Same as Option 3 Except Using SWB Unit Costs for all Multiple Concentration Tests

Permit Cycle: **$ 2,700,000** Annual Basis: **$ 540,000**

This amount is the difference between the cost for multiple concentration tests (for point estimates) in the San Francisco Bay Area calculated using State Water Board unit costs in the Staff Report for current monitoring frequencies, and the cost for multiple concentration tests computed for the conditions under the proposed toxicity policy using the State Water Board unit costs indicated in the Staff Report.

Documentation of BACWA Cost Estimate for Impact of Proposed WET Policy

By RMC Water and Environment

08 August 2012

Basis of Analysis

1. The cost estimate is based on the June 2012 Public Review Draft of the Policy for Toxicity Assessment and Control.

2. All permitted municipal wastewater treatment facilities in the San Francisco Bay region were included in this analysis. Only the EBDA outfall was included for all EBDA-related agencies except City of Livermore and Dublin San Ramon Sewer District, which are included separately.

3. The Average Dry Weather Design Flow (ADWF, which is taken here as equivalent to the permitted capacity although they are not always the same in reality), the frequency of routine monitoring, and the species for routine monitoring are taken from each agency's most recent NPDES permit, except for Pinole, South Bayside System Authority, and Sewer Authority Mid-coastside (which were taken from the current Tentative Orders).

4. Unit costs for conducting chronic toxicity screening are based primarily upon the June 2012 *Draft Staff Report and Environmental Checklist.* These costs appear to be somewhat higher in this region, so the cost estimate also provides information to reflect the locally higher costs for multiple-concentration tests (as currently performed). The regional cost information is based upon quotes provided in 2012 by AquaScience and Pacific EcoRisk to conduct chronic toxicity monitoring under the current WET method. No regional costs are ready available for the single-concentration tests under the proposed TST policy, since this test is not currently performed in the region.

5. The number of additional tests and accelerated monitoring triggers under both the existing and proposed policy is based on a false positive error rate of 5%. As reported in the June 2012 Draft Staff Report, 5% is the fixed false positive (β) rate for the proposed TST method and is also the false positive (α error) rate for existing hypothesis testing (e.g., no observed effect concentration). The actual false positive rate may be higher, based on results of a USEPA 2000 study on interlaboratory variability .

6. The cost of toxicity screening for agencies that do not currently conduct chronic toxicity tests (there are four) is included.

7. The cost estimate does not include costs associated with acute toxicity monitoring, Toxicity Reduction Evaluations (TREs), reference toxicant assays, or staff time to collect samples, deliver samples to the lab, interpret lab reports, coordinate internal team activity, or compliance reporting for the additional samples collected at a higher frequency.

Main Conclusions

- The primary reason for the increase in cost is the increase in monitoring frequency. Only 3 of 42 dischargers in the Bay Area have monthly monitoring right now. If the policy is adopted, 36 agencies will have monthly monitoring, and 4 agencies will begin monitoring for the first time. (There are 42 municipal wastewater agencies in the Bay Area that would be subject to the policy.) Agencies with a dry weather prohibition for 3-6 months will conduct fewer than 12 chronic toxicity tests per year.

- The Staff Report cost estimate is based on extrapolating a few case studies. Most of the POTWs used in the case studies happen to have monthly monitoring, and therefore the resultant cost savings do not reflect what would likely occur in Region 2.

- The Staff Report assumes significant costs savings from dropping acute monitoring. There is evidence that our local Regional Board staff would like to keep this requirement, which means no savings would be realized. Furthermore, unit costs for acute monitoring could increase under the proposed policy.

- Assuming a false positive rate of 5%, region-wide there will be a total of about 12 chronic toxicity violations per year based on false positives. Although mandatory minimum penalties do not apply to toxicity testing, administrative civil liability cases are still at the discretion of the Regional Water Board.

Column by Column Explanation of Detailed Worksheet

A. Unit cost for a single concentration test. This cost varies by the test species, and comes from the State Water Board staff report (June 2012), page 4-8 of Appendix H (*Economic Impacts*).

B. Unit cost for a multiple concentration test. This cost varies by the test species, and comes from the State Water Board staff report (June 2012), page 4-8 of Appendix H (*Economic Impacts*).

C. Unit cost for multiple concentration test, regional values. These unit costs reflect cost estimates provided by AquaScience and Pacific EcoRisk in 2012, but for two species we did not have cost estimates from these vendors (Macrocystis pyrifera and Haliotis rufescens), which apply to 4 out of 42 dischargers). For those two species, we used the staff report values. On a weighted-average basis, the regional costs are 13% higher than the staff report costs.

D. The cost for routine monitoring is equal to column 'B' x (number of tests per year, usually 12) * (5 years) for the permit cycle cost. At the bottom of the worksheet the annual cost is also shown.

E. The total cost for routine monitoring with the regionally adjusted unit costs is equal to column 'C' x (number of tests per year, usually 12) * (5 years) for the permit cycle cost. At the bottom of the worksheet the annual cost is also shown.

F. Accelerated monitoring is triggered 5% of the time (or more if the false positive rate is higher than 5%). Therefore, this column equals (# tests per year * 5 years * false positive rate).

G. Each time accelerated monitoring is triggered, it produces two additional samples at a minimum. The total cost for all monitoring is the sum of routine and accelerated monitoring costs, D + (F*B*2). All costs are based on the SWB staff report.

H. Each time accelerated monitoring is triggered, it produces two additional samples at a minimum. The total cost for all monitoring is the sum of routine and accelerated monitoring costs, E + (F*C*2). Unit costs reflect regionally adjusted values.

J. Under the new policy, dischargers greater than 1 MGD must sample monthly, and dischargers less than 1 MGD must sample quarterly. Sampling frequency is adjusted for agencies with a discharge prohibition during the dry season. There is a potential exclusion for "small communities" less than 20,000 people and disadvantaged economically, but we did not apply it here.

K. The total cost for routine monitoring using single-concentration tests (with no additional replicates) is equal to column 'J' x (5 years) x column 'A' for the permit cycle cost. At the bottom of the worksheet the annual cost is also shown.

L. The total cost for routine monitoring using multiple-concentration tests is equal to colum 'J' x (5 years) x column 'C' for the permit cycle cost. At the bottom of the worksheet the annual cost is also shown. This larger unit cost could reflect the use of multiple-concentration tests or doing lots of replicates, which would have roughly the same cost impact.

M. Additional monitoring is triggered 5% of the time (or more if the false positive rate is higher than 5%).

N. The total cost of additional monitoring is equal to two additional samples * unit cost for each sample ('A', single concentration test). This could be higher if a multiple concentration test or replicates are performed during the additional monitoring!

O. False positives can also lead to accelerated monitoring, if one of the additional monitoring samples is also a false positive. The math comes from P. Markle and is based on a binomial distribution. This is equivalent to the number of false violations per permit cycle, since every time accelerated monitoring is triggered, there is also a violation.

P. The total cost of accelerated monitoring is based on 4 samples (required by the draft WET policy) using multiple concentration unit costs provided by the Staff Report.

Regionally, the costs could be slightly higher. In other words, column 'O' x (qty. 4) x column 'B'.

Q. Dischargers who do not currently have a chronic toxicity program will have to conduct a screening (everyone has to do that every 5 years anyway, but for these folks it will be a new requirement). The staff reports has a crazy low value of about $4,000 for a screening, so I substituted the average of the recent quotes from AquaScience and PER.

R. The total costs = K + N + P + Q. Staff report values, single concentration tests.

S. The total costs = ('J' x (5 years) x column 'B') + N + P+Q for the permit cycle cost. At the bottom of the worksheet the annual cost is also shown. Staff report values, multiple concentration tests.

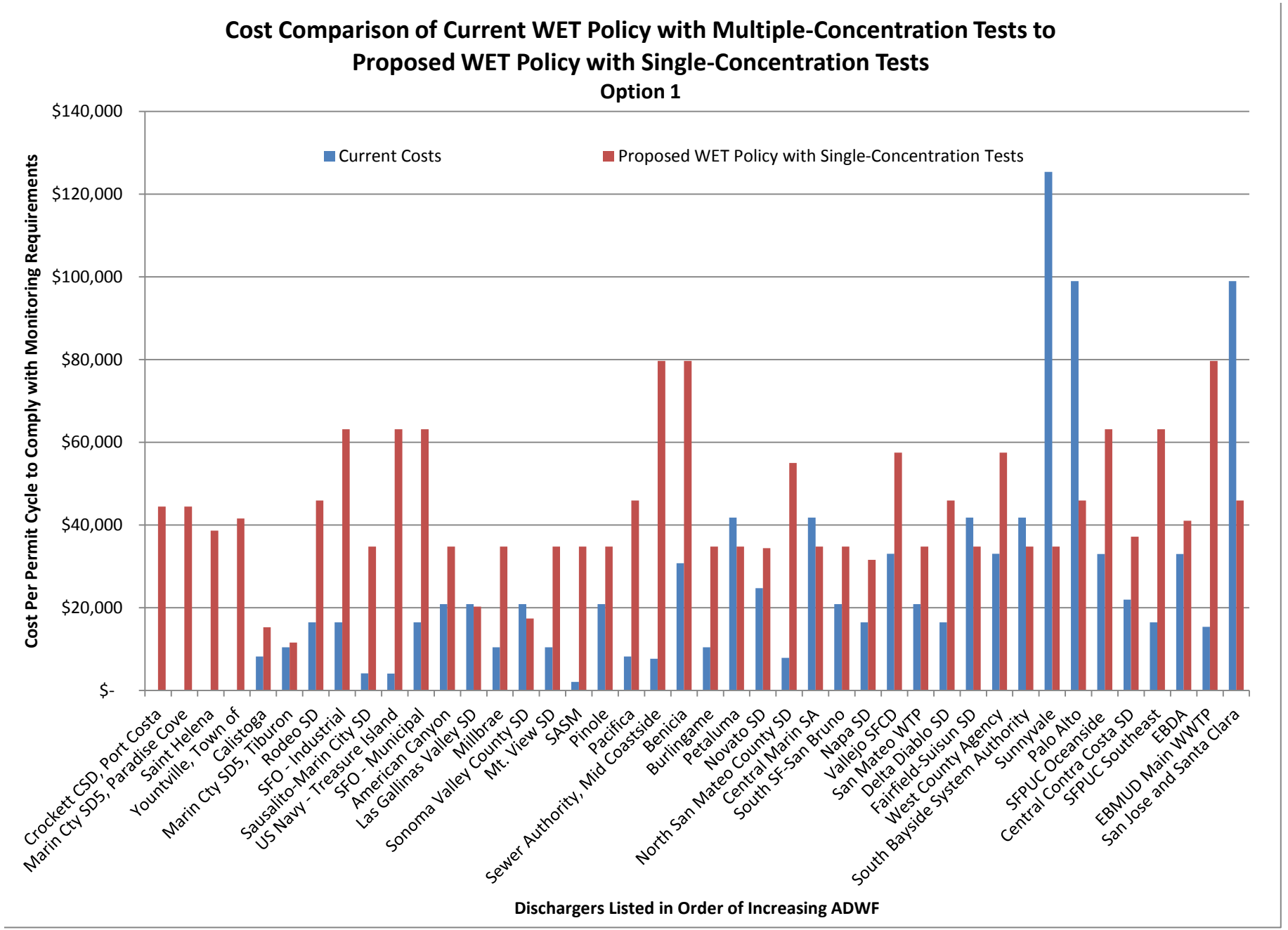
T. The total costs = L + N + P + Q. Regionally adjusted unit costs, multiple concentration tests for routine monitoring.

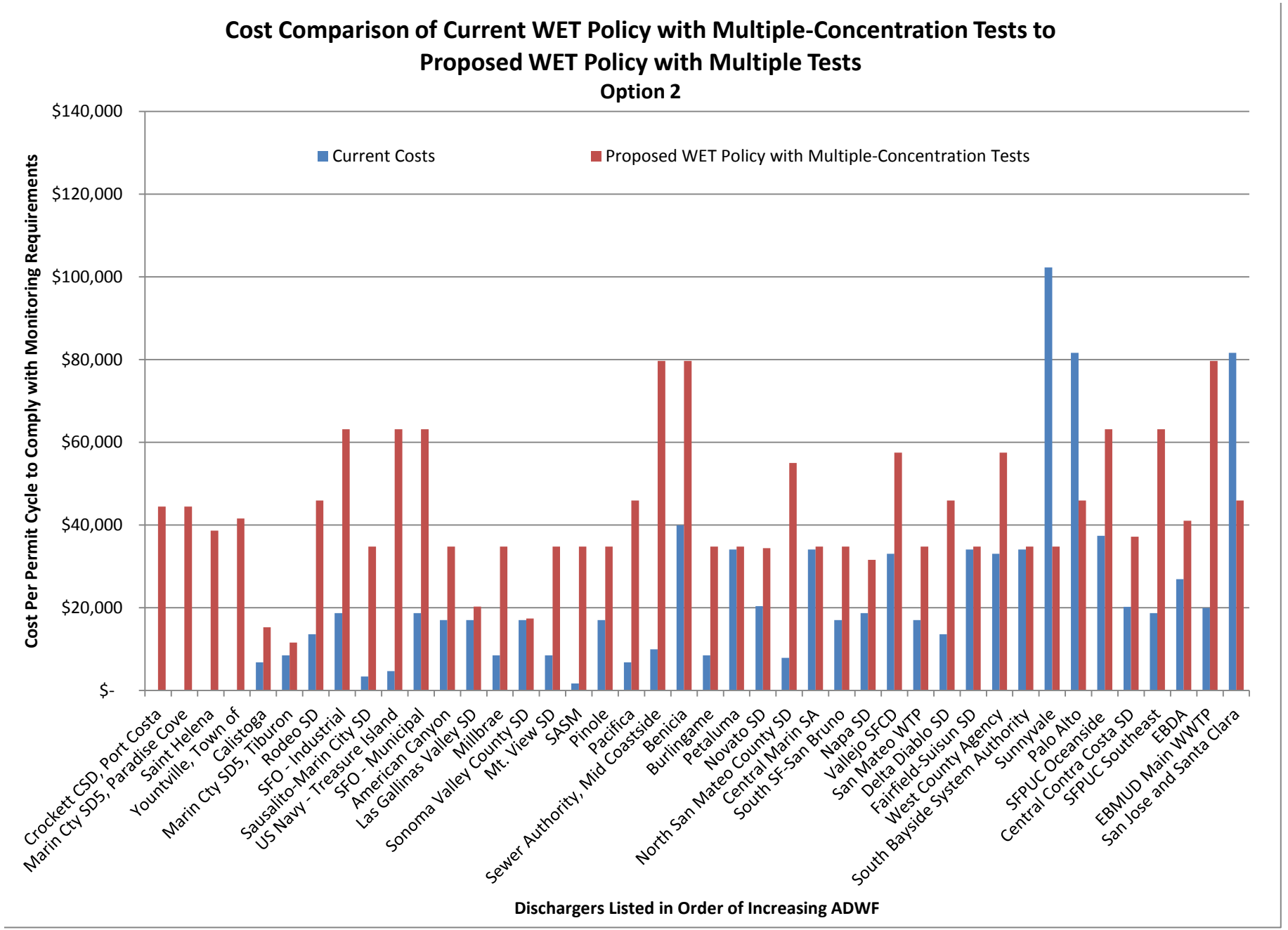
U. Costs could go up by as much as (T – H).

V. At a minimum, costs will go up by (R – H).

W. The difference in cost between columns T and G.

X. The difference in cost between columns S and G.


Cost Comparison of Current WET Policy with Multiple-Concentration Tests to Proposed WET Policy with Single-Concentration Tests
Option 1
Current Costs
Proposed WET Policy with Single-Concentration Tests
Cost Per Permit Cycle to Comply with Monitoring Requirements
$140,000
$120,000
$100,000
$80,000
$60,000
$40,000
$20,000
$-
Crockett CSD, Port Costa
Marin Cty SD5, Paradise Cove
Saint Helena
Yountville, Town of
Calistoga
Marin Cty SD5, Tiburon
Rodeo SD
SFO - Industrial
Sausalito-Marin City SD
US Navy - Treasure Island
SFO - Municipal
American Canyon
Las Gallinas Valley SD
Millbrae
Sonoma Valley County SD
Mt. View SD
SASM
Pinole
Pacifica
Sewer Authority, Mid Coastside
Benicia
Burlingame
Petaluma
Novato SD
North San Mateo County SD
Central Marin SA
South SF-San Bruno
Napa SD
Vallejo SFCD
San Mateo WTP
Delta Diablo SD
Fairfield-Suisun SD
West County Agency
South Bayside System Authority
Sunnyvale
Palo Alto
SFPUC Oceanside
Central Contra Costa SD
SFPUC Southeast
EBDA
EBMUD Main WWTP
San Jose and Santa Clara
Dischargers Listed in Order of Increasing ADWF


Cost Comparison of Current WET Policy with Multiple-Concentration Tests to Proposed WET Policy with Multiple Tests
Option 2
Current Costs
Proposed WET Policy with Multiple-Concentration Tests
Cost Per Permit Cycle to Comply with Monitoring Requirements
$140,000
$120,000
$100,000
$80,000
$60,000
$40,000
$20,000
$-
Crockett CSD, Port Costa
Marin Cty SD5, Paradise Cove
Saint Helena
Yountville, Town of
Calistoga
Marin Cty SD5, Tiburon
Rodeo SD
SFO - Industrial
Sausalito-Marin City SD
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Benicia
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Vallejo SFCD
San Mateo WTP
Delta Diablo SD
Fairfield-Suisun SD
West County Agency
South Bayside System Authority
Sunnyvale
Palo Alto
SFPUC Oceanside
Central Contra Costa SD
SFPUC Southeast
EBDA
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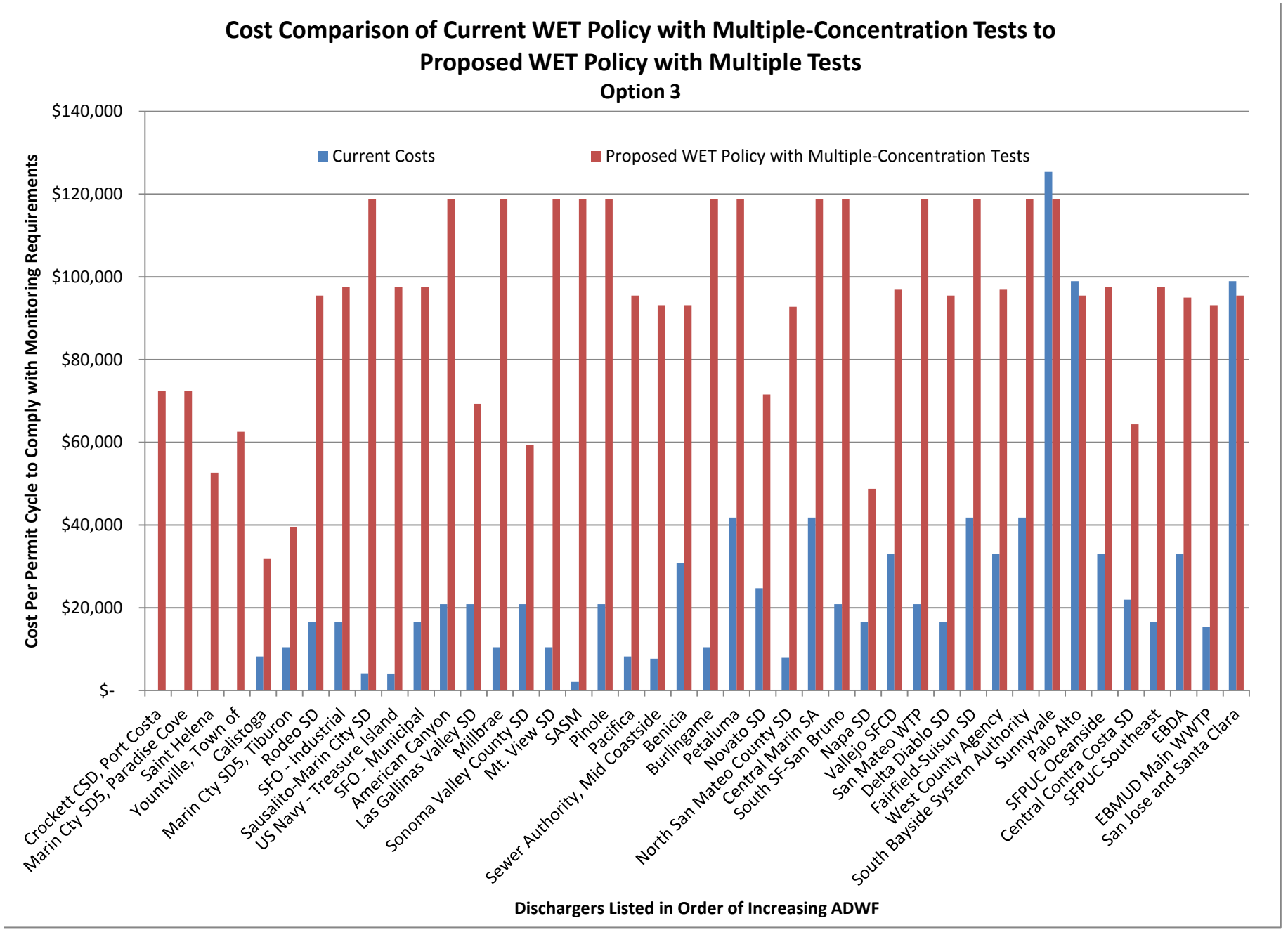
San Jose and Santa Clara
Dischargers Listed in Order of Increasing ADWF


Cost Comparison of Current WET Policy with Multiple-Concentration Tests to Proposed WET Policy with Multiple Tests
Option 3
Current Costs
Proposed WET Policy with Multiple-Concentration Tests
Cost Per Permit Cycle to Comply with Monitoring Requirements
$140,000
$120,000
$100,000
$80,000
$60,000
$40,000
$20,000
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Crockett CSD, Port Costa
Marin Cty SD5, Paradise Cove
Saint Helena
Yountville, Town of
Calistoga
Marin Cty SD5, Tiburon
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SFO - Industrial
Sausalito-Marin City SD
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American Canyon
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Millbrae
Sonoma Valley County SD
Mt. View SD
SASM
Pinole
Pacifica
Sewer Authority, Mid Coastside
Benicia
Burlingame
Petaluma
Novato SD
North San Mateo County SD
Central Marin SA
South SF-San Bruno
Napa SD
Vallejo SFCD
San Mateo WTP
Delta Diablo SD
Fairfield-Suisun SD
West County Agency
South Bayside System Authority
Sunnyvale
Palo Alto
SFPUC Oceanside
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EBDA
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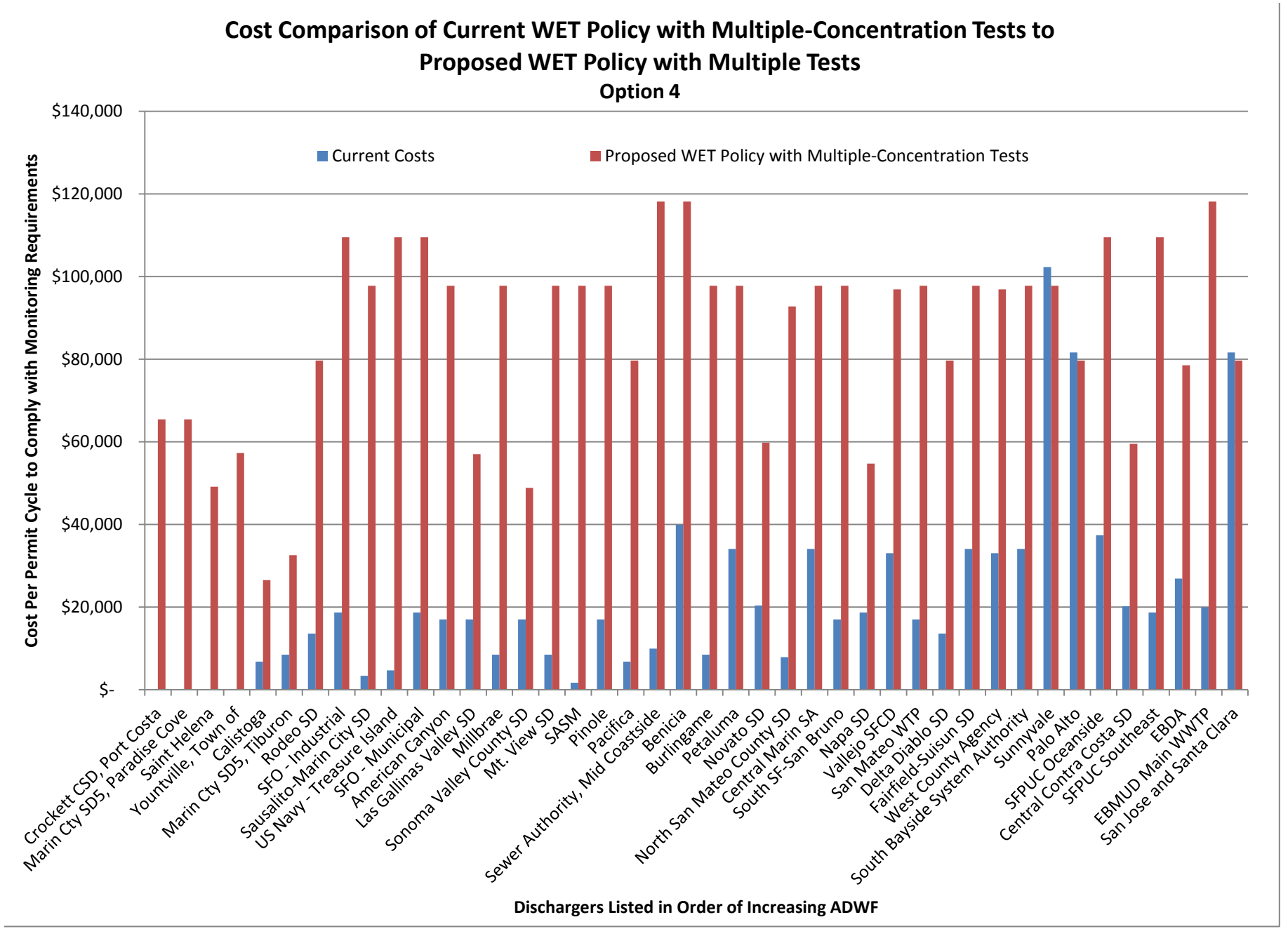
San Jose and Santa Clara
Dischargers Listed in Order of Increasing ADWF


Cost Comparison of Current WET Policy with Multiple-Concentration Tests to Proposed WET Policy with Multiple Tests
Option 4
Current Costs
Proposed WET Policy with Multiple-Concentration Tests
Cost Per Permit Cycle to Comply with Monitoring Requirements
$140,000
$120,000
$100,000
$80,000
$60,000
$40,000
$20,000
$-
Crockett CSD, Port Costa
Marin Cty SD5, Paradise Cove
Saint Helena
Yountville, Town of
Calistoga
Marin Cty SD5, Tiburon
Rodeo SD
SFO - Industrial
Sausalito-Marin City SD
US Navy - Treasure Island
SFO - Municipal
American Canyon
Las Gallinas Valley SD
Millbrae
Sonoma Valley County SD
Mt. View SD
SASM
Pinole
Pacifica
Sewer Authority, Mid Coastside
Benicia
Burlingame
Petaluma
Novato SD
North San Mateo County SD
Central Marin SA
South SF-San Bruno
Napa SD
Vallejo SFCD
San Mateo WTP
Delta Diablo SD
Fairfield-Suisun SD
West County Agency
South Bayside System Authority
Sunnyvale
Palo Alto
SFPUC Oceanside
Central Contra Costa SD
SFPUC Southeast
EBDA
EBMUD Main WWTP
San Jose and Santa Clara
Dischargers Listed in Order of Increasing ADWF

Summary of Estimated Cost Impacts of Proposed WET Policy on Region 2 POTWs

	Current Policy			Proposed New WET Policy				Changes			
		(1)	(2)		(3)	(4A)	(4B)	(3-2)	(3-1)	(4B-2)	(4A-1)
Agency	**Samples per Year in Current Permit**	**Total Permit Cycle Cost for Routine + Accelerated Monitoring (Staff Report Unit Costs)**	**Total Permit Cycle Cost for Routine + Accelerated Monitoring (Regional Unit Costs)**	**Samples per Year under New Policy**	**Total Costs, assuming Single Concentration Test for Routine Monitoring**	**Total Costs, assuming Staff Report Multiple Concentration Test for Routine Monitoring**	**Total Costs, assuming Regional Multiple Concentration Test for Routine Monitoring**	**Option 1 (see narrative)**	**Option 2 (see narrative)**	**Option 3 (see narrative)**	**Option 4 (see narrative)**
American Canyon, City of	2	$ 17,050	$ 20,900	12	$ 34,814	$ 97,814	$ 118,814	$ 13,914	$ 17,764	$ 97,914	$ 80,764
Benicia, City of	4	$ 39,974	$ 30,800	12	$ 79,676	$ 118,196	$ 93,176	$ 48,876	$ 39,702	$ 62,376	$ 78,222
Burlingame, City of	1	$ 8,525	$ 10,450	12	$ 34,814	$ 97,814	$ 118,814	$ 24,364	$ 26,289	$ 108,364	$ 89,289
Calistoga, City of	1	$ 6,804	$ 8,250	4	$ 15,310	$ 26,570	$ 31,830	$ 7,060	$ 8,507	$ 23,580	$ 19,767
Central Contra Costa Sanitary District	4	$ 20,240	$ 22,000	12	$ 37,178	$ 59,558	$ 64,358	$ 15,178	$ 16,938	$ 42,358	$ 39,318
Central Marin Sanitation Agency	4	$ 34,100	$ 41,800	12	$ 34,814	$ 97,814	$ 118,814	$ (6,987)	$ 714	$ 77,014	$ 63,714
Crockett CSD., Port Costa	0	$ -	$ -	4	$ 44,480	$ 65,480	$ 72,480	$ 44,480	$ 44,480	$ 72,480	$ 65,480
Delta Diablo Sanitation District	2	$ 13,607	$ 16,500	12	$ 45,931	$ 79,711	$ 95,491	$ 29,431	$ 32,324	$ 78,991	$ 66,104
East Bay Dischargers Authority (EBDA)	4	$ 26,950	$ 33,000	12	$ 41,033	$ 78,533	$ 95,033	$ 8,033	$ 14,083	$ 62,033	$ 51,583
EBMUD Main Wastewater Treatment Plant	2	$ 19,987	$ 15,400	12	$ 79,676	$ 118,196	$ 93,176	$ 64,276	$ 59,689	$ 77,776	$ 98,209
Fairfield-Suisun Sewer District	4	$ 34,100	$ 41,800	12	$ 34,814	$ 97,814	$ 118,814	$ (6,987)	$ 714	$ 77,014	$ 63,714
Las Gallinas Valley Sanitation District	2	$ 17,050	$ 20,900	7	$ 20,308	$ 57,058	$ 69,308	$ (592)	$ 3,258	$ 48,408	$ 40,008
Marin County SD. No. 5, Paradise Cove	0	$ -	$ -	4	$ 44,480	$ 65,480	$ 72,480	$ 44,480	$ 44,480	$ 72,480	$ 65,480
Marin County SD No. 5, Tiburon	1	$ 8,525	$ 10,450	4	$ 11,605	$ 32,605	$ 39,605	$ 1,155	$ 3,080	$ 29,155	$ 24,080
Millbrae, City of	1	$ 8,525	$ 10,450	12	$ 34,814	$ 97,814	$ 118,814	$ 24,364	$ 26,289	$ 108,364	$ 89,289
Mt. View Sanitary District	1	$ 8,525	$ 10,450	12	$ 34,814	$ 97,814	$ 118,814	$ 24,364	$ 26,289	$ 108,364	$ 89,289
Napa Sanitation District	2	$ 18,700	$ 16,500	6	$ 31,586	$ 54,776	$ 48,776	$ 15,086	$ 12,886	$ 32,276	$ 36,076
North San Mateo County Sanitation District	1	$ 7,909	$ 7,909	12	$ 55,010	$ 92,810	$ 92,810	$ 47,101	$ 47,101	$ 84,901	$ 84,901
Novato Sanitary District	3	$ 20,411	$ 24,750	9	$ 34,448	$ 59,783	$ 71,618	$ 9,698	$ 14,038	$ 46,868	$ 39,373
Pacifica, City of	1	$ 6,804	$ 8,250	12	$ 45,931	$ 79,711	$ 95,491	$ 37,681	$ 39,128	$ 87,241	$ 72,908
Palo Alto, City of	12	$ 81,642	$ 99,000	12	$ 45,931	$ 79,711	$ 95,491	$ (53,069)	$ (35,711)	$ (3,509)	$ (1,931)
Petaluma, City of	4	$ 34,100	$ 41,800	12	$ 34,814	$ 97,814	$ 118,814	$ (6,987)	$ 714	$ 77,014	$ 63,714
Pinole, City of	2	$ 17,050	$ 20,900	12	$ 34,814	$ 97,814	$ 118,814	$ 13,914	$ 17,764	$ 97,914	$ 80,764
Rodeo Sanitary District	2	$ 13,607	$ 16,500	12	$ 45,931	$ 79,711	$ 95,491	$ 29,431	$ 32,324	$ 78,991	$ 66,104
Saint Helena, City of	0	$ -	$ -	2	$ 38,677	$ 49,177	$ 52,677	$ 38,677	$ 38,677	$ 52,677	$ 49,177
San Francisco Airport - Industrial	2	$ 18,700	$ 16,500	12	$ 63,171	$ 109,551	$ 97,551	$ 46,671	$ 44,471	$ 81,051	$ 90,851
San Francisco Airport WQCP	2	$ 18,700	$ 16,500	12	$ 63,171	$ 109,551	$ 97,551	$ 46,671	$ 44,471	$ 81,051	$ 90,851
San Francisco Oceanside	4	$ 37,400	$ 33,000	12	$ 63,171	$ 109,551	$ 97,551	$ 30,171	$ 25,771	$ 64,551	$ 72,151
San Francisco Southeast Plant	2	$ 18,700	$ 16,500	12	$ 63,171	$ 109,551	$ 97,551	$ 46,671	$ 44,471	$ 81,051	$ 90,851
San Jose and Santa Clara, Cities of	12	$ 81,642	$ 99,000	12	$ 45,931	$ 79,711	$ 95,491	$ (53,069)	$ (35,711)	$ (3,509)	$ (1,931)
San Mateo, City of, WTP	2	$ 17,050	$ 20,900	12	$ 34,814	$ 97,814	$ 118,814	$ 13,914	$ 17,764	$ 97,914	$ 80,764
Sausalito-Marin City Sanitary District	0.4	$ 3,410	$ 4,180	12	$ 34,814	$ 97,814	$ 118,814	$ 30,634	$ 31,404	$ 114,634	$ 94,404
Sewer Authority, Mid Coastside	1	$ 9,994	$ 7,700	12	$ 79,676	$ 118,196	$ 93,176	$ 71,976	$ 69,682	$ 85,476	$ 108,202
Sewerage Agency of Southern Marin	0.2	$ 1,705	$ 2,090	12	$ 34,814	$ 97,814	$ 118,814	$ 32,724	$ 33,109	$ 116,724	$ 96,109
Sonoma Valley County Sanitation District	2	$ 17,050	$ 20,900	6	$ 17,407	$ 48,907	$ 59,407	$ (3,493)	$ 357	$ 38,507	$ 31,857
South Bayside System Authority	4	$ 34,100	$ 41,800	12	$ 34,814	$ 97,814	$ 118,814	$ (6,987)	$ 714	$ 77,014	$ 63,714
South San Francisco-San Bruno	2	$ 17,050	$ 20,900	12	$ 34,814	$ 97,814	$ 118,814	$ 13,914	$ 17,764	$ 97,914	$ 80,764
Sunnyvale, City of	12	$ 102,300	$ 125,400	12	$ 34,814	$ 97,814	$ 118,814	$ (90,587)	$ (67,487)	$ (6,587)	$ (4,487)
US Naval Support - Treasure Island	0.5	$ 4,675	$ 4,125	12	$ 63,171	$ 109,551	$ 97,551	$ 59,046	$ 58,496	$ 93,426	$ 104,876
Vallejo Sanitation and FCD	4	$ 33,044	$ 33,044	12	$ 57,527	$ 96,947	$ 96,947	$ 24,483	$ 24,483	$ 63,903	$ 63,903
West County Agency	4	$ 33,044	$ 33,044	12	$ 57,527	$ 96,947	$ 96,947	$ 24,483	$ 24,483	$ 63,903	$ 63,903
Yountville, Town of	0	$ -	$ -	3	$ 41,578	$ 57,328	$ 62,578	$ 41,578	$ 41,578	$ 62,578	$ 57,328
Sum (Permit Cycle)	**114**	**$ 912,747**	**$ 1,024,342**	**433**	**$ 1,820,083**	**$ 3,612,248**	**$ 3,934,983**	**$ 795,741**	**$ 907,336**	**$ 2,910,641**	**$ 2,699,501**
Sum (Annual Basis)	**114**	**$ 182,549**	**$ 204,868**	**433**	**$ 364,017**	**$ 722,450**	**$ 786,997**	**$ 159,148**	**$ 181,467**	**$ 582,128**	**$ 539,900**

Detailed Worksheet for Estimated Cost Impacts of Proposed WET Policy on Region 2 POTWs - **see separate sheet for column header explanations**

				Unit Costs			Existing Policy					Proposed New WET Policy														
				A	B	C	D	E	F	G (1)	H (2)	J	K	L	M	N	O	P	Q	R (3)	S (4A)	T (4B)	U (4B-2)	V (3-2)	W (3-1)	X (4A-1)
Display Name	Permitted ADWF (mgd)	Number per Year in Current Permit	Species	Unit Cost, Single Concentration Test, SWB Staff Report	Unit Cost, Multiple Concentration Test, SWB Staff Report	Unit Cost, Multiple Concentration Test, Regional Values (where avail.)	Cost for Routine Monitoring, SWB Staff Report Values	Cost for Routine Monitoring, Regional Values	Accelerated Monitoring - # Triggers per Permit Cycle	Cost for Routine + Accelerated Monitoring (Staff Report Unit Costs)	Cost for Routine + Accelerated Monitoring (Regional Unit Costs)	Samples per Year under New Policy	Cost for Routine Monitoring, Single Concentration SWB Staff Report Values	Cost for Routine Monitoring, Regional Multiple-Conc Values	Additional Monitoring - Triggers per Permit Cycle	Total Cost for Additional Monitoring	Accelerated Monitoring - Triggers per Permit Cycle (also Violations!)	Total Cost for Accelerated Monitoring (Assumes Multiple Conc.)	New Screening Costs	Total Costs, assuming Single Concentration Test for Routine Monitoring	Total Costs, assuming Staff Report Multiple Concentration Test for Routine Monitoring	Total Costs, assuming Regional Multiple Concentration Test for Routine Monitoring	Option 3 (see narrative)	Option 1 (see narrative)	Option 2 (see narrative)	Option 4 (see narrative)
Crockett CSD, Port Costa	0.033	0	None	$ 500	$ 1,550	$ 1,900	$ -	$ -	0.00	$ -	$ -	4	$ 10,000	$ 38,000	1.0	$ 1,000	0.1	$ 605	$ 32,875	$ 44,480	$ 65,480	$ 72,480	$ 72,480	$ 44,480	$ 44,480	$ 65,480
Marin Cty SD5, Paradise Cove	0.04	0	None	$ 500	$ 1,550	$ 1,900	$ -	$ -	0.00	$ -	$ -	4	$ 10,000	$ 38,000	1.0	$ 1,000	0.1	$ 605	$ 32,875	$ 44,480	$ 65,480	$ 72,480	$ 72,480	$ 44,480	$ 44,480	$ 65,480
Saint Helena	0.5	0	None	$ 500	$ 1,550	$ 1,900	$ -	$ -	0.00	$ -	$ -	2	$ 5,000	$ 19,000	0.5	$ 500	0.0	$ 302	$ 32,875	$ 38,677	$ 49,177	$ 52,677	$ 52,677	$ 38,677	$ 38,677	$ 49,177
Yountville, Town of	0.55	0	None	$ 500	$ 1,550	$ 1,900	$ -	$ -	0.00	$ -	$ -	3	$ 7,500	$ 28,500	0.8	$ 750	0.1	$ 453	$ 32,875	$ 41,578	$ 57,328	$ 62,578	$ 62,578	$ 41,578	$ 41,578	$ 57,328
Calistoga	0.84	1	Ceriodaphnia dubia	$ 674	$ 1,237	$ 1,500	$ 6,185	$ 7,500	0.25	$ 6,804	$ 8,250	4	$ 13,480	$ 30,000	1.0	$ 1,348	0.1	$ 482		$ 15,310	$ 26,570	$ 31,830	$ 23,580	$ 7,060	$ 8,507	$ 19,767
Marin Cty SD5, Tiburon	0.98	1	Americamysis bahia	$ 500	$ 1,550	$ 1,900	$ 7,750	$ 9,500	0.25	$ 8,525	$ 10,450	4	$ 10,000	$ 38,000	1.0	$ 1,000	0.1	$ 605		$ 11,605	$ 32,605	$ 39,605	$ 29,155	$ 1,155	$ 3,080	$ 24,080
Rodeo SD	1.14	2	Ceriodaphnia dubia	$ 674	$ 1,237	$ 1,500	$ 12,370	$ 15,000	0.50	$ 13,607	$ 16,500	12	$ 40,440	$ 90,000	3.0	$ 4,044	0.3	$ 1,447		$ 45,931	$ 79,711	$ 95,491	$ 78,991	$ 29,431	$ 32,324	$ 66,104
SFO - Industrial	1.2	2	Strongylocentrotus purpuratus and Dendraster excentricus	$ 927	$ 1,700	$ 1,500	$ 17,000	$ 15,000	0.50	$ 18,700	$ 16,500	12	$ 55,620	$ 90,000	3.0	$ 5,562	0.3	$ 1,989		$ 63,171	$ 109,551	$ 97,551	$ 81,051	$ 46,671	$ 44,471	$ 90,851
Sausalito-Marin City SD	1.8	0.4	Americamysis bahia	$ 500	$ 1,550	$ 1,900	$ 3,100	$ 3,800	0.10	$ 3,410	$ 4,180	12	$ 30,000	$ 114,000	3.0	$ 3,000	0.3	$ 1,814		$ 34,814	$ 97,814	$ 118,814	$ 114,634	$ 30,634	$ 31,404	$ 94,404
US Navy - Treasure Island	2	0.5	Echinoderm embryo development test, with either the sand dollar (Dendraster	$ 927	$ 1,700	$ 1,500	$ 4,250	$ 3,750	0.13	$ 4,675	$ 4,125	12	$ 55,620	$ 90,000	3.0	$ 5,562	0.3	$ 1,989		$ 63,171	$ 109,551	$ 97,551	$ 93,426	$ 59,046	$ 58,496	$ 104,876
SFO - Municipal	2.2	2	Strongylocentrotus purpuratus and Dendraster excentricus	$ 927	$ 1,700	$ 1,500	$ 17,000	$ 15,000	0.50	$ 18,700	$ 16,500	12	$ 55,620	$ 90,000	3.0	$ 5,562	0.3	$ 1,989		$ 63,171	$ 109,551	$ 97,551	$ 81,051	$ 46,671	$ 44,471	$ 90,851
American Canyon	2.5	2	Americamysis bahia	$ 500	$ 1,550	$ 1,900	$ 15,500	$ 19,000	0.50	$ 17,050	$ 20,900	12	$ 30,000	$ 114,000	3.0	$ 3,000	0.3	$ 1,814		$ 34,814	$ 97,814	$ 118,814	$ 97,914	$ 13,914	$ 17,764	$ 80,764
Las Gallinas Valley SD	2.92	2	Americamysis bahia	$ 500	$ 1,550	$ 1,900	$ 15,500	$ 19,000	0.50	$ 17,050	$ 20,900	7	$ 17,500	$ 66,500	1.8	$ 1,750	0.2	$ 1,058		$ 20,308	$ 57,058	$ 69,308	$ 48,408	$ (592)	$ 3,258	$ 40,008
Millbrae	3	1	Americamysis bahia	$ 500	$ 1,550	$ 1,900	$ 7,750	$ 9,500	0.25	$ 8,525	$ 10,450	12	$ 30,000	$ 114,000	3.0	$ 3,000	0.3	$ 1,814		$ 34,814	$ 97,814	$ 118,814	$ 108,364	$ 24,364	$ 26,289	$ 89,289
Sonoma Valley County SD	3	2	Americamysis bahia and Pimephales promelas	$ 500	$ 1,550	$ 1,900	$ 15,500	$ 19,000	0.50	$ 17,050	$ 20,900	6	$ 15,000	$ 57,000	1.5	$ 1,500	0.1	$ 907		$ 17,407	$ 48,907	$ 59,407	$ 38,507	$ (3,493)	$ 357	$ 31,857
Mt. View SD	3.2	1	Americamysis bahia	$ 500	$ 1,550	$ 1,900	$ 7,750	$ 9,500	0.25	$ 8,525	$ 10,450	12	$ 30,000	$ 114,000	3.0	$ 3,000	0.3	$ 1,814		$ 34,814	$ 97,814	$ 118,814	$ 108,364	$ 24,364	$ 26,289	$ 89,289
SASM	3.4	0.2	Americamysis bahia	$ 500	$ 1,550	$ 1,900	$ 1,550	$ 1,900	0.05	$ 1,705	$ 2,090	12	$ 30,000	$ 114,000	3.0	$ 3,000	0.3	$ 1,814		$ 34,814	$ 97,814	$ 118,814	$ 116,724	$ 32,724	$ 33,109	$ 96,109
Pinole	3.52	2	Americamysis bahia	$ 500	$ 1,550	$ 1,900	$ 15,500	$ 19,000	0.50	$ 17,050	$ 20,900	12	$ 30,000	$ 114,000	3.0	$ 3,000	0.3	$ 1,814		$ 34,814	$ 97,814	$ 118,814	$ 97,914	$ 13,914	$ 17,764	$ 80,764
Pacifica	4	1	Ceriodaphnia dubia	$ 674	$ 1,237	$ 1,500	$ 6,185	$ 7,500	0.25	$ 6,804	$ 8,250	12	$ 40,440	$ 90,000	3.0	$ 4,044	0.3	$ 1,447		$ 45,931	$ 79,711	$ 95,491	$ 87,241	$ 37,681	$ 39,128	$ 72,908
Sewer Authority, Mid Coastside	4	1	Mytilus galloprovincialis	$ 1,175	$ 1,817	$ 1,400	$ 9,085	$ 7,000	0.25	$ 9,994	$ 7,700	12	$ 70,500	$ 84,000	3.0	$ 7,050	0.3	$ 2,126		$ 79,676	$ 118,196	$ 93,176	$ 85,476	$ 71,976	$ 69,682	$ 108,202
Benicia	4.5	4	Mytilus edulis	$ 1,175	$ 1,817	$ 1,400	$ 36,340	$ 28,000	1.00	$ 39,974	$ 30,800	12	$ 70,500	$ 84,000	3.0	$ 7,050	0.3	$ 2,126		$ 79,676	$ 118,196	$ 93,176	$ 62,376	$ 48,876	$ 39,702	$ 78,222
Burlingame	5.5	1	Americamysis bahia	$ 500	$ 1,550	$ 1,900	$ 7,750	$ 9,500	0.25	$ 8,525	$ 10,450	12	$ 30,000	$ 114,000	3.0	$ 3,000	0.3	$ 1,814		$ 34,814	$ 97,814	$ 118,814	$ 108,364	$ 24,364	$ 26,289	$ 89,289
Petaluma	6.7	4	Americamysis bahia	$ 500	$ 1,550	$ 1,900	$ 31,000	$ 38,000	1.00	$ 34,100	$ 41,800	12	$ 30,000	$ 114,000	3.0	$ 3,000	0.3	$ 1,814		$ 34,814	$ 97,814	$ 118,814	$ 77,014	$ (6,987)	$ 714	$ 63,714
Novato SD	7.05	3	Ceriodaphnia dubia	$ 674	$ 1,237	$ 1,500	$ 18,555	$ 22,500	0.75	$ 20,411	$ 24,750	9	$ 30,330	$ 67,500	2.3	$ 3,033	0.2	$ 1,085		$ 34,448	$ 59,783	$ 71,618	$ 46,868	$ 9,698	$ 14,038	$ 39,373
North San Mateo County SD	8	1	Macrocystis pyrifera	$ 808	$ 1,438	$ 1,438	$ 7,190	$ 7,190	0.25	$ 7,909	$ 7,909	12	$ 48,480	$ 86,280	3.0	$ 4,848	0.3	$ 1,682		$ 55,010	$ 92,810	$ 92,810	$ 84,901	$ 47,101	$ 47,101	$ 84,901
Central Marin SA	10	4	Americamysis bahia	$ 500	$ 1,550	$ 1,900	$ 31,000	$ 38,000	1.00	$ 34,100	$ 41,800	12	$ 30,000	$ 114,000	3.0	$ 3,000	0.3	$ 1,814		$ 34,814	$ 97,814	$ 118,814	$ 77,014	$ (6,987)	$ 714	$ 63,714
South SF-San Bruno	13	2	Americamysis bahia	$ 500	$ 1,550	$ 1,900	$ 15,500	$ 19,000	0.50	$ 17,050	$ 20,900	12	$ 30,000	$ 114,000	3.0	$ 3,000	0.3	$ 1,814		$ 34,814	$ 97,814	$ 118,814	$ 97,914	$ 13,914	$ 17,764	$ 80,764
Napa SD	15.4	2	Strongylocentrotus purpuratus	$ 927	$ 1,700	$ 1,500	$ 17,000	$ 15,000	0.50	$ 18,700	$ 16,500	6	$ 27,810	$ 45,000	1.5	$ 2,781	0.1	$ 995		$ 31,586	$ 54,776	$ 48,776	$ 32,276	$ 15,086	$ 12,886	$ 36,076
Vallejo SFCD	15.5	4	Haliotis rufescens	$ 845	$ 1,502	$ 1,502	$ 30,040	$ 30,040	1.00	$ 33,044	$ 33,044	12	$ 50,700	$ 90,120	3.0	$ 5,070	0.3	$ 1,757		$ 57,527	$ 96,947	$ 96,947	$ 63,903	$ 24,483	$ 24,483	$ 63,903
San Mateo WTP	15.7	2	Americamysis bahia	$ 500	$ 1,550	$ 1,900	$ 15,500	$ 19,000	0.50	$ 17,050	$ 20,900	12	$ 30,000	$ 114,000	3.0	$ 3,000	0.3	$ 1,814		$ 34,814	$ 97,814	$ 118,814	$ 97,914	$ 13,914	$ 17,764	$ 80,764
Delta Diablo SD	16.5	2	Ceriodaphnia dubia	$ 674	$ 1,237	$ 1,500	$ 12,370	$ 15,000	0.50	$ 13,607	$ 16,500	12	$ 40,440	$ 90,000	3.0	$ 4,044	0.3	$ 1,447		$ 45,931	$ 79,711	$ 95,491	$ 78,991	$ 29,431	$ 32,324	$ 66,104
Fairfield-Suisun SD	17.5	4	Americamysis bahia	$ 500	$ 1,550	$ 1,900	$ 31,000	$ 38,000	1.00	$ 34,100	$ 41,800	12	$ 30,000	$ 114,000	3.0	$ 3,000	0.3	$ 1,814		$ 34,814	$ 97,814	$ 118,814	$ 77,014	$ (6,987)	$ 714	$ 63,714
West County Agency	28.5	4	Haliotis rufescens	$ 845	$ 1,502	$ 1,502	$ 30,040	$ 30,040	1.00	$ 33,044	$ 33,044	12	$ 50,700	$ 90,120	3.0	$ 5,070	0.3	$ 1,757		$ 57,527	$ 96,947	$ 96,947	$ 63,903	$ 24,483	$ 24,483	$ 63,903
South Bayside System Authority	29	4	Americamysis bahia	$ 500	$ 1,550	$ 1,900	$ 31,000	$ 38,000	1.00	$ 34,100	$ 41,800	12	$ 30,000	$ 114,000	3.0	$ 3,000	0.3	$ 1,814		$ 34,814	$ 97,814	$ 118,814	$ 77,014	$ (6,987)	$ 714	$ 63,714
Sunnyvale	29.5	12	Americamysis bahia	$ 500	$ 1,550	$ 1,900	$ 93,000	$ 114,000	3.00	$ 102,300	$ 125,400	12	$ 30,000	$ 114,000	3.0	$ 3,000	0.3	$ 1,814		$ 34,814	$ 97,814	$ 118,814	$ (6,587)	$ (90,587)	$ (67,487)	$ (4,487)
Palo Alto	39	12	Ceriodaphnia dubia	$ 674	$ 1,237	$ 1,500	$ 74,220	$ 90,000	3.00	$ 81,642	$ 99,000	12	$ 40,440	$ 90,000	3.0	$ 4,044	0.3	$ 1,447		$ 45,931	$ 79,711	$ 95,491	$ (3,509)	$ (53,069)	$ (35,711)	$ (1,931)
SFPUC Oceanside	43	4	Echinoderm embryo development test, with either the sand dollar (Dendraster	$ 927	$ 1,700	$ 1,500	$ 34,000	$ 30,000	1.00	$ 37,400	$ 33,000	12	$ 55,620	$ 90,000	3.0	$ 5,562	0.3	$ 1,989		$ 63,171	$ 109,551	$ 97,551	$ 64,551	$ 30,171	$ 25,771	$ 72,151
Central Contra Costa SD	53.8	4	Selenastrum capricornutum or Americamysis Bahia	$ 547	$ 920	$ 1,000	$ 18,400	$ 20,000	1.00	$ 20,240	$ 22,000	12	$ 32,820	$ 60,000	3.0	$ 3,282	0.3	$ 1,076		$ 37,178	$ 59,558	$ 64,358	$ 42,358	$ 15,178	$ 16,938	$ 39,318
SFPUC Southeast	84.5	2	Dendraster excentricus or Strongylocentrotus purpuratus	$ 927	$ 1,700	$ 1,500	$ 17,000	$ 15,000	0.50	$ 18,700	$ 16,500	12	$ 55,620	$ 90,000	3.0	$ 5,562	0.3	$ 1,989		$ 63,171	$ 109,551	$ 97,551	$ 81,051	$ 46,671	$ 44,471	$ 90,851
EBDA	107.8	4	Pimephales promelas	$ 600	$ 1,225	$ 1,500	$ 24,500	$ 30,000	1.00	$ 26,950	$ 33,000	12	$ 36,000	$ 90,000	3.0	$ 3,600	0.3	$ 1,433		$ 41,033	$ 78,533	$ 95,033	$ 62,033	$ 8,033	$ 14,083	$ 51,583
EBMUD Main WWTP	120	2	Mussel (Mytilus sp.) If Mytilus sp. is unavailable, the Discharger may use Pacific Oyster (Crassostrea gigas)	$ 1,175	$ 1,817	$ 1,400	$ 18,170	$ 14,000	0.50	$ 19,987	$ 15,400	12	$ 70,500	$ 84,000	3.0	$ 7,050	0.3	$ 2,126		$ 79,676	$ 118,196	$ 93,176	$ 77,776	$ 64,276	$ 59,689	$ 98,209
San Jose and Santa Clara	167	12	Ceriodaphnia dubia	$ 674	$ 1,237	$ 1,500	$ 74,220	$ 90,000	3.00	$ 81,642	$ 99,000	12	$ 40,440	$ 90,000	3.0	$ 4,044	0.3	$ 1,447		$ 45,931	$ 79,711	$ 95,491	$ (3,509)	$ (53,069)	$ (35,711)	$ (1,931)
Sum - permit cycle							**$ 829,770**	**$ 931,220**		**$ 912,747**	**$ 1,024,342**		**$ 1,477,120**	**$ 3,592,020**		**$ 147,712**		**$ 63,751**	**$ 131,500**	**$ 1,820,083**	**$ 3,612,248**	**$ 3,934,983**	**$ 2,910,641**	**$ 795,741**	**$ 907,336**	**$ 2,699,501**
Sum - annual basis							**$ 165,954**	**$ 186,244**		**$ 182,549**	**$ 204,868**		**$ 295,424**	**$ 718,404**		**$ 29,542**		**$ 12,750**	**$ 26,300**	**$ 364,017**	**$ 722,450**	**$ 786,997**	**$ 582,128**	**$ 159,148**	**$ 181,467**	**$ 539,900**

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