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December 14, 2017

Jeanine Townsend
Clerk to the Board
State Water Resources Control Board
P.O. Box 100, Sacramento, CA 95812-2000

Re: Comments on Proposed Amendments to the Sediment Quality Objectives

Dear Ms. Townsend:

On behalf of General Dynamics Corporation and Montrose Chemical Corporation of California, please accept the enclosed comments regarding the proposed amendments to the Sediment Quality Objectives. Thank you for the opportunity to comment.

Very truly yours,

A handwritten signature in blue ink that reads "Kelly E. Richardson, BDC".

Kelly E. Richardson
of LATHAM & WATKINS LLP

Enclosure



E X T E R N A L M E M O R A N D U M

TO: Kelly Richardson, Latham & Watkins LLP
FROM: Rick Bodishbaugh
DATE: December 14, 2017

SUBJECT: Review of Draft Amendments to SQO Guidance

Exponent has reviewed the recent draft proposed amendments to the Water Quality Control Plan for Enclosed Bays and Estuaries of California, Sediment Quality Objectives (SQOs), together with supporting information and documentation made available by the State Water Quality Control Board (the Board) for public review on their website (SWB 2017). We have produced the following comments grouped by general category. Both specific comments on the proposed language and guidance amendments provided in Appendix A to the draft Staff Report (the SQO Provisions), and general comments and concerns we have with implementation of the revised Water Quality Control Plan are provided.

Part 1 of the SQO guidance, adopted by the Board in 2008, was limited to a narrative SQO for protection of benthic communities and associated implementation guidance. The subject amendments make limited modifications to this existing guidance, add a significant new narrative SQO and implementation guidance for protection of human health, and provide program specific implementation guidance for the resulting combined benthic community and human health assessment. The new implementation guidance is far-reaching, with applications in dredge material management, NPDES permitting, sediment monitoring and site assessment, and evaluation of waters for listing as impaired under the State's Clean Water Act Section 303(d) list.

Comments on SQOs for Protection of Benthic Communities

1. Existing problems with benthic SQOs have not been addressed and have been made more problematic by the proposed amendments and new guidance.

There were already a number of serious technical flaws and deficiencies in the metrics and methods of the multiple line of evidence approach used to assess potential impacts to benthic macroinvertebrate (BMI) communities under the existing Part 1 SQO guidance. Generally speaking, these have not been addressed by the proposed revisions. Furthermore, the potential negative implications of these flaws have been made more severe by additions to guidance that stipulate uses of SQO BMI community station scores for specific regulatory purposes, including Clean Water Act 303(d) impairment listing, and assessment of possible permitted discharge limit exceedances. These technical flaws include:

- Reliance on categorical chemical concentration thresholds that lack a sound scientific or statistical basis to characterize the sediment chemistry leg of the BMI triad assessment.
- Lack of provision for incorporating empirical measures of bioavailability into the sediment chemistry line of evidence (e.g., equilibrium partitioning models, passive samplers).
- Lack of consideration of site-specific background levels to characterize the chemistry line of evidence using the default numeric response values.
- Use of four complex numerical metrics of benthic community disturbance to characterize the community structure leg of the BMI triad assessment, without interpretation or inclusion of traditional community structure endpoints (e.g., species richness, diversity, individual taxa abundances). All of these metrics rely on internal categorical threshold comparisons rather than comparison to site-specific reference conditions.

- Failure to consider or even acknowledge comparison to site-specific reference conditions as a necessary component of the community structure line of evidence, when using the default numeric response values.
- Lack of requirement for replication or statistical analysis of variability between replicate benthic community samples at a station or between stations.
- Lack of site-specific reference comparisons in laboratory toxicity bioassays used to characterize the sediment toxicity leg of the BMI triad assessment. Under the method guidance, test sample results are compared only to negative controls, not reference sample results.
- Non-standard statistical comparisons between test sample results and negative controls. Under this guidance, tested samples can be classified as “toxic”, even when the results are NOT significantly different from controls.
- Biased methods used to combine multiple metrics for all three sediment triad assessment lines of evidence that overstate the actual metric findings (i.e., rounding up of all categorical metric means or medians in a given line of evidence).
- Inability to consider non-chemical stressors in the interpretation of station scores (i.e., presumption of chemical causation).
- Failure to appropriately acknowledge or characterize the high levels of uncertainty in constituent metric of SQO lines of evidence, let alone the multiple line of evidence station scores.

Details on these and other technical deficiencies have been well documented, and have been known to the Board since well before Part 1 SQO adoption (see CA Chambers of Commerce 2007), and are not fully replicated here. However the stipulation of use of Part 1 SQO station scores as 303(d) listing criteria thresholds and NPDES receiving water limits makes these known deficiencies more problematic (see implementation comments below).

To a significant degree, uncertainties and technical deficiencies associated with the benthic SQO assessment process are problematic because the guidance is so rigid, without allowance for consideration of unique Site-specific factors. In development of the new human health SQO process, the Board has recognized the need for integration of Site-specific considerations through incorporation of a tiered assessment process, whereby rapid, default methods may be modified at higher tiers of assessment to address unique Site-specific conditions, which may result in exposures different from the default assumptions. Incorporation of similar options to develop a higher tier of benthic community assessment would enhance and improve the reliability of the current benthic SQO framework. For example, use of alternative Site-specific reference comparisons for benthic community metrics at Sites that have highly modified benthic environments would be helpful in understanding the role that sediment chemistry does or does not play in apparent community disturbance, or when community metrics disagree.

Recommendation: The existing SQO metrics and multiple line of evidence paradigm should be critically reviewed and documented scientific weaknesses should be addressed. Due to uncertainty, unreliability, and conservative bias, the current form of the benthic SQO station scores are useful only as an advisory line of evidence, not as automatic regulatory action levels. The Board should expand the flexibility that is explicitly included in the new human health SQO guidance (i.e., the tiered approach) to apply to benthic SQOs.

2. The reference envelope option for benthic SQO determination should be clarified and guidance expanded.

Both the proposed Provisions and existing Part 1 guidance allows for use of a “reference envelope” approach as an alternative to the prescriptive calculation and combination of numerical metrics that comprises the SQO multiple line of evidence process. Under this option, lines of evidence are assessed by statistical comparison to reference conditions, a traditional approach to sediment triad assessment that has been used for decades: “Categorization of LOEs—Determination of the presence of an LOE effect (i.e., biologically significant chemical exposure, toxicity, or benthic community disturbance) shall be based on a comparison to a numeric response value or a statistical comparison to reference stations. The numeric values or

statistical comparisons (e.g., confidence interval) used to classify a LOE as Effected shall be comparable to those specified in Chapters IV.A.1.f through IV.A.1.h Sections V.F-H. to indicate High Chemical Exposure, High Toxicity, or High Disturbance. Reference stations shall be located in an area expected to be uninfluenced by the discharge or pollutants of concern in the assessment area and shall be representative of other habitat characteristics of the assessment area (e.g., salinity, grain size). Comparison to reference shall be accomplished by compiling data for appropriate regional reference sites and determining the reference envelope using statistical methods (e.g., tolerance interval).” (Provisions, Section IV.A.1.j, p.15-16).

This option is poorly described by the Provisions. Both the accompanying staff report and the SCCWRP Sediment Quality Assessment Manual (SCCWRP 2009) provide no guidance on conducting a reference envelope assessment. In practice, the Regional Boards appear to be unaware of or unwilling to endorse this approach. The tiered approach of the new human health SQO guidance explicitly recognizes the increased value and reliability that expanded use of site-specific data provides. A similar structure should be added to the benthic SQO guidance, explicitly recognizing that site-specific sediment conditions will often confound use of the default numeric response values, and that these can be addressed using the reference envelope approach. Additional guidance on key considerations and decision points involved in implementing a reference envelope assessment would be helpful, including guidelines for reference site selection, number of stations required for statistical comparisons, and appropriate statistical methods for comparison of chemical and biological data.

Recommendation: Clarify Provisions to state that reference envelope benthic triad assessment is an acceptable alternative to the default numeric response value approach, and that it offers significant benefits (at significant cost of additional data collection) when confronted with unique site-specific conditions, including the presence of non-chemical stressors. Develop additional guidance and technical resources to aid in implementation of reference envelope assessments.

Comments on SQOs for Protection of Human Health

1. The rules and language regarding the tiered assessment framework are unclear.

The proposed Provisions concerning the limitations and progression between tiers of human health risk assessment for bioaccumulative chlorinated organics are unclear in several ways. Tiering is a well-established risk assessment approach designed to facilitate rapid “screening-out” of sites or exposure pathways that fall clearly below a specified level of regulatory concern. Higher tiers of assessment make use of more site-specific information and data, thus resulting in a more reliable risk assessment, at the cost of more effort and data acquisition (see USEPA 2001).

The proposed guidance and amendments make use of this approach, but do so in an unnecessarily restrictive manner: “Tier 3 may be performed at any time with approval from the Regional Board provided that Tier 2 is completed at the same time. A change in any parameter or model from that used in Tier must be justified based on site conditions in comparison to Tier 2 assumptions and values, and approved by the Regional Board prior to performing the analysis.” (Provisions, Section IV.A.2.e, p.30). Many sites under investigative orders, with known site-related organochlorine release histories are unlikely to be cleared by Tier 1 or even Tier 2 assessments, as described by the Provisions. A responsible party should have the option to proceed directly to Tier 3 in such cases. A Tier 3 assessment, though more expensive and time-consuming, would be more reliable. Tier 3 findings should always supersede findings of lower assessment tiers. Furthermore, the conditions under which a Regional Board would approve site-specific Tier 3 exposure assumptions are unclear. What standards would be used to evaluate evidence that site-specific exposure parameters exist and can be estimated?

Recommendation: Eliminate requirement for Tier 2 assessment in cases where site meets Tier 3 triggering criteria and the responsible party elects to go directly to Tier 3. Clarify factors and conditions upon which Board approval for Tier 3 would be contingent. Clarify that the

triggering criteria list in the Provisions (Section IV.A.2.e, p.30) are examples, not an inclusive list.

2. **Empirical measurements of sediment contaminant bioavailability should be allowed**

The source study for the bioaccumulation modeling technique specified for Tier 2 and 3 assessments, Gobas and Arnot (2010), states that concentrations of freely dissolved contaminants in surface water and porewater should be used in calculating BSAF. The proposed guidance does not require or discuss the collection of such data, nor the use of tissue data from prey species to parameterize Gobas food web models. When practicable, collection of these types of site-specific data in a Tier 3 assessment would produce more reliable estimates of human exposure and risk than obtained from modeling bioaccumulation using bulk sediment concentrations alone.

Recommendation: The guidance should explicitly recognize the value of site-specific empirical data in parameterizing bioaccumulation models, and allow the use of devices such as passive samplers to measure pore water concentrations and the use of prey tissue data to replace modeled tissue concentrations in Tier 3 Gobas models.

3. **Table 21 appears to contain an error**

Table 21. Site Sediment Linkage Categories for Tier 2 Evaluation (Provisions, p.29) appears to contain an error in the last row. The conditions defining outcome 4 (“High” Site sediment linkage) would be met by all of the conditions for outcomes, 1, 2, or 3. The table, and the scaling scheme it describes would make logical sense if the value in the first cell of the last row was 75%, not 25%.

Recommendation: Review and correct Table 21 as described above, or provide additional explanation of the existing table.

Comments on SQO Implementation

1. SQO Provisions regarding TMDLs and discharge limits are not retroactive.

The proposed amendments state that the SQO “implementation provisions ... do not apply to dischargers that discharge to receiving waters for which a total maximum daily load (TMDL) has been established to address for [sic] the bioaccumulation of organochlorine pesticides or polychlorinated biphenyls from sediment into sportfish tissue within enclosed bays and estuaries unless the applicable Regional Board approves the application of such provisions.” (Provisions, Section II.A.1.b, p.3).

This provision is unnecessarily restrictive. Many existing TMDLs are based on outdated and faulty science, and are inconsistent with the proposed amendments. Some TMDLs rely upon comparison of site conditions to scientifically flawed sediment quality guidelines, such as ER-Ls and TELs, that are not reliable indicators of benthic community impairment, and are fundamentally inappropriate for use in developing protective targets for human health or bioaccumulation. Re-evaluation of existing TMDLs under the final SQO guidance should be an option available for all California water bodies and dischargers, regardless of whether or not TMDLs have already been promulgated, when it results in a more scientifically defensible and reliable management goal.

The proposed Provisions similarly include language regarding the implementation of SQOs in the development of receiving water and effluent limitations, stating that “Effluent limits to be established to protect or restore sediment quality only after:

- i. A clear relationship has been established linking the discharge to the degradation
- ii. The pollutants causing or contributing to the degradation have been identified, and

- iii. Appropriate loading studies have been completed to estimate the reductions in pollutant loading that will restore sediment quality.”
(Provisions, Section IV.A.4.c, p.32)

Again, many established receiving water and effluent limitations are inconsistent with the proposed SQO Provisions. As with TMDLs, updating current discharge limits driven by bioaccumulation of organochlorine chemicals in a manner consistent with the final SQO implementation guidance should be an option available to all dischargers.

Recommendation: The Board should modify relevant sections of the proposed Provisions to indicate that updating existing TMDLs and discharge/receiving water limits is an option for all waterbodies and existing limits that are based on less rigorous science.

2. Aquatic life SQO scores should not be used as automatic triggers for impairment listings or determinations of receiving water limitation exceedances.

All tested stations in a Part 1 SQO assessment receive one of 6 categorical scores: “Clearly Unimpacted”, “Likely Unimpacted”, “Possibly Impacted”, “Likely Impacted”, “Clearly Impacted”, or “Inconclusive”. The proposed Provisions stipulate that an exceedance of a receiving water limit to protect aquatic life is demonstrated when “Any station within the site is assessed as Clearly Impacted as defined in Chapter IV.A.1.i and IV.A.1.j or the total percent area categorized as Possibly Impacted and/or Likely Impacted equals or exceeds 15 percent of the site area over the duration of a permit cycle. Calculation of percent area shall be based on data from spatially representative samples selected using a randomized study design or equivalent spatial analysis.” (Provisions, Section IV.A.4.c, p.32-33).

Similarly, the draft Provisions stipulate that 303(d) listings will be triggered by aquatic life SQO scores if either “i. Any station within the site is assessed as Clearly Impacted...” or “ii. The total percent area categorized as Possibly Impacted and/or Likely Impacted equals or exceeds 15 percent of the site area over the duration of a listing cycle. Calculation of percent area shall be based on data from multiple spatially representative samples selected using a randomized study design or equivalent spatial analysis.” (Provisions, Section IV.A.4.e, p.36-37).

This automatic trigger for listing or flagging discharge exceedances is inappropriate for several reasons:

- SQO station scores are not numeric standards based on measurable adverse effects and are not reliable stand-alone indicators of chemically-induced impairment (see comments on SQOs for protection of benthic communities above).
- The trigger level of 15 percent of the site area exceeding any specified station score is arbitrary and unjustified. This threshold has no demonstrated relevance to the question of beneficial use impairment. The justification for this frequency provided in the draft Staff Report (Section 6.7, p104-106) is not technically valid. The review of “critical exceedance rates proposed by USEPA” (Staff Report, Table 6-9) is an evaluation of the predictiveness of concentration-based effect criteria (i.e., chemical concentration thresholds that have been determined by a statistically valid approach to be associated with the onset of adverse effects). SQO category scores are not adverse effect thresholds, and have no demonstrated level of predictiveness. They do not exhibit the same cumulative probability characteristics that concentration-based threshold exceedances do. Furthermore, if the minimum recommended number of stations (currently 5 for a small site) was assessed, a single “Possibly Impacted” or worse station would potentially trigger listing. This finding would be insufficient to classify any waterbody as impaired, regardless of the conditions at that single tested station.
- “Possibly Impacted” scores are not indicative of impairment (see comment 3 below)

Benthic SQOs are a valuable line of evidence that can and should be considered by the Board when making listing decisions. Notwithstanding the technical flaws in the benthic SQO method noted above, a rational assessment of benthic triad data is inherently more relevant than simple comparison of sediment chemistry data to published benchmarks (e.g., ER-Ls). However, stipulation of automatic listing due to the linear outcome of a SQO assessment of a small

number of stations is inappropriate, particularly in the absence of a full causal analysis (i.e., a stressor identification with a clear outcome). Listing decisions should remain a professional judgment-driven process that can draw on all available site-specific information, including but not limited to SQO results.

Recommendation: Remove all language in the Provisions that specifies mandatory exceedance determinations or 303(d) listing for any SQO outcome. Specify that Board listing and exceedance decisions remain a professional judgement process, but that SQO findings should be considered synoptically with other relevant lines of evidence and information. Include requirements that causal analysis (stressor identification) must be conducted and conclusive before a waterbody can be listed for any specific cause.

3. Listing decisions and receiving water limitation exceedances should not be triggered by the “Possibly Impacted” benthic community station category.

As noted above, the range of benthic SQO station scores that can trigger 303(d) listing and limit exceedances includes “Possibly Impacted” in the proposed Provisions.

The description of the “Possibly Impacted” categorical score in Part 1 SQO guidance makes it clear that this outcome is not a finding of impairment, but of either small magnitude effects (possibly from non-Site related stressors) or uncertainty in the lines of evidence evaluated and/or the underlying data. The Provisions define “Possibly Impacted” as follows: “Sediment contamination at the site may be causing adverse impacts to aquatic life, but these impacts are either small or uncertain because of disagreement among LOE.” (Provisions, Section IV.A.1.i, p.14). The Provisions go on to provide the following guidance on interpretation of the “Possibly Impacted” category, describing it as “meeting the protective conditions if the studies identified in Chapter IV.A.4.f demonstrate that the combination of effects and exposure measures are not responding to toxic pollutants in sediments and that other factors are causing these responses within a specific reach segment or waterbody. In this situation, the Water Board will consider only the Categories **Likely Impacted** and **Clearly Impacted** as degraded when

making a determination on receiving water limits and impaired water bodies as described in Chapter IV.A.4.” (Provisions, Section IV.A.1.i., p.15).

The “Possibly Impacted” outcome for an SQO station is not indicative of clear chemical-associated BMI community impairment. Rather it is an indication of uncertainty in the analysis, often associated with the presence of non-chemical stressors at a site or variability in the community data. The logical interpretation of such an outcome is to supplement the default SQO analysis with additional information (such as a reference envelope comparison), or to perform stressor identification when uncertainty is widespread at a Site. To the extent that aquatic life SQO station scores are considered in impairment listing or discharge exceedance determination decisions, only “Likely Impacted” and “Clearly Impacted” scores should be considered as evidence of possible impairment. Treatment of the “Possibly Impacted” finding as indicative of impairment is scientifically inappropriate and internally inconsistent with the SQO guidance itself.

Recommendation: Remove the inclusion of “Possibly Impacted” station scores from the description of aquatic life SQO outcomes that shall support any decision for impairment listing or exceedances of discharge or receiving water limits. “Possibly Impacted” findings should only be used as a justification for additional investigation or supplemental lines of evidence to characterize benthic conditions at a Site or waterbody.

4. Listing decisions and receiving water limitation exceedances should not be triggered by the “Possibly Impacted” human health site category.

As with the aquatic life SQOs, the proposed Provisions require that waters be placed on the 303(d) list for exceedance of the narrative SQO for human health if Site sediments are categorized as “Possibly Impacted”, “Likely Impacted”, or “Clearly Impacted” over the duration of the listing cycle (6 years) (Provisions, Section IV.A.4.e, p. 38). As with the benthic station SQOs, the “Possibly Impacted” category for human health assessment is clearly not a finding of impairment. Rather, it is only indicative of high chemical exposure with low site sediment

linkage (see Provisions, Table 22, p.29), a condition most likely associated with non-Site related factors.

Such a finding should, at most, trigger additional investigation to assess the reasons for the uncertainty, not automatic listing or exceedance designations. To the extent that human health SQO Site scores are considered in impairment listing or discharge exceedances decisions, only “Likely Impacted” and “Clearly Impacted” scores should be considered as evidence of possible impairment.

Recommendation: Remove the inclusion of “Possibly Impacted” station scores from the description of human health SQO outcomes that shall support any decision for impairment listing. “Possibly Impacted” findings should only be used as a justification for additional investigation or supplemental lines of evidence to characterize human exposure conditions at a Site or waterbody.

5. The use of “regional background” in management decisions should be extended to benthic community SQO assessments.

The Provisions on human health SQO assessment include explicit consideration of regional background contamination levels during development of management guidelines, requiring such guidelines for a site to be established in consideration of regional background conditions: “Regional background contamination should be taken into account when establishing management guidelines or actions. Regional background is defined as the concentration of contaminant that is primarily attributable to diffuse sources, not attributable to a specific source or release. It is not feasible to establish management guidelines for a site that are below regional background, as they cannot be expected to be attained within a defined timeframe. Instead, such values should be regarded as management goals to inform watershed-based management plans.” (Provisions, Section IV.A.4.h, p.43). This consideration is apparently restricted by the Provisions to human health management guidelines, and is not mentioned in the preceding section on benthic community protection guidelines.

The scientific and regulatory rationale for inclusion of background consideration in management decision-making for human health protection apply equally to benthic and other ecological beneficial use protection. Regional background considerations should be integrated into the benthic Site-specific management guideline process. Derivation of background concentrations can be a challenging and contentious process. Further guidance should be developed by the Board on the appropriate statistical methods for estimation of regional background and comparison to Site data that are consistent with Board practice and risk assessment guidance. For example, use of background upper prediction limits or similar upper distribution points from background/reference data distributions should be compared to Site data, not means or confidence limits on means (see USEPA 2002).

Recommendation: Add an explicit consideration of appropriate background data to the benthic community chemistry line of evidence. Sediments that do not exceed regional background should not be assigned “high” chemistry scores in a benthic triad assessment. Furthermore, management guidelines to protect benthic communities should explicitly incorporate consideration of regional background. Develop additional implementation guidance on estimation of regional background and appropriate statistical methods for comparison to Site data.

6. Stressor Identification Evaluation guidance should be clarified.

Conceptual guidance is provided in flowchart form for the Stressor Identification Evaluation (SIE) process in Appendix A-2 of the Provisions (Provisions, p.49). The process requires a discharger to “review and revise SIE workplan” when the SIE is inconclusive and fails to identify the “chemicals or classes of chemicals” responsible for an SIE exceedance, an outcome that experience has shown is common. The result can be an infinite do-loop with no resolution in cases where positive stressor identification proves elusive. This flowchart should be amended to provide a decision point on when to end the evaluation process, as well as guidance on possible next steps (such as a Tier 3 human health assessment or reference envelope benthic assessment).

Recommendation: Revise the flow chart in Appendix A-2 to indicate a decision point on next steps in the event of an inconclusive SIE outcome.

References

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- USEPA. 2001. Risk Assessment Guidance for Superfund: Volume III - Part A, Process for Conducting Probabilistic Risk Assessment. Office of Emergency and Remedial Response. U.S. Environmental Protection Agency, Washington, DC. EPA 540-R-02-002. December 2001. 385 pp.
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