2 September 2009

COMMENTS AND ISSUES – COLORADO LAGOON DRAFT TMDL

The follow sections include general and specific comments on the July 23, 2009 draft of the Colorado Lagoon Organochlorine Pesticides, PCBs, Sediment Toxicity, PAHs and Metals TMDL. The general comments focus on the major issues of concern where substantive changes are recommended or where further information may be necessary. The section on specific comments provides detailed remarks on the draft document including some minor typographical errors. Please note that all typographical errors are not listed.

GENERAL COMMENTS

- **PAHs**

Historical data from the BPTCP (Anderson et al. 1998) presented for PAHs appear inconsistent with data in the BPTCP reports and database files. Data from these reports would suggest that inclusion of PAHs on the 303(d) list may have been in error unless a single measurement of 1770 ppb phenanthrene is considered adequate for listing all PAHS. The Effects Range Median (ERM) for phenanthrene is 1500 ppb. We suggest that these data be reassessed to determine if this listing was based upon typographical errors and, if so, remove PAHs should be removed from the TMDL.

- **Utilization of "probable background levels"**

"Probable background levels" are used as one of several "criteria" for assessing whether levels of contaminants in Colorado Lagoon sediments were contributing to impairment. The probable background levels appear to have been extracted from the Regional Board's 1996 Water Quality Assessment. These numbers are supposed to represent background conditions at locations distant from direct point sources. However, these values clearly do not reflect background conditions and are not referenced to any known database. As noted below, these numbers would suggest that chlordane is typically more than 16 times the ERM rather than rarely being detected. We recommend removing these values from the data evaluation process.

- **Better definition of chlordane and PCBs**

Both chlordane and PCBs consist of a large number of individual compounds. Different studies have tended to use a variety of different definitions to represent these compounds making it difficult to compare data sets. Technical chlordane is a complex mixture of approximately 140 compounds and PCBs consist of 209 separate congeners.

The National Oceanic and Atmospheric Administration (NOAA) considers seven compounds as representative of the major components of technical chlordane. These include alpha-chlordane, gamma-chlordane, cis-nonachlor, trans-nonachlor, heptachlor, heptachlor epoxide and oxychlordane. Note that heptachlor was also used independently as a termiticide. The BPTCP used four compounds to represent chlordane and the Bight ’03 studies have limited their measurements to just two compounds.

Similar issues exist for the PCBs. None of the field studies that we are aware of in Southern California (including analyses conducted by EPA’s Region 9 laboratory for this TMDL) has attempted to measure all congeners as suggested in the TMDL. We recommend identification of specific chlordane compounds and a set of PCB congeners such as those used for the Bight ’03 studies so that there is standardization in how improvements are measured.

- **Delete all reference to IIRMES/FOCAL data**

We recommend removal of discussion of the IIRMES/FOCAL data set since it was clearly a student project conducted as a class learning exercise. There is not even basic information as to where each sample was taken within the Lagoon.

- **ERL / ERMs**

The use of ERMs as a benchmark for listing sediment on the 303(d) list and setting the TMDL target at the Effects Range Low (ERL) value creates an excessive Margin of Safety (MOS). This approach is inconsistent with TMDLs addressing water quality where the listing criteria is an acute or chronic water quality criteria and goals are met by loads that allow the water quality to meet the original listing criteria. In the case of PAHs, a 90% reduction is required to simply reduce sediment concentrations from the ERM to the ERL. We recommend establishing initial sediment numeric targets at a value of 85-90 % of the ERM which would provide an explicit MOS of 10-15%.

- **Fish tissue targets vs mussels**

Tissue targets were established on the basis of fish with the intent of protection of human health. There are few species found in the Lagoon that are commonly targeted for human consumption. It is also unlikely that the same species will be consistently available. In addition, it is impossible to know how long fish captured in the Lagoon have been present. Use of mussel tissue targets would be more appropriate especially since resident and transplanted mussels were the primary source of tissue data that lead to the original listing. There is also a substantial database established by the State Mussel Watch Program that can assist in the interpretation of the data. We recommend that mussel tissue targets be developed in lieu of fish tissue targets and that mussels are used instead of fish for monitoring and assessing bioaccumulation of contaminants of concern.

- **Dredging of Northern Arm**

The TMDL suggests that the Northern Arm of Colorado Lagoon should be dredged if “high sediment concentrations” still remain after proposed actions are implemented. This inference that the Northern Arm of the Lagoon has high levels of sediment contamination levels is misleading. None of the target analytes exceed the ERM in surficial sediment samples from the Northern Arm. Two metals, lead and zinc exceed the ERLs but not the ERMS. In 2000, concentrations of total DDT exceeded the

ERL but not the ERM. Surficial sediments analyzed by EPA in 2008 had no detectable DDT but reporting limits were relatively high.

A composite of three sediment cores (1.5 to 3.5 feet, average of 2.7 feet) taken in the Northern Arm in 2004 provided evidence that the depth of contamination is not extensive. Concentrations of both lead and zinc in the composite samples were less than the ERLs but total DDT concentrations were about 1/10 of the ERM and 4-5 times the ERL. DDT at this level is comparable to background levels found throughout inland waters in this region. The EFDC model also appears to indicate that DDT concentrations will be near the ERL regardless of which implementation scenario is eventually followed.

Field studies conducted by Chamber's Group in 2004 also indicate that the Northern Arm supports a typical benthic assemblage for this type of habitat. Overall, the costs of removing and disposing of sediment with very limited contaminants of concern and an apparently healthy benthic assemblage would seem to outweigh any ecological improvements.

We would not recommend dredging the Northern Arm simply on the basis of the concentrations of three analytes being measured between the ERL and ERM. Further consideration of dredging should not be considered unless multiple lines of evidence (e.g. persistent sediment toxicity or bioaccumulation exceeding guidelines) indicate that sediments from the Northern Arm are at levels of ecological concern. Long, Field and McDonald (1998) summarized incidence of toxicity relative to exceedences of a variety of sediment guidelines and found that amphipod tests showed evidence of highly toxic responses in 13% of sediments with 1-4 analytes exceeding just the ERL. That compares to sediments with no ERL exceedences being highly toxic to amphipods in 11% of the cases. It would be difficult to justify the cost and ancillary impacts of dredging simply on the basis of 3 ERL exceedences.

- **Monitoring**

Adjustments are suggested to make the monitoring program more efficient and allow more direct assessment of targets.

- We suggest complete elimination of water quality monitoring based upon existing monitoring efforts that indicate that concentrations of contaminants of concern are either measured below relevant water quality criteria or are not detectable at Minimum Levels as defined by the State Implementation Plan.
- Conduct sediment toxicity testing annually consistent with sediment quality testing as opposed to conducting quarterly testing during the first year and semi-annual testing thereafter.
- Eliminate use of fish for tissue monitoring and replace with a transplanted mussel monitoring program.

More details on these issues are provided in the following pages.

SPECIFIC COMMENTS

SECTION 2

p. 17. The Draft TMDL Report indicates that REC1 and REC2 Beneficial Uses are impacted by constituents addressed by this TMDL. The TMDL addresses contaminants in sediments and tissues. There are no water quality data that support the assumption that REC1 and REC2 Beneficial Uses are impacted by contaminants that are the subject of this TMDL.

p. 18. The footnote to Table 2-2 indicates that total PCBs are defined as the sum of all congener or isomer or homolog or Aroclor analyses. This broad definition is used throughout the report including sections addressing monitoring requirements. PCB analysis of sediments collected by the BPTCP in January 1993 included 18 PCB congeners. The NOAA status and trends program utilizes 20 congeners in sediments. The 2004 Kinnetic Laboratories, Inc/Moffatt Nichols report utilized the summation of Aroclors to characterize PCBs. SCCWRP's Bight '03 studies use as set of 41 congeners to characterize PCBs in sediments in Southern California. Few laboratories run the full set of 209 PCB congeners due to both cost and benefit issues. Standardization is needed to provide a consistent basis for assessment of PCBs in sediments and tissues.

p. 20. Table 2-3 appears to have been extracted from the Regional Board's 1996 Water Quality Assessment. We recommend that the approach of using probable "background" levels be removed from the TMDL. These numbers do not represent typical "background" levels and are not referenced to any known dataset. For example, chlordane background levels in sediments are cited as 100 ppb which is over 16 times the Effects Range Median (ERM) value of 6 ppb. The Bight '03 studies found chlordane compounds detected in only 8% of the samples and concentrations were elevated only in coastal water bodies heavily impacted by urban or industrial activities. Mean area-weighted chlordane concentrations were highest (11 ppb) in Los Angeles estuaries.

p. 21 Table 2-4. Guidelines applicable exclusively to freshwater should be excluded. Colorado Lagoon has no freshwater habitat.

p. 21 Table 2-4. PCBs are listed twice with incomplete information in both cases.

p. 22 Table 2-5. As noted earlier, use of background level approach should be eliminated and should not be considered as one of the criteria for the 303(d) listings.

p. 22 Table 2-5. REC 1 and REC 2 should not be listed as impaired uses due to contaminants in sediment and tissues.

p. 22 Table 2.6. Much of the BPTCP sediment data appears to be inconsistent with the BPTCP database (bptcp514.dbf) and the report (Anderson et al. 1998).

The PAHs listed in the table are far greater than those listed in the database. Total PAHs should be 10,270.7 ppb, low molecular weight PAHs should be 2,238.4 ppb, and high molecular weight PAHs should be 6,946 ppb. Calculations for low and high molecular weight PAHs were based upon the lists used in Anderson et al. (1998). Since they did not include all analyzed PAHs, the two classifications do not add up to the total PAHs. The only PAH compound exceeding an ERM should be phenanthrene which was 1770 ppb compared to the ERM of 1500 ppb.

Total DDTs are 181.42 ppb in Table 2.6 but the database indicates that six DDT compounds sum to 208.1 ppm.

Total chlordane is listed as 74.32 in the table but the text does not indicate which compounds are summed. The total of cis-chlordane and alpha-chlordene would be 81.5 ppb.

The remaining values seem consistent with the database and report.

p. 23 Table 2-7. Alpha-chlordane and gamma-chlordane should be alpha-chlordene and gamma chlordene. Total chlordane needs to be footnoted to indicating the seven compounds combined to assess total chlordane. The other chlordane compounds, especially trans-nonachlor which was a significant component of total chlordane, should be included in this summary table.

p. 24. All data and reference to the IIRMES study should be removed from this document. These analyses were from a class project, so the whole project (sampling through analysis) was a training experience for the students. Basic QAQC are available for the sediment analyses that would indicate that these analyses are likely reasonable but sampling locations are mostly undocumented. GPS coordinates exist for only 3-4 of the 16 sites listed in Table 2-13 on p. 31. Sites with known locations do not include Sites 8 and 9 that were indicated to have elevated levels of PAHs. It is indicated that these sites were taken near storm drains. QAQC for the tissue samples are known to be poor with only about 20% recovery from the CRM and MS. While the data are interesting and provide some insight into potential small scale variability, it is not appropriate to include these data or the generalizations included in the IIRMES Annual Report.

p. 25 and 26. Information available to KLI/Moffatt Nichols in 2004 indicated that the CL-East site was actually in the Northern Arm, not in the central portion of the Lagoon near the culvert.

p. 27. Table 2-10. Use of freshwater translators to convert dissolved lead and zinc criteria to total recoverable concentrations is not appropriate. The saltwater translators in the CTR (0.951 for lead and 0.946 for zinc) should be used IF any criteria are cited. It should also be noted that the listed criteria are chronic (CCC) criteria and that the translators are based upon acute data since chronic translators for saltwater criteria are not available. (CTR p. 31717).

p. 27. Section 2.4.1.3. Text indicates that “High” concentrations of metals were detected. Conversely, would you state concentrations of all organics were “Low” since all but two compounds (see next comment) are reported as “not detected” (ND)? Please indicate what criteria are being used to designate concentrations measured at all sites as high. Concentrations of zinc measured in sediments from the Western Arm consistently exceeded the ERMs but data from both surveys at the other two sites exceeded only the ERL.

p. 29. Table 2-11. Gamma-chlordane at CL-1 on 2/28/08 should be reported as 14 with a J qualifier. Similarly, the value of 17 reported for endosulfan-I should be J-qualified since this compound was detected below the quantification limit. This table would be more valuable if the quantification limits were reported as they are on the previous tables.

p. 30. Table 2-12. Please include quantification limits as they are on previous tables in this section.

p. 30. IIRMES/FOCAL. As previously noted, this section should be eliminated.

p. 32. typo on mussel genus, should be *Musculista senhousia.*

p. 32. Typo on dominant alga, should be *Enteromorpha*.

p. 32, third paragraph from top, "The lack of invertebrate diversity in the Western Arm may be related to toxicity in sediments or to relatively low dissolved oxygen in this part of the lagoon." The 2004 review of water quality data found that oxygen levels can be depressed at times but there was no indication that oxygen levels in the Western Arm were any lower than any other segment of the Lagoon. In fact, one would expect that the heavy cover of *Enteromorpha* and *Ulva* would have very significant diurnal impacts on dissolved oxygen levels in the Northern Arm of the Lagoon. Please include a reference for this conclusion or data that demonstrates significant spatial differences in dissolved oxygen within the Lagoon. Alternatively, delete the second half of the sentence.

SECTION 3

p. 32. General. This section incorporates water targets. The text states that "Multiple numeric targets are often employed when there is uncertainty that a single numeric target is sufficient to ensure protection of designated beneficial uses." Unfortunately, inclusion of water targets does not provide any measureable benefit. As detailed below, NONE of the water quality monitoring surveys in Colorado Lagoon has provided evidence that water quality objectives have been exceeded and there is no reason to believe that further monitoring will provide different results. Two more water quality surveys are scheduled to be conducted after construction is complete but we see no benefit from conducting further routine water quality monitoring. As noted on p. 35, constituents of concern in this TMDL "have a high affinity for particles and the delivery of these pollutants is generally associated with the transport of suspended solids from the watershed or from sediments within the lagoon."

Conditions that might result in suspension of solids in the lagoon only happen episodically with storm events. Even monitoring during such events would only result in data that would be difficult to interpret.

Use of the sediment and tissue numeric targets will provide the level of protection necessary and, more importantly, these targets provide an integrated measure of changes within the lagoon and endpoints that can be realistically measured. As noted on p. 64 "..the potential effects of OC pesticides, PCBs, PAHs, and metals are related to bioaccumulation in the food chain and sediment accumulation over long periods of time, short term variations in concentration are not likely to cause significant impacts upon beneficial uses."

p. 32 last paragraph, first sentence. "associated with metals and selenium." should be corrected to reflect constituents of concern in this TMDL.

p. 33, Table 3.1. Water quality sampling in Colorado Lagoon was reported by Kinnetic Laboratories, Inc/Moffatt Nichols (2004). Additional sampling was performed by the Regional Board/EPA in 2008 as part of the current TMDL effort. Two rounds of water quality sampling were also conducted by Kinnetic Laboratories, Inc./ Moffatt Nichols as part of the pre-construction monitoring effort. None of this sampling has resulted in exceedences of water quality standards despite use of extremely low detection limits for the 2008 pre-construction monitoring surveys. None of the previous sampling has included PAHs.

The targets established for chlordane compounds, total DDT compounds, dieldrin and PCBs are well below conventional low detection limits and could only be achieved by very expensive nonconventional methods that utilize large sample volumes and involve preconcentration procedures. The following table provides a summary of target levels requested versus reporting limits used at the US EPA Region 9 laboratory and the lowest achievable by a local, commercial laboratory with extensive experience in marine chemistry.

Constituent	**Table 3.1 Water Quality Targets (ug/L)**	**EPA Region 9 Laboratory Reporting Limits (ug/L)**	**KLI/Moffatt Nichols Reporting Limits[1] (ug/L)**
Chlordane	0.00059	0.02[3]	0.1- 0.005[4]
Total DDT	0.00059	0.05[5]	0.01-0.005[6]
Dieldrin	0.00014	0.05	0.01-0.005
PCBs[2]	0.0007	0.05-0.09	0.5-0.02[7]

1. Analyses performed by CRG Marine Laboratories.
2. As the sum of seven Aroclors.
3. Based upon a single chlordane component (alpha-chlordane). Detection limit for technical chlordane was 2.3 ug/L.
4. CRG now reports a capability of meeting a reporting limit of 0.005 ug/L for alpha-chlordane with similar limits for the other major components of chlordane. The lower detection limits were used for 2008 pre-construction monitoring.
5. RL is for a single component of DDT. EPA lab reported three DDT compounds.
6. CRG now provides a lower detection limit of 0.005 for single components of DDT such as 4,4'-DDT and reports 6 isomers. The lower limit was used in the two recent water quality surveys conducted for 2008 pre-construction monitoring.
7. Reporting limits are for Aroclors. RLs for individual congeners are approximately 0.005 ug/L.

Utilizing the ERL values as sediment targets provides an excessive Margin of Safety (MOS). The current State Board listing policy utilizes the ERM as a basis for placement on the 303(d) list. In the case of total PAHs, there is a full order of magnitude difference between the ERM and ERL. The approach of using the ERLs to provide an implicit margin of safety is inconsistent with strategies used in other TMDLS (Chollas Creek and Calleguas Creek) where explicit margins of safety were used that ranged from 10 to 15 percent. In the extreme case of total PAHs, a 90% reduction is required just to cover the difference between the ERM and ERL. This issue will require a much more thorough and critical review to establish target values that are rational and scientifically supportable. We suggest setting the sediment targets at a level that would be 10-15% less than the ERM which is used for listing the sites. This would provide an explicit MOS of 10-15% consistent with most other TMDLs.

p. 36, Section 3.2 Water Quality Criteria. As previously noted, including water quality targets does not provide any significant benefits and should be removed from the TMDL.

Colorado Lagoon meets the Basin and CTR definitions of a saltwater environment based upon the fact that salinities are equal to or greater than 10 ppt at least 95% of the time in a normal water year.

Therefore, saltwater quality criteria apply to these receiving waters. The draft report incorrectly states that Colorado Lagoon would be considered a tidally influenced fresh water environment that supports estuarine beneficial uses. Please revise the text accordingly.

p. 36, Section 3.3 Fish Tissue Target. While we agree that Fish Tissue Targets have merits, the issues of the mobility of fish and unknown exposure times should be noted as a confounding factor. Based upon data in Section 2, it is questionable as whether PAHs should be included in this TMDL. In addition, PAHs are typically metabolized rapidly in fish the mixed oxidase function system in the liver such that measurement of PAH body burdens may not prove useful. Apparently in recognition of this issue, PAHs were not included in the fish tissue monitoring specified on pages 78 and 79. We recommend tissue targets be established for mussels rather than fish. This would eliminate questions of residence time and species availability. It would also be consistent with tissue data that were used to initially place Colorado Lagoon on the 303(d) list due to tissue burdens.

p. 37. Clarify that the EPA PAH Screening Level of 5.47 ug/kg is for recreational fisherman (EPA 2000, EPA 823-B-00-007). It also should be noted that the following 15 PAHs with existing Toxicity Equivalency Factors (TEF) should be used for measurement of total PAHs.

- Dibenz[a,h]anthracene
- Benzo[a]pyrene
- Benz[a]anthracene
- Benzo[b]fluoranthene
- Benzo[k]fluoranthene
- Indeno[1,2,3-cd]pyrene
- Anthracene
- Benzo[g,h,i]perylene
- Chrysene
- Acenaphthene
- Acenaphthylene
- Fluoranthene
- Fluorene
- Phenanthrene
- Pyrene

SECTION 4

p. 40. MS4 Stormwater permits. The City of Long Beach MS4 permit was issued, not renewed, in 1999.

p. 41. Section 4.2.2. Please include the land use specific EMC values in the tables.

p. 42. Rainfall records from the Long Beach Daugherty Airport may be more appropriate. Average rainfall for calendar years 2006 through 2008 was 11.82 inches.

p.43. Section 4.2.4 Point Sources Summary. The text references Table 5-3 which is in the next section and contains loading capacity information. It could be Table 4-3 but that sums only stormwater runoff. Is there a missing table that sums stormwater and dry weather flows?

p. 44. Section 4.2.4 Point Sources Summary. Last paragraph. A component of the lead load still reflects historical uses. Lead should still be considered a legacy contaminant. Extremely high concentrations of lead are found along major traffic arteries. During periods of intense rainfall, lead from these areas can be mobilized. It is our understanding that Caltrans is currently implementing a variety of BMPs to reduce the potential for these reservoirs to continue serve as sources for lead.

p. 45. Change "….the first flush normally exhibits a heavy spike in concentration discharged to the lagoon" to "…the first flush would be expected to exhibit a heavy spike in concentration discharged to the lagoon". There are no stormwater data for Colorado Lagoon.

p. 45. first paragraph. Please reference the source for these generalizations or delete the last two sentences. The information is not consistent with other work such as that conducted on first flush metals by Michael Stenstrom's group and Caltrans (Kim et al. 2003).

p. 45. Section 4.3.2 Atmospheric Deposition, second paragraph. Reference to Table 5-5 should be 4-5.

SECTION 5

p. 51. First paragraph, last sentence. The tide gates were partially closed at all times but flows easily pass through the structure due to the condition of the gates at the time of the study.

p. 51. Second paragraph, last sentence. "As can be seen from the comparison indicated in Figure 5.3, the hydrodynamic model provides a good foundation for the simulation of water quality for the Colorado Lagoon." It is not clear that this statement is valid given the inability to accurately duplicate existing limits on low tides. Differences of roughly two feet of water at low tides would seem to have a substantial impact on how well the model simulates existing conditions.

p. 53. Table 5.1 Please identify purpose of red highlights in the data table.

p. 64. Table 5.2. This table identifies a sixth subbasin that is not identified as one of the subbasins listed on p. 10 and on the map on p. 11. This subbasin appears to be equivalent in size to Subbasin D (Line M).

p. 65. 5.5 Margin of Safety. Utilization of multiple targets, ERLs and incorporation of an additional 10% Margin of Safety provides an excessive level of protection. The additive nature of using all of these factors can result in use of an MOS that corresponds to a full order of magnitude (see earlier discussion of PAH ERL/ERMs) which is not the intent of the TMDL program. None of the sediment data from the Northern Arm of the Lagoon have provided evidence that would indicate that this portion of the Lagoon should have been included in the original 303(d) listing since ERMs were not exceeded. As noted on p.32, "Colorado Lagoon supports a relatively diverse benthic invertebrate community in the central and northeast portions of the Lagoon." We recommend maintaining tissue targets, eliminating the water targets which do not contribute to effective monitoring of improvements, and using the ERM as a target with incorporation of an explicit MOS as a percentage of the ERM.

SECTION 6

p. 66. Table 6-1. Numbers in this and all subsequent tables (Tables 6-2 through 6-4) need to be adjusted to reflect the correct number of significant figures.

p. 67. end of first full paragraph. This is the first mention of Line N in the draft report. Is this synonymous with 5104? If so, early data indicates similar solids loads to Subbasin D (Line M)?

SECTION 7

No comments. Implementation section reflects activities proposed as part of the City's Colorado Lagoon Restoration Project.

SECTION 8

p. 78 Section 8.1 Water, Sediment, Fish Tissue Monitoring. As previously noted, quarterly water quality sampling will not provide significant information for evaluating effectiveness of the Implementation Program. All constituents of concern are strongly associated with particles. The 2004 sampling by Kinnetic Laboratories, Inc/Moffatt Nichols was conducted at low detection limits as were the organic analyses conducted by the Regional Board/EPA in 2008. Detection limits were at or below Minimum Levels. Two additional rounds of water quality sampling (Figure 1, Table 1) were performed in the late 2008 by Kinnetic Laboratories, Inc./Moffatt Nichol. Data from these two surveys also utilized low detection limits (at or below the State Implementation Policy Minimum Levels). All constituents of concern met applicable water quality criteria. We recommend that water quality sampling be eliminated from the Monitoring Program since additional data are not be expected to provide any substantive benefits with regard to evaluation of the effectiveness of the Implementation Program.

The draft report recommends that sediment toxicity testing be conducted quarterly during the first year and semiannually thereafter. We recommend this testing be limited to annual testing in conjunction with the sediment sampling effort such that chemistry is available to help interpret sediment toxicity results.

p. 79 Section 8.1 Water, Sediment, Fish Tissue Monitoring. The monitoring program specifies fish tissue monitoring. The last sentence adds analysis of tissues from resident or bay mussels to evaluate potential human impacts. The tissue targets were established for fish and should not necessarily apply to mussels.

Monitoring of fish tissues introduces a number of uncertainties. These include unknown exposure time and the real potential that target species will vary among years. Furthermore, very few species targeted by fisherman for consumption are abundant in the Lagoon. This will make the data very difficult to evaluate. As noted in Section 2, tissue 303(d) listings were based upon resident and transplanted mussels analyzed by the State Mussel Watch Program. Establishing tissue targets for mussels and exclusive use of mussels for the monitoring program would provide much more relevant and interpretable data for measuring improvement of conditions in the Lagoon.

Figure 1. Monitoring Sites for Bacteria (B-1 through B-5), General Water Quality (WQ-1 through WQ-3) and Water Level (TG) in Colorado Lagoon.

Table 1. Summary of Pre-Construction Water Quality Surveys in Colorado Lagoon, October and December 2008.

	9-Oct-2008				16-Dec-2008			
	WQ-1	WQ -2	WQ -3	WQ -3 FD	WQ -1	WQ -2	WQ -3	WQ -3 FD
Conventionals (mg/L)								
Nitrate (as N)	0.02J	0.03J	0.02J	0.02J	0.21	0.21	0.19	0.19
Nitrite (as N)					0.02J	0.02J	0.01J	0.02J
Orthophosphate (as P)	0.02	0.02	0.02	0.02	0.11	0.12	0.11	0.12
Total Kjeldahl Nitrogen	1.5	1.7	1.5	1.5	0.98	1.3	1.1	0.84
Total Ammonia (as N)	0.07	0.05	0.06	0.07	0.25	0.22	0.24	0.21
Total Phosphorus	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.053	0.05U
Total Suspended Solids	2.5J	1.7J	3J	1.8J	5	5.2	4J	4.5J
Dissolved Metals (ug/L)								
Aluminum	6U	6U	6U	6U	6U	6U	6U	6U
Antimony	0.25	0.23	0.21	0.19	0.36	0.19	0.015U	0.18
Arsenic	1.13	1.17	1.15	1.17	1.26	1.2	1.14	1.24
Beryllium	0.01U	0.01U	0.01U	0.01U	0.01	0.01	0.012	0.011
Cadmium	0.055	0.045	0.041	0.038	0.043	0.057	0.050	0.049
Chromium	0.099	0.094	0.107	0.092	0.399	0.427	0.360	0.367
Cobalt	0.055	0.07	0.061	0.059	0.106	0.139	0.097	0.112
Copper	0.65	1.0	0.62	0.57	3.72	3.19	2.86	2.57
Iron	1.5	3.4	0.8J	0.8J	8.5	9.8	1U	8.1
Lead	0.056	0.082	0.108	0.087	0.188	0.228	0.11	0.149
Manganese	4.92	8.89	6.71	7.47	11.84	14.52	12.18	12.42
Molybdenum	9.306	9.457	9.611	9.496	6.009	6.06	0.01U	6.483
Nickel	0.277	0.354	0.301	0.282	0.904	1.132	1.032	0.854
Selenium	0.01J	0.02	0.02	0.01J	0.02	0.02	0.04	0.02
Silver	0.04U	0.04U	0.04U	0.04U	0.04U	0.04U	0.04U	0.04U
Thallium	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U
Tin	0.011	0.039	0.01U	0.01U	0.121	0.009J	0.01U	0.008J
Titanium	0.074	0.098	0.133	0.093	0.134	0.122	0.075	0.067J
Vanadium	2.00	2.04	2.04	1.98	2.14	2.2	2.12	2.15
Zinc	0.10	1.13	8.02	6.38	23.6	28.2	16.9	19.0
Total Metals (ug/L)								
Aluminum	9.2	4J	24	6U	131.6	151	128.2	137.9
Antimony	0.44	0.19	0.22	46	0.53	0.39	0.33	0.32
Arsenic	1.34	1.35	1.29	23	1.33	1.23	1.33	1.34
Beryllium	0.01U	0.01U	0.01U	0.213	0.014	0.017	0.015	0.016
Cadmium	0.044	0.031	0.025	1.25	0.058	0.046	0.040	0.041
Chromium	0.145	0.149	0.177	0.05U	0.74	0.86	0.70	0.76
Cobalt	0.087	0.1	0.095	0.688	0.19	0.24	0.18	0.20
Copper	0.65	0.69	0.75	0.02U	4.2	5.5	4.0	4.3
Iron	44	39	55	1U	187	208	176	175
Lead	0.46	0.53	0.68	0.25	1.4	2.0	1.3	1.3
Manganese	5.83	10	8.5	54	14.2	18.1	15.3	16.3
Molybdenum	9.1	9.3	9.6	9.1	5.3	5.4	6.0	6.0
Nickel	0.33	0.38	0.37	0.12	1.0	1.3	1.0	1.1
Selenium	0.01J	0.01J	0.01J	0.015U	0.02	0.02	0.02	0.02
Silver	0.04U	0.04U	0.04U	0.35	0.04U	0.04U	0.04U	0.04U
Thallium	0.01U	0.01U	0.01U	9.44	0.01U	0.01U	0.01U	0.01U
Tin	0.014	0.01U	0.01U	2.31	0.052	0.041	0.029	0.032
Titanium	1.3	0.95	2.3	0.17	9.2	10.1	9.0	9.3
Vanadium	2.2	2.3	2.3	0.04U	2.7	2.8	2.7	2.7
Zinc	7.3	3.0	19	0.01U	23	32	19	24

Table 1. Summary of Pre-Construction Water Quality Surveys in Colorado Lagoon, October and December 2008. (continued)

	9-Oct-2008				16-Dec-2008			
	WQ-1	WQ -2	WQ -3	WQ -3 FD	WQ -1	WQ -2	WQ -3	WQ -3 FD
Chlorinated Pesticides (ug/L)								
2,4'-DDD	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
2,4'-DDE	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
2,4'-DDT	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
4,4'-DDD	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
4,4'-DDE	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
4,4'-DDT	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Aldrin	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
alpha-BHC	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
alpha-Chlordane	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
beta-BHC	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
cis-Nonachlor	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
DCPA (Dacthal)	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U
delta-BHC	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Dicofol	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U
Dieldrin	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Endosulfan I	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Endosulfan II	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Endosulfan sulfate	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Endrin	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Endrin aldehyde	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Endrin ketone	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
gamma-BHC (Lindane)	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
gamma-Chlordane	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Heptachlor	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Heptachlor epoxide	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Methoxychlor	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Mirex	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Oxychlordane	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Perthane	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U
Toxaphene	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U
trans-Nonachlor	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB Congeners (ug/L)								
PCB003	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB008	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB018	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB028	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB031	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB033	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB037	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB044	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB049	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB052	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB056+060	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB066	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB070	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB074	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB077	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB081	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB087	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB095	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U

Table 1. Summary of Pre-Construction Water Quality Surveys in Colorado Lagoon, October and December 2008. (continued)

	9-Oct-2008				16-Dec-2008			
	WQ-1	WQ -2	WQ -3	WQ -3 FD	WQ -1	WQ -2	WQ -3	WQ -3 FD
PCB097	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB099	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB101	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB105	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB110	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB114	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB118	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB119	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB123	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB126	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB128	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB138	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB141	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB149	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB151	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB153	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB156	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB157	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB158	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB167	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB168+132	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB169	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB170	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB174	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB177	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB180	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB183	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB187	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB189	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB194	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB195	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB200	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB201	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB203	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB206	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
PCB209	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U

U = Analyte not detected at the associated reporting limit
J = Analyte detected at a concentration between the method detection limit and reporting limit. Associated value considered and estimate.
FD = Field Duplicate

SECTION 9

p. 80 and 81. Table 9.1 and 9.2 appear to be identical except slightly reordered?? Table 9.1 was supposed to show dry weather flow and water quality. Table 9.2 was supposed to show conditions under restoration scenarios. The set of four tables on these two pages are basically uninterruptable at this time. In addition, as previously noted, the six basins modeled appear to conflict with the five subbasins described in Section 1 and false accuracy implied by use of up to eight significant figures needs addressed.

p. 84. This section refers to Tables 9.5 and 9.6. Table 9.5 is indicated as representing "increased concentrations due to annual loading". Table 9.6 is indicated as representing background concentrations estimated at 10% of the existing concentrations as determined by the two 2008 sediment surveys. The text indicates that the final concentrations are obtained by adding the concentration data in Table 9.5 to the concentration data in Table 9.6. The text does not clearly explain how the model can calculate increases in concentration without considering background concentrations and why concentrations are considered additive. It appears that the model is calculating the quantity and quality (mass of solids combined with pollutant concentrations) that would be deposited to the Lagoon. Addition of any sediment with concentrations below the assumed background levels would be expected to decrease final sediment concentrations. If background concentrations are exceeded in the newly deposited sediments then one would expect an increase. Obviously, this is based upon a simple case with no resuspension and transport but is intended only to illustrate the point.

p. 85. Last paragraph, last sentence. This sentence states that "It is recommended that the dredging of the sediments in the Northern Arm should be considered if high sediment concentrations still remained after proposed actions are implemented." There is very little evidence to suggest that this action would result in a significant environmental benefit. According to 303(d) listing guidelines, these sediments would not have been listed in the first place since the ERM is not exceeded. It is not uncommon for the ERL to be exceeded by one compound in otherwise healthy habitat. Bight '03 surveys (Schiff, Maruya and Christensen, 2006) indicated that over half the sites sampled had exceedences of 1 to 4 ERLs and many of these sites were located far from sources of contaminants. Toxicity tests showed many of these sites to be categorized as nontoxic and had benthic assemblages considered to meet reference conditions. Dredging of this area would destroy the existing benthic community and would consume disposal capacity that could be more effectively utilized by sediment with more substantial contamination.

p. 95. PAH value for CL-2 under Scenario 1 should be 153 not 1,153 ug/Kg-dry. Remove added "0" for PCBs at CL-2 under Scenario 2

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