Comments on
Notice of Tentative Waste Discharge Requirements for
United States Army Corps of Engineers,
Department of Water Resources and the Port of Stockton
Stockton Deep Water Ship Channel Maintenance Dredging Activities
From Channel Mile 4.4 to Mile 41.0
Contra Costa, Sacramento, & San Joaquin Counties

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On January 8, 2004, the Central Valley Regional Water Quality Control Board made available a Notice of Tentative Revised Waste Discharge Requirements for United States Army Corps of Engineers, Department of Water Resources and Stockton Deep Water Ship Channel Maintenance Dredging Activities from Channel Mile 4.4 to Mile 41.0. According to this notice,

> *"The General Order WDRs is being amended to include the expansion of two existing dredge material disposal (DMD) sites situated on Sherman Island and the related mitigation measures for the protection of giant garter snake (*Thamnophis gigas*) and its habitat associated with the project."*

As discussed herein, many of the deficiencies that occur in these Tentative Revised Waste Discharge Requirements for dredging of the Deep Water Ship Channel have been discussed in the August 27, 2003, comments that I submitted on the summer 2003 Notice of Tentative Waste Discharge Requirements for dredging of the San Joaquin River (SJR) Deep Water Ship Channel (DWSC).

While I find that some of the issues I raised in my August 27, 2003, comments have been addressed by the staff in these revised WDRs, there are still significant problems that must be addressed to properly evaluate the potential impacts of SJR DWSC dredging and dredged sediment management, which need to be corrected in connection with the expansion of the two existing dredge material disposal sites on Sherman Island.

As discussed in my August 27 comments,

> *"Overall, this draft tentative waste discharge requirements for maintenance dredging of the San Joaquin River Deep Water Ship Channel covers many of the key issues that need to be considered in evaluating the environmental and public health impacts of*

maintenance dredging of the San Joaquin River Deep Water Ship Channel and managing of the dredged sediments. There are several issues, however, that need to be addressed."

I was informed last fall by the CVRWQCB staff that the issues that I raised in my August comments could be addressed later in a more comprehensive review of dredging, since the Corps needed to dredge several areas of the Channel that were shoaling and thereby inhibiting navigation. I did not object to proceeding with the dredging without addressing the significant deficiencies in the Tentative Waste Discharge Requirements that were made available in the summer 2003 for review.

Since the disposal of sediments associated with dredging of the channel is now being raised again, it is appropriate that these issues be addressed at this time, to eliminated the significant deficiencies that exist in the approach that the CVRWQCB has been following with respect to properly evaluating the potential impacts of dredging and dredged sediment management associated with maintenance dredging of the Deep Water Ship Channel.

Page 2, item 8 states that clamshell dredging tends to cause greater turbidity in the water column than hydraulic dredging. That statement is not necessarily correct. In the studies that I conducted for the Corps in the 1970s, we evaluated both clamshell and hydraulic dredging and found that clamshell dredging did not cause greater turbidity at the dredging site.

Included in these comments are some comments on terminology that needs to be addressed. An example is on page 4, item 19, where mention is made of "sulfide complexes." The word "complexes" has a special meaning in chemistry, related to an ion dipole bond. The term "sulfide precipitates" would be more appropriate.

On page 9, Table 2 lists the characteristics of the previous sediment testing. One of the issues that needs to be specified is what is the type of water used in the elutriate test. This can make a difference in the test results. The modified elutriate test showed 0.012 µg/L of mercury released. While this value is less than the current CTR criterion, the current CTR criterion is known to be a non-protective criterion, under certain conditions, in preventing bioaccumulation of mercury in edible organism tissue. The CVRWQCB staff who are responsible for developing dredging permits should review the write-up that I prepared this past fall on regulating mercury:

Lee, G. F., "Regulating Mercury in the Water Column and Sediments," Report to Dredge Tailings Workgroup, by G. Fred Lee & Associates, El Macero, CA (2003).
http://www.gfredlee.com/TotalMercuryandDissolvedMercuryStandards-rev.pdf

The CVRWQCB staff need to expand their requirements for mercury monitoring associated with sediment characterization, dredging operations and discharges from dredged material disposal areas to include analysis of methylmercury. Mercury bioaccumulation is one of the most significant problems in the Delta. The concentrations of mercury in the sediments and in the elutriate test are sufficient to lead to excessive methylmercury concentrations in the water that can bioaccumulate to excessive levels in edible organisms. In my August 27, 2003, comments I pointed out that the CVRWQCB has not been properly evaluating the potential for dredging operations to influence excessive bioaccumulation of hazardous chemicals in aquatic life in the

Delta. This issue should be addressed in future dredging operations, where a proper evaluation is made to be certain that dredging of the sediments does not contribute to the excessive bioaccumulation of mercury, organochlorine pesticides, PCBs or dioxins. Additional comments on this issue are presented below.

Page 9, Table 2 presents Analytical results from year 2000 sediment testing. The same table was presented in the summer 2003 Tentative Waste Discharge Requirements, where, in my August 27, 2003, comments I questioned this table of data, with respect to how many different sediment samples were tested, where they were taken from and what the range and standard deviation were of the results. This information would provide an indication of how representative the averages are of the actual concentrations. I also commented that the analytical method detection limits used for the organochlorine pesticides should be specified for each of the pesticides measured. This information has not been provided in the current revised Tentative Waste Discharge Requirements. This is a significant deficiency in the information provided for review, which should be corrected so that the information can be properly examined. An updated set of data should be required from the Corps, which provides the detailed information on the characteristics of the sediments that are to be dredged.

On page 10, item 41 states, "*Sediments contain organic material and ammonia.*" The sediments contain inorganic and organic materials and ammonia. The word "inorganic" should be added. Also on page 10, item 41, and throughout the document, the term "bioassay" is used. That terminology is out of date and should not be used in the future. "Toxicity testing" is the proper terminology for the kind of testing that is done.

On page 17, Table A.3 Discharge Applicability Table Part 1 lists the maximum concentration of soluble constituents. In general, the maximum concentrations of soluble constituents are the CTR criteria. As discussed above, however, the 50 ng/L CTR criterion for mercury is acknowledged as not being protective. According to Phil Woods, US EPA Region 9, the value that should be used is about 5 ng/L. This would be protective against excessive methylmercury formation. Additional information on regulating methylmercury is available in US EPA (2001).

As I indicated in my August 27 comments,

> "*Because of the importance of methylmercury as a cause of excessive bioaccumulation in fish in the Delta, discharges from dredged sediment disposal areas should be monitored for methylmercury, to be certain that these areas are not generating methylmercury that is released to the Delta waterways. Dr. Chris Foe of the Central Valley Regional Water Quality Control Board can provide information on this issue.*"

At this location, in the footnotes, and at several other locations in the text, mention is made of "*USEPA Preliminary Remediation Goals (PRG) for ecological or residential use.*" At no place is there a reference provided to the PRGs that are used. Especially of concern are the so-called "ecological" PRGs. The staff need to be more explicit as to what PRGs are used and where these are presented, so that someone can look them up and determine whether the PRGs that are being used are appropriate for protection. Some US EPA PRG values are not protective. For example, for chemicals that tend to bioaccumulate (like mercury, organochlorine pesticides, PCBs and

dioxins), the PRG values do not consider food web bioaccumulation as a human health hazard. In a dredging situation where there can be bioaccumulation associated with the dredging and dredged sediment disposal discharges, this is an important issue that needs to be addressed.

With respect to the ecological PRGs, I examined the US EPA Region 9, as well as the US EPA national websites to try to find the ecological PRGs, and I could not find them. The URLs for these PRGs should be specified in a requirement of this type so that they can be evaluated.

On page 20, footnote 7 to Table A.3 presents an equation for the CCC for ammonia. It is not clear that this equation considers the monthly average that the US EPA allows.

On page 22, Table A.3 (continued) shows maximum concentrations for the organochlorine legacy pesticides. As I commented on this same table and data in my August 27 comments,

> *"The maximum concentration of soluble constituents listed in that table is not a valid approach for regulating these chemicals. These pesticides, as well as PCBs and dioxins, tend to be strongly sorbed on particulates, and could be present in the discharge from "confined" disposal areas associated with fine particulates in the discharge. This could lead to the presence of finely divided particulate pesticides, as well as pesticides associated with colloidal particles, in the receiving waters and/or an accumulation of these pesticides in the receiving water sediments that can lead to excessive bioaccumulation in fish of the area. If fish taken from the waters in the vicinity of where the dredged sediment discharge occurs have concentrations in excess of OEHHA critical concentrations, then monitoring of the effluent for concentrations above US EPA criteria should be done, based on total concentrations, not just dissolved. This same issue applies to all chemicals that tend to bioaccumulate in fish tissue, causing threats to human health."*

On page 27, item 4 lists COD as a parameter. COD should be deleted from this evaluation, and TOC should be used in its place. COD does not measure a definable parameter. TOC does. TOC is also of importance with respect to potential impacts on drinking water.

On page 28, item 9, the term "bioassay" should be replaced with "toxicity test."

On page 28, item 10, as discussed in my August 27 comments, the regulation of organochlorine legacy pesticides, PCBs and dioxins must be based on bioaccumulation issues – not concentrations. Measurement of concentrations is not a reliable approach. The following paragraphs are excerpted from my August 27 comments.

> *During 2002 Dr. Anne Jones-Lee and I (Lee and Jones-Lee, 2002) conducted a detailed review of the information available on the excessive bioaccumulation of the organochlorine pesticides, PCBs, dioxins, etc., in Central Valley waterbody fish. The chemicals of concern tend to be associated with aquatic sediments, where they bioaccumulate through the food web to excessive concentrations in edible fish tissue. This problem is one of the most important chemically caused human health-related water quality problems in the Central Valley. As we discussed, due to funding limitations it is*

not being adequately addressed by the Central Valley Regional Water Quality Control Board. The Central Valley Regional Water Quality Control Board should require that those doing the maintenance dredging (or other dredging) in the Deep Water Ship Channel and associated marinas and ports conduct bioaccumulation testing of the sediments that are to be dredged, to determine if they have concentrations of bioaccumulatable chemicals, such as the organochlorine legacy pesticides (DDT, et al.), PCBs, dioxins and furans. The procedure that should be used is,

> *US EPA, "Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates," Second Edition, U.S. Environmental Protection Agency, EPA/600/R-99/064, Washington, D.C. (2000).*

Additional information on this issue is provided by,

> *US EPA, "Bioaccumulation Testing and Interpretation for the Purpose of Sediment Quality Assessment: Status and Needs," U.S. Environmental Protection Agency, EPA-823-R-00-001, Washington, D.C. (2000), http://www.epa.gov/ost/cs/biotesting/*

as well as in Lee and Jones-Lee (2002).

The use of benthic organism sediment uptake studies to assess bioavailable forms of organochlorine pesticides, PCBs, etc., has been demonstrated by Lee, et al. (2002) for sediments in Smith Canal, a city of Stockton waterway that is connected to the Deep Water Ship Channel.

Page 30, item 9 focuses on fecal coliforms. The CVRWQCB has adopted *E. coli* as the organism that should be used for evaluating sanitary quality of waters. While not approved yet at the State Board level, *E. coli* should be specified as a measured parameter, since it is the US EPA recommended organism. It is suggested that both fecal coliforms and *E. coli* be monitored.

Comments on the Monitoring and Reporting Program

In Table 2 on page 2, COD should be deleted from the list as a monitored parameter and replaced by TOC. "Toxicity bioassay" should be "toxicity test." Toxicity testing should be done for both the water column and sediments. The sediment toxicity should be evaluated using *Hyalella azteca*, in accordance with US EPA (2000).

Dioxins should be added to this list. Also, common pyrethroid-based pesticides should be added to the list of parameters to be monitored. Shakoora Azimi can provide information on the pyrethroid pesticides that are being found in aquatic sediments in the Central Valley. These pesticides are being widely used, tend to associate with sediments and appear to be causing toxicity in sediments. They should be measured.

In Table 3 on page 3, methylmercury should be added to this list.

On page 4, under "Dredge Site Receiving Water Monitoring," since these are tidal systems, specific information regarding monitoring at a particular tide stage should be given. Of particular concern is to focus on sampling at a tide stage for waters that had been previously exposed to the dredging operation.

On page 4, sampling frequency is listed as "daily." That is not frequent enough, especially because of the variability in dredging operations. It should be at least every four hours during dredging.

Sampling also should be done in the water column near the surface, at mid-depth and 2 meters off of the bottom. This is especially important for DO depletion, since the studies related to the SJR DO TMDL have shown that the greatest depletion of DO occurs about a meter or two above the sediments. It is important that samples be taken in early morning, mid-day and late afternoon, to see the range of conditions that exist as influenced by photosynthetic activity. The diel DO changes can be as much as 5 mg/L over a day, from early morning to late afternoon. These same issues apply to other sampling that is required.

On page 7, mid-page, the chronic and acute "bioassays" should be "toxicity tests." This applies near the bottom of the page as well.

Near the bottom of page 7, there is an inconsistency in the presentation of "U.S. EPA." In some cases it is presented with periods, and in others, without. In some cases, there are no spaces between the letters. The presentation should be consistent throughout the document.

On page 5, the first line states, "*The Discharger shall immediately notify ….*" There needs to be some specification of what time period is meant by "immediately."

Comments on the "Information Sheet"

With respect to the Information Sheet, the last line of page 1 states, "*… the Discharger will be allowed to use the Applicability values from the 96-220 WDR for the 2001 dredging season only.*" It is not clear to me whether that is the correct year, or how this relates to the 2002 data that are presented earlier. This needs to be clarified.

On page 4, first line, "fecal coliform." *E coli* should be added.

On page 5, references should be provided to the location of the US EPA PRGs that are mentioned throughout this section.

Discharge Applicability Table Part 1 on page 8 has the same comment presented earlier regarding maximum concentration of soluble constituents. This approach is inappropriate for mercury. The table is confusing, since mercury is not listed as a "filtered" value, yet the maximum soluble concentration is presented.

The comment on the ammonia equation made above applies also to page 9 of the information sheet. I am not sure how the 30-day average comes into this evaluation that is allowed in the current US EPA guidelines for ammonia criteria.

Page 10 has the same problems commented on earlier with maximum concentrations of soluble constituents for the organochlorine legacy pesticides. The approach for regulating the legacy pesticides needs to be changed along the lines that are discussed herein so that it more appropriately addresses concerns about bioaccumulation.

On page 12, this diagram is constructed in such a way that it appears that the waste extraction test is used to evaluate groundwater pollution and surface water runoff. The waste extraction test is not a reliable test for this type of material or situation. A more appropriate leaching procedure should be used that simulates the conditions that will exist.

On the last page (the Technical Report Flow Diagram), methylmercury should be added as a measured parameter and one that is used to evaluate potential problems.

One of the issues not adequately addressed in this tentative WDR is the bioaccumulation of hazardous chemicals by terrestrial life that can pick up the hazardous chemicals from the on-land disposal site (DMD site) or through the food web associated with this site. Increasing attention is being given to concentrations of constituents in soils that are hazardous to terrestrial life. I am involved in a Superfund site investigation at the Lava Cap Mine site near Nevada City, where the US EPA project manager and the US EPA consultant have provided information on the concentrations that are suggested to be used for protection of terrestrial life in contact with contaminated soils. Information in their reports may be of help in defining concentrations of constituents in DMD soils that are a threat to terrestrial life. David Seter (seter.david@epa.gov) of the US EPA Region 9 is the site manager.

References

Lee, G. F. and Jones-Lee, A., "Organochlorine Pesticide, PCB and Dioxin/Furan Excessive Bioaccumulation Management Guidance," California Water Institute Report TP 02-06 to the California Water Resources Control Board/Central Valley Regional Water Quality Control Board, 170 pp, California State University Fresno, Fresno, CA, December (2002). http://www.gfredlee.com/OClTMDLRpt12-11-02.pdf

Lee, G. F.; Jones-Lee, A.; and Ogle, R. S., "Preliminary Assessment of the Bioaccumulation of PCBs and Organochlorine Pesticides in *Lumbriculus variegatus* from City of Stockton Smith Canal Sediments, and Toxicity of City of Stockton Smith Canal Sediments to *Hyalella azteca*." Report to the DeltaKeeper and the Central Valley Regional Water Quality Control Board, G. Fred Lee & Associates, El Macero, CA, July (2002).

US EPA, "Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates," Second Edition, EPA/600/R-99/064, U.S. Environmental Protection Agency, Washington, D.C. (2000).

US EPA, "Water Quality Criteria for the Protection of Human Health: Methylmercury," EPA-833-F-01-001, U.S. Environmental Protection Agency, Office of Water, Washington, D.C. (2001).

US EPA, “Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms,” Fifth Edition, US Environmental Protection Agency, Office of Water, Washington, D.C. (2002a). http://www.epa.gov/OST/WET/disk2/

US EPA, “Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms,” EPA-821-R-02-013, US Environmental Protection Agency, Office of Water, Washington, D.C. (2002b). http://www.epa.gov/OST/WET/disk3/