

**Recommended Approach For Development of CALFED Funded  
Remediation Program To Control Heavy Metal Water Quality Use Impairments  
Associated With Exceedance of Quality Standards**

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CALFED is developing remediation programs to control water quality use impairments within the Delta and its watershed. Some heavy metals are present in CALFED jurisdiction waters above water quality standards based on worse case US EPA water quality criteria. It is known however, that for many waters the exceedance of a US EPA water quality criteria tends to overestimate the actual use impairments that occur in the waterbody. This is due to the highly conservative nature of the way in which US EPA criteria are developed and implemented into state standards and discharge permits. Rather than assuming that the exceedance of a US EPA water quality criterion for a heavy metal represents a real significant water quality use impairment which requires remediation to achieve the criterion value with no more than one exceedance of any magnitude every three years, the approach that CALFED should follow in developing a technically valid, cost-effective heavy metal control program for potentially toxic heavy metals that are found to cause exceedance of water quality standards is to:

- 1) Critically define where heavy metals are the cause of water quality problems/use impairments in the waterbody of concern. A use impairment should be defined as heavy metals causing toxicity to aquatic life that significantly adversely alters the numbers, types and/or characteristics of desirable forms of aquatic life. Do not assume that the exceedance of a water quality criterion/standard represents a real use impairment that requires control of heavy metal inputs to achieve water quality standards. Conduct the necessary studies to determine whether the exceedance of a water quality standard for a potentially toxic heavy metal results in heavy metal caused toxicity in the ambient waters of concern.
- 2) Evaluate the water quality significance of the use impairments to the waterbody's resources and CALFED's interests. The stakeholders/public should be involved in determining what constitutes a significant use impairment of the beneficial uses of the waterbody. Evaluate how the beneficial uses of the waterbody would be improved if the heavy metal caused use impairment were controlled.
- 3) For those situations where there is a clearly defined use impairment that affects the waterbody's beneficial uses, formulate a heavy metal control program that focuses on the specific sources of the heavy metals that are toxic to aquatic life. Do not assume that this is in any way related to the total concentrations of the heavy metals or even their dissolved forms. A combination of toxicity tests and appropriately conducted TIE's should be used in a forensic study framework to define the sources toxic, available heavy metals that need to be controlled.

4) In those situations where there is insufficient information to define where the heavy metals at a particular location are causing a real significant water quality use impairment, develop a credible investigative program to determine whether the suspected water quality use impairment is a real use impairment. The areas where this will likely be most important are the areas where there is an exceedance of a US EPA water quality criterion (state standard) for a heavy metal or group of heavy metals. While the exceedance of a US EPA water quality criterion tends to significantly overestimate the toxic available forms, there are situations such as for chromium 6 where the US EPA water quality criterion is not protective of all desirable forms of aquatic life such as zooplankton which can be key components of larval fish food. There may also be situations where combinations of heavy metals or heavy metals with other constituents leads to toxic conditions that would not be predicted based on exceedance of water quality standards. It is for these reasons that if the toxicity testing of a waterbody shows toxic conditions, then TIE studies should be conducted to determine the cause of the toxicity and in particular whether a heavy metal(s) is responsible for this toxicity.

Since CALFED municipalities and many other dischargers do not have sufficient funds to control all exceedances of water quality standards within the waterbody's watershed, it is essential that the funds available be used to control real significant water quality use impairments within the waterbody of concern and the watershed that adversely impacts the beneficial uses of the waterbody.

If this program shows that the exceedance of a water quality standard for a heavy metal does not result in a significant beneficial use impairment, CALFED should work with the stakeholders, regulatory agencies and others in developing a more appropriate approach for regulating heavy metals in the waterbody of concern than exists today.

A key component of a remediation program based on this approach is the availability of funding to conduct an ongoing program designed to detect more subtle water quality impacts than those investigated in the initial use impairment evaluation. Further this program would provide funds to detect new water quality problems due to heavy metals through their expanded use or the introduction of significant amounts of toxic forms of heavy metals associated with new activities in the waterbody's watershed.

This is the technically valid, cost effective approach for developing a remediation program for potentially toxic heavy metals. While the focus of this discussion is heavy metals, this same approach applies to all constituents that are regulated by US EPA water quality criteria/state standards.

Reference as:"Lee, G.F., 'Recommended Approach For Development of CALFED Funded Remediation Program To Control Heavy Metal Water Quality Use Impairments Associated With Exceedance of Quality Standards,' Report G. Fred Lee & Associates, El Macero, CA, April (1998)."