WATER QUALITY PROGRAM BACKGROUND

INTRODUCTION

The mission of the CALFED Bay-Delta Program (Program) is to develop a long-term comprehensive plan that will restore ecosystem health and improve water management for beneficial uses of the Bay-Delta system. The Program has identified six solution principles as fundamental guides for developing and evaluating alternative solutions:

Reduce Conflicts in the System
Solutions will reduce major conflicts among beneficial uses of water.

Be Equitable
Solutions will focus on solving problems in all problem areas. Improvements for some problems will not be made without corresponding improvements for other problems.

Be Affordable
Solutions will be implementable and maintainable within the foreseeable resources of the Program and stakeholders.

Be Durable
Solutions will have political and economic staying power and will sustain the resources they were designed to protect and enhance.

Be Implementable
Solutions will have broad public acceptance and legal feasibility, and will be timely and relatively simple to implement compared with other alternatives.

Have No Significant Redirected Impacts
Solutions will not solve problems in the Bay-Delta system by redirecting significant negative impacts, when viewed in their entirety, within the Bay-Delta or to other regions of California.

The Program addresses problems in four resource areas: ecosystem quality, water quality, levee system integrity, and water use efficiency. Each resource area forms a component of the Bay-Delta solution and is being developed and evaluated at a programmatic level. Therefore, problems and corrective actions are described in a general manner sufficient to make broad decisions on program direction. The complex and comprehensive nature of a Bay-Delta solution requires that it be composed of many different programs, projects, and actions, that will be implemented over time.

The Program is being completed in three phases (Figure 1). Phase I of the Program began in June 1995 and was completed in August 1996. During this phase, three conceptual alternatives were developed to solve Bay-Delta problems. These conceptual alternatives all include program components to comprehensively address ecosystem restoration, water quality improvements, enhanced Delta levee system integrity, and increased water use efficiency.

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1995 – 1996	1996 – 1998	1998 – 2030?
Phase I	**Phase II**	**Phase III**
3 Conceptual Alternatives	Alternatives Refinement Programmatic EIS/EIR Selection of Preferred Alternative	Project-specific Environmental Documentation Implementation of Preferred Alternative Adaptive Management Assurances

Figure 1. The three phases of the CALFED Bay-Delta Program.

Phase II of the Program is currently underway and will be completed in Fall 1998. It includes a broad-based environmental review, the development of a Programmatic EIS/EIR, refinement of the three alternative solution options, and the selection of a preferred alternative.

Phase III of the Program will begin in late 1998 or early 1999 and will continue for 20 to 30 years. During this phase, a more focused analysis, environmental documentation, and implementation of specific programs and actions will occur.

The CALFED Bay-Delta Program's goal for water quality is to provide good water quality for environmental, agricultural, drinking water, industrial, and recreational beneficial uses. To achieve this goal, CALFED has developed and is implementing a Water Quality Program. The purpose of this report is to detail the results of Water Quality Program activities conducted during Phase II of the Program and to highlight those activities planned in Phase III. Water Quality Program plans for Phase III will be described in a later document called the *Water Quality Implementation Plan*. See Appendix B for a preliminary draft outline of the *Water Quality Implementation Plan*. However, the strategy upon which the Implementation Plan will be based is included within the Programmatic EIS/EIR.

During Phase I of the Water Quality Program, parameters of concern to beneficial uses were identified and a preliminary set of actions to address those parameters were developed. During Phase II, which is currently underway, the list of parameters of concern and programmatic water quality actions are being refined, performance measures and indicators of success for each action are being defined, and monitoring and research needs are being defined. Before Phase III, scheduled to begin in late 1998 or early 1999, the *Water Quality Implementation Plan* will be developed to prioritize and implement water quality actions. The three phases of the Water Quality Program and associated documents are shown in Figure 2.

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1995 – 1996	1996 – 1998	1998 – ?
Phase I	**Phase II**	**Phase III**
Parameters of Concern Preliminary Set of Actions	Refinement of Parameters and Actions Performance Measures and Indicators of Success Strategies for Phased Implementation	Prioritization and Implementation of Actions Adaptive Management
DOCUMENTS		
Agriculture Subteam Report Urban Subteam Report CALFED Water Quality Supplemental Information Document	Programmatic EIS/EIR Water Quality Technical Report (Affected Environment and Impact Analysis) Water Quality Program Plan	Water Quality Implementation Plan

STAKEHOLDER INVOLVEMENT THROUGHOUT

Figure 2. The three phases of the Water Quality Program and associated program documents.

CALFED staff recognize that the necessity to formulate the Water Quality Program at a level of detail appropriate to a programmatic environmental document leaves many questions unanswered. Water quality problems are not spelled out in detail and the actions to address the problems are described only generally. At the programmatic level of detail, the identified actions constitute a commitment to improving water quality. In many cases, this commitment cannot be fulfilled until additional study, evaluation, feasibility determination, and pilot scale implementations are accomplished. These activities must be relegated to Phase III of the process beginning in 1998.

At this time, however, linkage is needed between the programmatic actions of Phase II and project specific activities in Phase III. A *Water Quality Implementation Plan* provides the needed bridge, and an outline of that *Plan* is included as Appendix B to this document. The *Water Quality Implementation Plan* firms up the programmatic commitment to water quality actions by describing the steps to be taken and how stakeholders, agencies, and the public are to participate.

GEOGRAPHIC SCOPE

Consistent with the CALFED Programmatic EIS/EIR, the geographic scope of the Water Quality Program encompasses five regions:

- Sacramento River Region
- San Joaquin River Region
- Delta Region
- Bay Region
- State Water Project and Central Valley Project Services Areas Outside of the Central Valley

Descriptions of these regions are contained in the Glossary at the front of this document. A map showing the location of these regions within the state immediately follows the Glossary.

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STAKEHOLDER INVOLVEMENT PROCESS

In accordance with CALFED efforts to work in partnership with diverse interests, CALFED staff have sought input on the Water Quality Program from a variety of technical experts representing federal, state, and local agencies, environmental groups, industry, agriculture, recreation, urban, water supply and watershed interests. During Phase I, the Water Quality Program was composed of three subteams: the urban subteam, the agricultural subteam, and the ecosystem subteam (Figure 3). The teams met separately for several months to identify parameters of concern to their respective beneficial uses and to formulate actions to address their parameters.

The teams were composed of technical experts from various public agencies and private entities. The ecosystem subteam was composed of federal and state agency representatives from the California Department of Fish and Game, US Fish and Wildlife Service, US Environmental Protection Agency, State Water Resources Control Board, Central Valley Regional Water Quality Control Board, and San Francisco Regional Water Quality Control Board. The urban subteam was composed of both agency staff and urban water agency representatives. The agricultural subteam was composed of agency staff, farmers, and agricultural water suppliers. A variety of technical experts representing federal, state, and local agencies, environmental groups, industry, agriculture, recreation, urban water supply and watershed interests have provided va... ...t into the developmer... ...ogram.

WATE... ...TY SUBTEAMS

Urban ...ulture Ecosystem

Figure 3. CA... ...r Quality Subteams involved in P...

Based upo... ...data and technical knowledge ...am identified "parameter ...n" to its respective beneficial ...ased on a set of criteria. T... ...s also identified actions to ... ...r parameters of concern.

At the end ... ...the three teams met to discuss the... ...The findings of each subteam ca... ...in the CALFED Water Qua... ...mental Information document.

During Ph... ...ional stakeholders have ...oin the Water Quality Program t... ...ticipation by a broad array of in... ...gether with individuals from the s... ...ese stakeholders have formed a t... ...visory body to the CALFED Staff Water Qu... ...f, known as the Water Quality Te... ...up (Figure 4).

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The WQTG is currently composed of 218 individuals, representing 104 private entities and public agencies (Appendix A). The WQTG meets regularly to discuss the Water Quality Program, review CALFED water quality documents, and make recommendations to CALFED on water quality related issues. Recommendations from the WQTG are incorporated into the Water Quality Program, as appropriate.

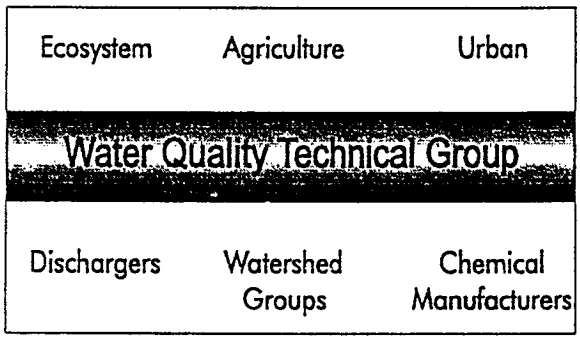

Figure 4. Stakeholder Groups Participating in the WQTG.

In addition to the WQTG, a second advisory body, known as the Parameter Assessment Team, makes recommendations to the Water Quality Program. The Parameter Assessment Team (PAT) is composed of 18 individuals representing 17 private entities and public agencies (Appendix A). PAT members are Water Quality Technical Group members who have volunteered to participate on the PAT.

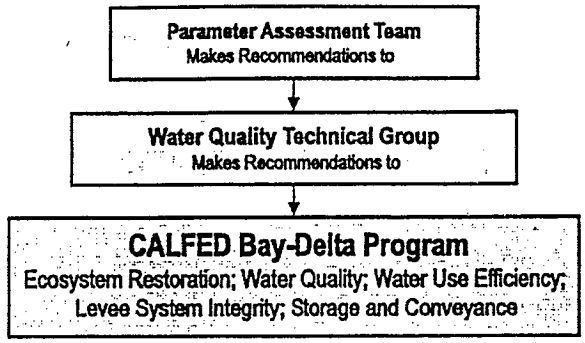

Figure 5. Relationship between the CALFED Water Quality Program and its Advisory Bodies.

The PAT has four primary functions:

- Propose or receive recommendations to add or delete parameters of concern
- Present or receive scientific evidence regarding proposed parameters of concern
- Debate whether to add or delete parameters of concern, and make recommendations to the WQTG (the WQTG, in turn, will consider PAT recommendations and make recommendations to CALFED as appropriate)
- Determine targets for any additional parameters of concern and recommend them to the WQTG (the WQTG, in turn, will consider PAT recommendations and make recommendations to CALFED, as appropriate).

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In addition to meetings of the WQTG and PAT, CALFED staff have held workshops to inform the general public about activities of the Water Quality Program. CALFED staff have met with a variety of groups including the ~~Clean~~ Environmental Water Caucus, California Water Environment Association, and the California Urban Water Agencies. The CALFED Bay-Delta Advisory Committee has been kept abreast of the Water Quality Program's progress through informational segments at their regularly scheduled meetings.

Stakeholder involvement in the CALFED Water Quality Program is planned to continue throughout the life of the CALFED Bay-Delta Program.

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WATER QUALITY PROGRAM ACTIONS

INTRODUCTION

The Water Quality Program has developed programmatic actions to address beneficial use impairments within its geographic scope. Implementing these actions will further the program's goal of providing good water quality for environmental, agricultural, drinking water, industrial, and recreational beneficial uses of water. The Water Quality Impact Analysis of the Programmatic EIS/EIR contains a comprehensive analysis of the impacts of CALFED actions on water quality and other components of the CALFED Bay-Delta Program.

Determining impairment to a beneficial use is always a difficult and complicated matter. For some beneficial uses, such as drinking water use and agricultural water use, concentrations of parameters of concern in ambient water that may impact their use are well quantified. For other beneficial uses such as ecosystem use, concentrations of parameters of concern in ambient water that may impact the diverse assemblages of species in the Delta Region are less well understood. As a result, the Program has relied on the technical expertise of a variety of stakeholders representing beneficial uses. These stakeholders have worked with CALFED staff to identify parameters of concern to beneficial uses, the locations of beneficial use impairments, the types of water quality actions needed to address these impairments, and the ways to assess the effectiveness of actions.

BACKGROUND

Stakeholders and CALFED staff have developed a list of parameters of concern to beneficial uses (Table 1). The list is composed of 27 constituents and characteristics. Three more substances (nitrogen, nitrite and bioavailable phosphorus) have been recommended by the Parameter Assessment Team for addition to the list. The list of parameters of concern may be updated as new information becomes available, consistent with the adaptive management policy of the CALFED Bay-Delta Program.

Water quality problems associated with these parameters have been identified by the State in accordance with the Clean Water Act. Existing information from the Clean Water Act 303(d) list of impaired water bodies for California was used by the program to identify the locations of beneficial use impairments associated with parameters of concern. The "303(d) list" identifies water bodies with impaired beneficial uses, the parameters of concern within each water body, and the likely sources of the parameters of concern. Table 2 (at the end of this section) lists the 152 impaired water bodies within the Water Quality Program's geographic focus identified by the State in 1996. The state is currently in the process of updating the 303(d) list and this information will be used by CALFED as it becomes available.

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TABLE 1. WATER QUALITY PARAMETERS OF CONCERN TO BENEFICIAL USES

METALS & TOXIC ELEMENTS	ORGANICS/PESTICIDES	DISINFECTION BY-PRODUCT PRECURSORS	OTHER
Cadmium	Carbofuran	Bromide	Ammonia
Copper	Chlordane**	TOC	Dissolved Oxygen
Mercury	Chlorpyrifos		Salinity (TDS, EC)
Selenium	DDT**		Temperature
Zinc	Diazinon		Turbidity
	PCBs**		Toxicity of Unknown Origin*
	Toxaphene**		Pathogens
			Nutrients (Nitrate)
			pH (Alkalinity)
			Chloride
			Boron
			Sodium adsorption ratio

*Toxicity of Unknown Origin refers to observed aquatic toxicity, the source of which is unknown.
**These compounds are no longer used in California. Toxicity from these compounds is remnant from past use.

Although the data used to develop the "303(d) list" of impaired water bodies are subject to criticism (many people note that the data need to be updated) it is the most comprehensive information on beneficial use impairment available at this time. The program recognizes the need for a comprehensive analysis of beneficial use impairments to Delta waters and will use such additional information as it becomes available, consistent with the adaptive management policy of the CALFED Bay-Delta program. The implementation strategy for the Water Quality Program envisions ongoing assessments involving experts, regulatory agencies, and the public to assure the best possible understanding is applied to CALFED investment decisions. It is anticipated that a great deal of information on the status of water quality and beneficial use impairments throughout the geographic scope will be compiled by the Comprehensive Monitoring, Assessment, and Research Plan (CMARP).

There are 25 water quality actions. These actions are grouped into nine categories: mine drainage (2), urban and industrial runoff (5), wastewater and industrial discharges (5), agricultural drainage and runoff (7), water treatment (2), water management (2), human health (1) and toxicity of unknown origin (1). These actions are located throughout the Program's geographic focus (Table 2).

Water quality actions to address beneficial use impairments may include a combination of research, pilot studies, and targeted activities. This approach allows actions to be taken on known water quality problems and sources of those problems, while allowing further research of potential problems and solutions. For example, for some parameters of concern, such as mercury, little is understood about its

maybe this is the section to talk about early implm funded thru Cat 3 $

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TABLE 3. SUMMARY OF WATER QUALITY PROGRAM ACTIONS BY REGION

TOPIC	REGION				
	DELTA	BAY	SACRAMENTO RIVER	SAN JOAQUIN RIVER	SWP & CVP SERVICE AREAS OUTSIDE THE CENTRAL VALLEY
Mine Drainage	✔	✔	✔	✔	
Urban and Industrial Runoff	✔	✔	✔	✔	
Wastewater and Industrial Discharge	✔	✔	✔	✔	
Agricultural Drainage and Runoff	✔		✔	✔	
Water Treatment	✔				✔
Water Management	✔				
Human Health	✔				
Toxicity of Unknown Origin	✔	✔	✔	✔	

the relative contributions of various

sources, the bioavailability of the various mercury species, factors contributing to its bioavailability, and the load reductions needed to reduce fish tissue concentrations to levels acceptable for human consumption.

Therefore, further study of mercury is recommended before full-scale projects are implemented. For other parameters, such as selenium, sources are better documented, and source control or treatment actions may be taken with a reasonable expectation of positive environmental results.

Actions will be adapted over time to ensure the most effective use of resources. The effectiveness of actions will be assessed based on the achievement of action-specific objectives. Two types of action-specific objectives have been established for each action: performance measures and indicators of success.

toward addressing the problem

Performance measures are used to gauge the progress of an action. Progress may be judged based on a variety of factors such as reduced concentrations of a parameter. In other words, performance measures answer the question "Is water quality improving?"

For source control actions, performance measures are quantifiable reductions in loadings of parameters of concern, whenever possible. For actions that recommend further study of a parameter, performance measures may be a focused outcome. For example, an action for mercury may be further research to better understand the sources and mechanisms of mercury accumulation in the Delta Region while the performance measure may be the development of pilot scale projects to determine the feasibility of cleaning up mercury contaminated sediment. In order for the effectiveness of actions to be assessed, performance measures are based on demonstrable evidence indicating that water quality improvement is occurring, whenever possible. For example, performance measures such as increased fish populations, decreased abnormalities, and decreased toxicity are preferable to subjective measures such as improved public awareness.

Indicators of success are the endpoints used to determine when beneficial uses are no longer impaired (i.e., they indicate when actions have been successful). These endpoints may be based on achievement of a variety of measurable factors including: numerical and narrative objectives for water, sediment and tissue and lack of toxicity as indicated by toxicity testing. In other words, indicators of success answer the question "Have water quality goals been achieved?"

The beneficial use impairment and the parameter of concern being evaluated determine which type of endpoints are most appropriate. For example, numerical water quality objectives for drinking water sources have been documented by state and federal agencies. These numbers can be used to determine the success of actions to address drinking water beneficial use impairments. On the other hand, numerical water quality objectives for ecosystem uses are not as well documented as they relate to ecosystem impairments. Therefore, achievement of numerical water quality objectives alone may not ~~be enough to~~ ensure good water quality for ecosystem beneficial uses. Other indicators such as tissue concentrations and lack of toxicity to native and laboratory species may be used, where appropriate, to determine whether ecosystem beneficial uses are being adequately protected. Table 4, at the end of this section, shows a variety of indicators of success that could potentially be used as tools to assess the effectiveness of water quality actions.

The Water Quality Program has identified narrative or numerical water quality targets for each parameter of concern (Table 5 at the end of this section). These targets represent desirable in-stream concentrations of parameters of concern that will be used as indicators of success to determine the effectiveness of water quality actions. However, the degree to which these targets are realized will depend upon overall CALFED solutions. Targets may not be fully realized because of competing CALFED solution requirements or because attainment of a target is technically infeasible.

In general, water quality targets are based on Water Quality Control Plans (Basin Plans) of the ~~Bay Area~~ San Francisco and Central Valley Regional

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Water Quality Control Boards, U.S. Environmental Protection Agency ambient water quality objectives, standard agricultural water quality objectives, and target source drinking water quality ranges as defined by technical experts. Other indicators of success may be used in conjunction with these targets on a project-specific basis to determine the effectiveness of actions toward protecting beneficial uses.

PRE-FEASIBILITY ANALYSIS

Individual programmatic actions may vary in cost, technical feasibility, and in other respects which may affect the final choices for implementation. Therefore, actions will be subjected to pre-feasibility analysis to determine which programmatic actions are most appropriate to be implemented. This analysis has begun and will continue into Phase III of the CALFED Program. Full feasibility analysis in conjunction with project-specific environmental documentation will be performed in Phase III. The process by which actions will be implemented will be identified in the *Water Quality Implementation Plan* scheduled for release during Phase III. A draft outline for the *Water Quality Implementation Plan* is located in Appendix B.

DESCRIPTION OF WATER QUALITY ACTIONS

Following is a description of actions for each major category:

- Mine Drainage
- Urban and Industrial Runoff
- Wastewater and Industrial Discharge
- Agricultural Drainage and Runoff
- Water Treatment
- Water Management
- Human Health
- Toxicity of Unknown Origin

Each action is cross-referenced with the other actions to facilitate the reader's understanding of the relationship between water quality actions. Methods, performance measures, and indicators of success for each action are *not* listed in order of priority or preference.

MINE DRAINAGE

ACTION 1: Reduce the impairment to environmental beneficial uses within the Delta and Sacramento River regions associated with cadmium, copper, and zinc loadings by source control or treatment of mine drainage at inactive and abandoned mine sites. Actions are targeted at the Upper Sacramento River (Shasta Dam to Red Bluff) and its tributaries that are major contributors of copper, cadmium and zinc loadings.
[Urban and Industrial Runoff - Action 1]

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