

CALFED Drinking Water Quality Strategy 2002 – Draft
BDPAC-DWS (August 20, 2002 version)

Providing good quality drinking water is one of our most important goals for the CALFED Bay-Delta Program. Nothing is static in the world of drinking water quality. Source water quality and quantity are subject to frequent changes, sometimes unpredictably. Drinking water treatment methodologies change with advances in technology and in response to new regulations. New technologies present new challenges in performance, reliability, and disinfection byproducts. Drinking water quality standards change in response to changes in technology and better health effects information. Even variations in post-treatment distribution can profoundly affect drinking water quality at the tap. Each region of the state, and many sub-regions thereof, face different opportunities and challenges in providing good quality drinking water. There is no single answer. However, there can be a common approach to arriving at the most appropriate answers.

There are eleven CALFED program elements; Ecosystem Restoration, Watersheds, Water Supply Reliability, Storage, Conveyance, Environmental Water Account, Water Use Efficiency, Water Quality, Water Transfers, Levees, and Science. All of these elements play a part in the over-arching program goal of providing good water quality for all beneficial uses. Although a detailed discussion of the relationships of all program elements to Delta water quality is beyond the scope of this paper, here are a few examples. The CALFED Levee Program works to improve levee stability and prevent breaches that can cause major increases in Delta salinity. The Watershed Program promotes water quality improvement at the local level through local watershed management activities. The Conveyance Program is investigating the effect of changes to the flow of water through the Delta on water quality.

The Drinking Water Quality Program (DWQP) is responsible for most of the actions identified as “Water Quality” in the ROD. These actions are focused on reducing the impacts of organic carbon, bromide, salts, and other pollutants that interfere with municipal uses of Delta water. The Ecosystem Restoration Program (ERP) has a closely related set of water quality objectives targeting impairment of aquatic life uses and the two programs work together to pursue common solutions. The DWQP, the ERP, and the Science Program form the core of the CALFED Water Quality element. The Science Program facilitates application of scientific knowledge and methods to planning, implementation, and monitoring in all of the CALFED programs. In the DWQP, the Science Program is

instrumental in developing the research, monitoring, and performance measurement elements.

CALFED Drinking Water Quality Program

The CALFED Drinking Water Quality Program is unique because it attempts to integrate and improve water quality and reliability from source to tap. Improvements generally fall into four broad categories:

- a) enable users to capture higher quality Delta water for drinking water purposes;
- b) reduce contaminants and salinity that impair Delta water;
- c) evaluate alternative approaches to drinking water treatment to address growing concerns over disinfection by-products (DBPs) and salinity;
- d) enable voluntary exchanges or purchases of high quality source waters for drinking water use.

The State and federal agencies involved in CALFED's water quality improvement effort include the California Department of Health Services, State Water Resources Control Board and Central Valley Regional Water Quality Board, US Environmental Protection Agency, Department of Water Resources, US Bureau of Reclamation, California Department of Food and Agriculture, and the US Geological Survey.

CALFED water quality goals, objectives, and targets

The CALFED Record of Decision (ROD) adopted general goals and objectives of 1) continuously improving the quality of the waters of the Bay-Delta system, 2) providing good quality water for all beneficial uses, including in-Delta environmental and agricultural uses, and 3) safe, reliable, and affordable drinking water. For the Drinking Water Quality Program (DWQP), the target for providing safe, reliable and affordable drinking water was expressed as either: a) average concentrations at Clifton Court Forebay and other southern and central Delta drinking water intakes of 50 ug/L bromide and 3.0 mg/L total organic carbon, or b) an equivalent level

of public health protection using a cost-effective combination of alternative source water, source control and treatment technologies.

The numerical objectives were suggested in 1998 by a panel of experts engaged by the California Urban Water Agencies, based upon predicted changes in drinking water standards set by the Federal Environmental Protection Agency, and best-available disinfection techniques. These objectives were revisited by the expert panel in 2001 with a focus on bromide and bromate formation. The panel concluded that, given their assumptions about the future of drinking water treatment regulations and the uncertainties in low level bromide measurement in relevant studies, they stood by their 1998 recommendations. This opinion was reiterated in a presentation by one of the expert panel members to the subcommittee in April 2002.

By stating the target and the alternative, the ROD implicitly recognized that:

1. it might not prove practical/cost-effective to achieve the numeric limits in the Delta,
2. the EPA might not revise drinking water standards to the point where these limits were necessary,
3. drinking water disinfection techniques might change, affecting the importance of one or both of these targets, or
4. other sources of water, lower in these constituents, might be available which could be used instead of or blended with Delta water for drinking purposes.

An Integrated Resources Plan for Water Quality

The Drinking Water Subcommittee of the BDPAC was created to provide public input on implementing the ROD drinking water targets. In its deliberations it has recognized that each of the four factors denoted above need to be taken into consideration in developing a strategy for implementing the ROD drinking water targets, and that a methodology is needed which incorporates the factors involved in analyzing "an equivalent level of public health protection" alternative to the numerical targets.

The BDPAC Drinking Water Subcommittee has developed a schematic to illustrate an approach by which individual drinking water providers can identify and analyze the opportunities and challenges pertinent to its individual situation. The diagram is also a useful way to simply show CALFED's strategy, or integrated resources plan, for drinking water quality.

The following outline explains the structure of the diagram, its elements, its relationship to the CALFED program, and other factors affecting the quality of the public water supply, including water use efficiency, education, monitoring and assessment, and health effects. The elements of the diagram and strategy fall into three broad categories:

- Delta water quality, source control, conveyance, operations, and storage (primarily the responsibility of CALFED and its member agencies **in partnership with local beneficiaries**)
- Local management of other water sources (primarily the responsibility of local water agencies)
- Treatment and distribution (local agency responsibility with CALFED investments and policy support)

DELTA WATER QUALITY

The Sacramento-San Joaquin Delta receives water from its natural tributaries, including subsurface drainage, and wet year runoff from the Tulare Lake Basin. It also receives water from the Trinity River by virtue of the CVP imports into the Sacramento River. The quantity of the inflow to the Delta varies dramatically by season, and by hydrologic year type. The water quality of those inflows also fluctuates dramatically in response to ocean salinity intrusion in periods of low Delta outflow, natural processes (changes in temperature, organic carbon loads influenced by flood plain returns and breakdown of vegetation, and algae formation) and by waste loads from municipal, industrial, agricultural, environmental and recreational uses.

Source Control

Point sources include publicly owned treatment works (POTWs), industrial dischargers, and municipal stormwater systems operating under discharge permits issued by the Central Valley Regional Water Quality Control Board. Discharge permits must have limits for

constituents with “water quality standards” which have a reasonable potential to impair a listed beneficial use.

Non-point sources of pollution may include agriculture, forestry, urban runoff, mining, and construction. By definition, non-point sources are not regulated by discharge permits. Non-point source pollution is typically managed using incentive based, non-regulatory programs.

ROD commitments directly related to source water quality:

- Assist existing agency programs to reduce turbidity and sedimentation; reduce the impairment caused by low dissolved oxygen conditions; reduce the impacts of pesticides including organochlorine pesticides; reduce the impacts of trace metals; mercury; and selenium; reduce salt sources to protect water supplies; and increase understanding of toxicity of unknown origin.
- Improve dissolved oxygen conditions in the San Joaquin River near Stockton.
- Water Supply Reliability – allocate Proposition 13 funds dedicated to interim water supply reliability and water quality.
- Address drainage problems in the San Joaquin Valley
- Implement source controls in the Delta and its tributaries
- Address water quality problems at the North Bay Aqueduct
- Develop and implement a plan to meet all existing water quality standards and objectives for the SWP and CVP

In addition to these commitments, the CALFED Watershed Program works to improve water quality throughout the solution area through promotion of local watershed management activities. Many of these local actions specifically address drinking water quality constituents of concern including turbidity, nutrients, and pathogens.

Conveyance

Conveyance and operations in or closely associated with the Delta are addressed here. Operations, conveyance, and storage south of the Delta are discussed in a later section.

As discussed in the ROD, the CALFED Agencies have chosen to pursue a through-Delta conveyance strategy. Because of differences in source water quality, complex hydrology, relatively long transit time, and its estuarine nature, water quality changes as it moves across the Delta.

Water quality problems associated with existing conveyance practices include sea-water intrusion, short circuiting of lower quality San Joaquin River to the South Delta diversions and discharge of drainage from Delta islands in close proximity to drinking water intakes. Salts (especially bromide and chloride) and dissolved organic matter are the most problematic Delta pollutants impairing municipal uses of Delta water. Pathogenic organisms are frequently detected but not at unusually high concentrations. When impairment of agricultural uses of Delta water has occurred it has usually been due to high salt content. In addition, the DWQP is also addressing other pollutants such as nutrients, turbidity, and taste and odor compounds.

Currently conveyance practices which influence water quality at the major diversion points include timing of reservoir releases, operation of the Delta Cross Channel, timing and rate of SWP and CVP pumping, and installation of temporary barriers in the South Delta. Planned conveyance changes include increasing CVP pumping, dredging channels, installing permanent barriers, installation of an intertie between the CVP and SWP, and evaluation of a screened diversion on the Sacramento River between Hood and Georgiana Slough.

ROD Commitments related to water quality and Conveyance include:

- Restore habitat and hydraulic needs on Frank's Tract in the Delta to optimize improvements in ecosystem restoration, levee stability, and Delta water quality.
- Reduce agricultural drainage in the Delta
- Evaluate and implement improved operational procedures for the Delta Cross Channel

- Evaluate a screened through-Delta facility
- Intertie between the SWP and CVP facilities at or near Tracy
- Bypass canal to the San Felipe Unit at San Luis Reservoir
- Control runoff into the California Aqueduct and similar conveyances
- Study recirculation of export water to reduce salinity and improve dissolved oxygen in the San Joaquin River

Storage

Upstream storage reservoirs capture water that would otherwise flow to the Delta and influence Delta outflow. Releases from storage reservoirs also influence flow to the Delta. Water is generally captured during the wet season and Spring snow melt periods and released during the summer and early Fall. Storage of water in the major reservoirs both upstream and downstream of the Delta has changed the seasonal flow and water quality patterns in the Delta dramatically. The overall trend has been a reduction in the natural seasonal variation in Delta flows and water quality. Increased storage will increase the amount of water available for export and other uses and will generally provide increased flexibility to manage water.

ROD commitments related to water quality and Storage include:

- Expand CVP storage in Shasta Lake by approximately 300 TAF.
- Expand Los Vaqueros Reservoir by up to 400 TAF.
- In-Delta storage project- 250 TAF.
- Evaluation of Sites Reservoir and upper San Joaquin River
- Groundwater storage and management (conjunctive use)

Delta Water

Water quality at the Delta diversion points is central to the entire DWQP. The diagram is constructed to show the relationship between the major upstream factors, Delta water quality, and the downstream processes influencing tap water quality. As stated previously the target is "to achieve either: (a) average concentrations at Clifton Court Forebay and other southern and central Delta drinking water intakes of 50 ug/L bromide and 3.0 mg/L total organic carbon, or (b) an equivalent level of public health protection using a cost-effective combination of alternative source waters, source control and treatment technologies."

Source Water Exchanges

Source water exchanges are meant to allow water supply agencies to take advantage of high quality water from other sources to improve water quality and reliability.

ROD Commitments related to Source Water Exchanges include:

- Establish a Bay Area Blending/Exchange project.
- Facilitate water quality exchanges between the eastern San Joaquin Valley and Southern California (to the extent that these efforts do not adversely affect ongoing consensus efforts to restore the upper San Joaquin River).

CVP/SWP Operations and Storage

Water quality in the CVP and SWP south of the Delta changes for a variety of reasons thus there are significant variations in delivered water quality to agencies in the San Joaquin Valley, the Bay Area, the Central Coast, and in Southern California. Evaporation, algae growth, flood water inflows, exchanges, local watershed inflows, and system operations all have an effect on water quality in CVP/SWP aqueducts and reservoirs.

ROD Commitments related to Operations, Conveyance, and Storage south of the Delta include:

- Bypass canal to the San Felipe Unit at San Luis Reservoir
- Control runoff into the California Aqueduct and similar conveyances

LOCAL WATER SOURCES

Few water supply agencies are entirely dependent on the Delta for their source water needs. Most have some combination of alternative surface water, ground water and Delta water supplies. Most local sources are faced with challenges different than those listed above for the Delta. Source water protection programs (source control), storage, and operations all have a bearing on the quality of water from local sources. An advantage of having alternative sources is the ability to improve water quality through supply flexibility and blending.

Water supply agencies drawing their water from different points in the system and with different combinations of Delta water and local supply will have unique water supply and treatment needs. For the purpose of developing regional water quality strategies, Delta water users can be grouped as follows:

1. North Bay Aqueduct
2. Contra Costa Canal
3. South Bay Aqueduct
4. City of Tracy
5. San Felipe Unit
6. San Luis Canal
7. Coastal Branch
8. Kern County Water Agency
9. Antelope Valley-East Kern
10. Southern California (with many subgroups)

[regional agencies to complete this section]

TREATMENT AND DISTRIBUTION

The CALFED goals of 50 ug/L bromide and 3 mg/L TOC were based on conventional chemical flocculation, settling, filtration, and chlorination and the anticipated drinking water standards at the time the ROD was developed. Treatment technology has continued to advance since the targets were adopted. Although there are water supply agencies still using the model treatment that was the basis for 50 and 3, most are using or planning to use some combination of advanced treatment technologies that reduce formation of disinfection byproducts. These treatment options are tailored to the source water quality composition experienced at different points in the system. Commonly employed treatment technologies for Delta water users are ozone, chloramine, and conventional chlorine disinfection. For CALFED, investments in treatment technology should match water supplies that local agencies will likely be utilizing during droughts, a portfolio that would include not only Delta water, but also local surface water and especially groundwater. Water quality effects on and from distribution systems also cannot be ignored, nor can treatment process residuals, including reject water from membrane systems.

ROD commitment related to treatment and distribution include:

- Invest in treatment technology demonstration projects.

WATER USE EFFICIENCY

Water use efficiency is an important component of the CALFED program throughout the solution area.

ROD commitments related to water quality and the Water Use Efficiency include:

- CALFED Water Use Efficiency Program, incentive based programs in the urban sector, agricultural sector, and in the water reclamation area
- Water measurement and transfer actions

EDUCATION AND OUTREACH

Education and outreach are important in all elements of the Drinking Water Quality Program. For example, education is one of the most important tools, even considered a "management measure" or "best management practice," available for source water protection. Consumers also need to be knowledgeable about the safety of their water supply to be empowered to make informed decisions about the relative risks of tap water.

MONITORING AND ASSESSMENT

[to be added in conjunction with the Science Program]

HEALTH EFFECTS

[to be added]

Appendix A: Drinking Water Quality Improvement Strategy

The CALFED Bay-Delta Program Phase II Report, a part of the Final EIR/EIS dated July 2000, includes a strategy for Drinking Water Quality Improvement (pages 44-50), that describes CALFED actions in all of the above listed elements.

Source Control - CALFED agencies will implement source controls in the Delta and its tributaries. CALFED, SWRCB, CVRWQCB, and DHS with assistance from EPA will develop a comprehensive source water protection program.

Alternative Sources – Work with Bay Area water suppliers to develop BAB/E and facilitate eastern SJV-Southern California exchanges.

Health Effects – Work with DHS and EPA to support ongoing research on drinking water health effects.

Treatment – Evaluate alternative approaches to drinking water treatment.

Storage and Operations – Water quality benefits from planned operations changes. Evaluate the role of storage in water quality as part of Integrated Storage Investigations.

Conveyance – Conduct appropriate studies of how existing and planned conveyance improvements can be developed and operated.

Linkages to other program elements – Watershed Program, Water Use Efficiency, Levees, Science Program