APPENDIX A

ELPH DIAGRAM

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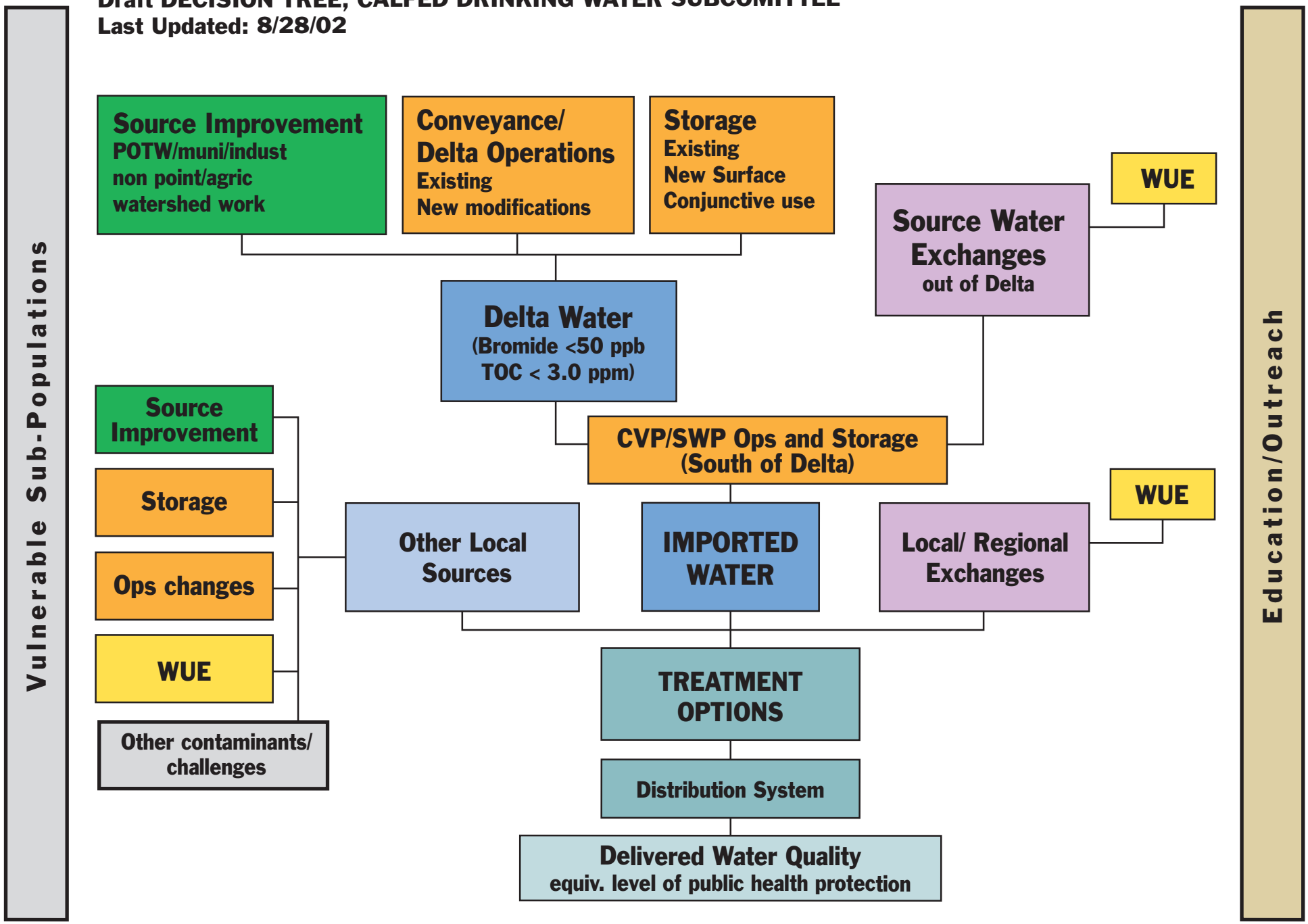
EQUIVALENT LEVEL OF PUBLIC HEALTH PROTECTION
Draft DECISION TREE, CALFED DRINKING WATER SUBCOMITTEE
Last Updated: 8/28/02



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APPENDIX B

MEETING INFORMATION

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BROWN AND CALDWELL CALFED REPORT – WTP MEETING

CONTACTS LIST

Water Treatment Facility/Agency	Location	Contact Person -Position	E-mail
City of Vallejo	Vallejo	Franz Nestlerode – Deputy Water Superintendent of Maintenance and Operations	fnestlerode@ci.vallejo.ca.us (707) 648-4308
Alameda County Water District	Fremont	Karl Stinson – Operations Manager	Karl.Stinson@acwd.com (510) 668-4200
Contra Costa Water District	Concord	David Huey – Water Operations Manager	dhuey@ccwater.com (925) 688-8254
Santa Clara Valley Water District	San Jose	Bruce Cabral – Water Quality Unit Manager	bcabral@valleywater.org (408) 265-2607 ext. 2796
City of Avenal	Avenal	Rick Cunningham – Utilities Supervisor	rcunningham@cityofavenal.com (559) 386-5020
City of Coalinga	Coalinga	Tim Hawk – Water Treatment Operations Manager	thawk@coalinga.com (559) 935-1533
Kern County Water Agency	Bakersfield	James Beck – General Manager	jbeck@kcwa.com (661) 634-1451
Metropolitan Water District of Southern California	La Verne	Brad Coffey – Water Purification Unit Manager	bcoffey@mwdh2o.com (909) 392-5045
Crestline Lake Arrowhead Water Agency	Crestline	Thomas Newell - Superintendent	(909) 338-1779
Central Coast Water Authority	Buellton	William Brennan – Executive Director	wjb@ccwa.com (805) 688-2292 ext. 215

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Drinking Water Quality Program (DWQP) Assessment of Delta Drinking Water Treatment

Prepared by Brown and Caldwell

Objective: To assess future goals and concerns of drinking water treatment plants utilizing Delta water and to recognize how the CBDA DWQP can assist them in achieving goals and addressing their concerns. To assess how CBDA DWQP can better serve the needs of drinking water treatment facilities.

Drinking Water Treatment Plant Goals

1. In general, what are the water quality goals for your facility?

2. What are some of the challenges and concerns that your facility is facing associated with current and upcoming water quality regulations?

3. Is assistance needed to meet these challenges? Is this an area where you would like CALFED to become more involved?

Delta Source Water Reliability

1. How would you define a "reliable" source water?

2. Is Delta source water quality reliability a concern? Now or in the future how have you dealt and/or plan to deal with the variability of the Delta water quality?

3. How and where do you think CALFED should focus on source water quality reliability?

Treatment

1. What parameters have governed your choice of disinfectant used at your facility?

2. Would CALFED assistance increase the feasibility of changing disinfection or implementing other new technologies?

3. Which areas of treatment are becoming or expected to become more difficult and require additional investment? What are the major driving factors causing this?

Conveyance/Distribution Issues

1. What kinds of needs have been identified to improve water conveyance from the Delta intakes to your water treatment plant?

2. Do you see changes in the treatment or purchase of Delta water becoming a concern? Are alternative sources being considered for your system?

Future Communications

1. How are you currently tracking data/information regarding source and treated water quality? Which data system is being used?

2. What is the level of communication between your facility and other facilities using Delta source water? What are your ideas for increasing communication/cooperation between these utilities, and how do you believe CALFED could help?

3. Would a "Delta Users" forum be helpful in increasing communication and cooperation between utilities using Delta Water? Would you participate?

APPENDIX C

BAY DELTA AREA AGENCY MEETING SUMMARIES

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CBDA Treatment Meeting Summary

Meeting Location: Alameda County Water District

Date: March 3, 2005

Attendees:

Brown and Caldwell

Sarahann Dow	Project Manager
Bill Faisst	Senior Engineering Project Advisor
Eian Lynch	Project Engineer

Water Agency/Facility

Eric Cartwright	Senior Water Resources Planner
Laura Hidas	Environmental Engineer
Steve Peterson	Project Engineering Manager
Karl Stinson	Operations Manager

Treatment Plants:

- Mission San Jose Water Treatment Plant (MSJWTP)
- Water Treatment Plant No. 2 (WTP2)

Intake Summary: Primary source is South Bay Aqueduct (SBA)

- Two diversions of SBA; one for each WTP
  - Considered 1 source by DHS due to close proximity.
  - Approximately 15 miles of conveyance pipeline (11 miles open canal).
- Lake Del Valle captures local runoff (ACWD and Zone 7 share water rights); seasonally blended with Delta supply.
  - Recharged by local watershed, but majority pumped from SBA.
  - Multi-use facility; because of recreation, maintenance of a high water level is desirable (historical operation).

Drinking Water Treatment Plant Goals	
Water Quality Goals	1. Bromate < 4 ppb; TTHM/HAA5 <32/24 ppb 2. Address taste and odor (T&O) problems a. MSJWTP i. Prevent shut down when T&O problems cannot be resolved with powdered activated carbon (PAC) b. WTP2 i. Implemented ozonation, working on optimization

Drinking Water Treatment Plant Goals (Continued)	
Challenges with Current/Up and Coming Regulations	1. Meeting Locational Running Annual Average (LRAA) for the Stage 2 D/DBP Rule a. High TOC and bromide levels experienced seasonally at MSJWTP & WTP2 2. Simultaneous compliance with LTSWTR disinfection goals a. To limit DBPs, disinfection scenarios are limited (minimize free chlorine contact time, plant chloramination) 3. Simultaneously complying with Disinfectant/DBP regulations and addressing T&O, algal growth problems 4. May have problems in the future consistently meeting a possible bromate standard of 5 μg/L at WTP2 a. Due to high source water bromide may need to further lower pH to prevent bromate formation; use of sulfuric acid would result in high capital & operational costs and safety concerns.
Assistance Needed/Suggested from CALFED	1. Source water protection & improvements a. Minimizing TOC & bromide concentration b. Prevent Delta island flooding and subsequent drainage (eliminating high TOC loads) c. Eliminate, relocate or treat Delta agricultural drains d. Ensure tertiary treatment of wastewater plant discharges i. Reduce pathogens, TOC, nutrients and pharmaceuticals and personal care products (PPCPs) 2. Delta and SBA high algae growth problems a. DWR helpful in addressing algal monitoring and control 3. Improve knowledge on concentrations of PPCPs in wastewater discharges and treatment strategies for their removal a. Research needed to define removal using conventional treatment, health effects in relation to detection limits, pilot new treatment solutions if necessary 4. Piloting of new treatment technologies
Delta Source Water Reliability	
Definition of reliable source water	1. Water that is consistently available and treatable a. Water quality needs to be stable and predictable (daily and seasonal) without reduction in supply i. Reduce fall and dry year peaks in bromide ii. Reduce daily fluctuations in turbidity, temperature, pH iii. Reduce seasonal peaks in TOC

Delta Source Water Reliability (Continued)	
Concerns with the Reliability of Delta Source Water	1. Reliability of the Delta is a major concern a. Levee integrity, threat of future failures and resulting long term water quality degradation 2. ACWD deals with it as-is by: a. Adjusting chemical doses b. Modifying operations to meet DBP goals c. Installing additional treatment processes/upgrades to deal with the variations (CO_2, membranes, etc.) 3. Fast-paced variability (daily) experienced in turbidity, pH, temperature; weekly or monthly variability in bromide & TOC
Suggestions for CALFED Focus on Delta Water Quality Reliability	1. Reduce dry year water quality degradation without reducing the SWP water supply a. Reductions in bromide, TOC, algae, nutrients in dry years and in all years 2. Dampen peaks (bromide) exhibited in SBA 3. Dampen turbidity spikes seen in SBA 4. Protect Clifton Court Forebay a. High winds and silt deposition result in increased turbidity b. Return forebay to nominal depth (or deepen to minimize frequency of dredging) and reduce temperature and high algae growth 5. Protect Bethany Reservoir – dredge area of silt collection adjacent to South Bay Pumping Plant 6. Eliminate drainage inlets to SBA (will be done through the SBA Improvement & Enlargement project) 7. Cover open portions of SBA to eliminate temperature fluctuations
Treatment	
Parameters Governing Disinfectant Choice	1. Good inactivation (ozone & chlorine) 2. DBP formation prevention 3. "absolute barrier" approach (membranes) 4. System disinfectant residual 5. Ease of operation 6. State of technology (i.e. don't have UV because it's less developed) a. Piloting treatment technologies would help implement new technologies

Treatment (Continued)	
Areas of Increasing Difficulty	1. Simultaneous compliance with disinfection and DBP MCLs 2. Bromate control with increasing bromide peaks and decreasing MCL a. pH suppression targets (CO_2 addition) are based on incoming bromide levels and pH 3. TTHM/HAA5 with increasing TOC 4. Turbidity control with increases in frequency, intensity or duration of turbidity spikes in raw water (Clifton Court) 5. Taste & odor control, increased frequency, duration, and severity of algae 6. Clarifier performance due to temperature and pH variance 7. Implementing new treatment technology a. Prefer to use proven treatment techniques b. Forced to look at piloting new technologies because of degradation in source water quality 8. Ultrafiltration backwashes/recycle (citric acid) degrading functionality of coagulation a. Potential sulfuric acid addition undesirable (due to cost and safety concerns) but may be necessary 9. Increased nitrification due to chloramination for residual maintenance 10. Lack of knowledge on Pharmaceutical and Personal Care Products in wastewater a. Research needed to define removal using conventional treatment, health effects relation to detection limits, pilot new treatment solutions if necessary
Conveyance/Distribution Issues	
Improvements for Delta Water Conveyance	1. Dredge Clifton Court and area of Bethany Reservoir by South Bay Pumping Plant 2. Cover open portions of SBA to eliminate algae growth, temperature and pH fluctuations 3. Eliminate agricultural drainage and local runoff discharge to SBA 4. ACWD strongly against increased agricultural usage of Delta islands a. Stated that Delta water quality could be maintained if islands left flooded, drainage and pumping causing high TOC concentration

Conveyance/Distribution Issues (Continued)	
Improvements for Distribution	1. Local distribution with chloramine residual a. Low residence time b. No problems experienced with more DBP formation 2. Treated water storage a. Currently designing mixing and chemical feed improvements at 2 existing reservoirs b. Will use mixing and proportional chloramines dosing in reservoirs to maintain residual disinfection
Alternative Water Sources	1. Treatment costs expected to rise with increasing water quality degradation and stricter standards 2. Delta water is primary source a. Additional supplies to meet future demands will likely have to be delivered via the SBA 3. Supply storage a. Lake De Valle currently used for blending with Delta water; can't be considered a new or additional supply.
Future Communications	
Current Data Tracking	1. Real-time monitoring of some constituents at both WTPs, grab samples on various schedules for others 2. Weekly Real-time Data Forecasting reports from DWR staff about Delta issues a. MWQI not compatible with SCADA system at WTPs b. Not timely enough to allow operators time to make treatment adjustments
External Communication Level	1. Communicate regularly with SBA users via SBA Contractors Water Quality Task Force (SBCWQTF, 3 agencies) meetings (3 times per year) a. Members communicate about water quality & treatment issues regularly b. DWR / South Bay Contractors weekly conference call during problematic algae, taste & odor season 2. Involvement with CUWA and Bay Delta Urban Coalition 3. Lack of resources to send representatives to CALFED and other meetings a. Outcomes considered minimal (high time commitment, slow progress, low reward) b. Would like to participate

Future Communications (Continued)	
Thoughts on Potential "Delta Users" Web Forum	1. Information on grant solicitation in advance would be beneficial a. Application procedure b. Preliminary data required, etc. c. Pro-active actions that can be taken to ensure that projects we're interested in doing will be eligible for future rounds of funding d. Investments to prepare for proposals solicitation often wasted because of lack of information 2. New CALFED and other water quality project information desired a. PDFs from completed projects, pilot scale studies, data 3. Include Bay-Delta Consortium reports on monthly or quarterly basis, teleconferences, progress updates, mechanisms to give feedback 4. Online information on treatment technology, modification, implementation information exchange a. Pilot study applications to full scale (ultrafiltration problems)

CBDA Treatment Meeting Summary

Meeting Location: Contra Costa Water District-Bollman Water Treatment Plant Concord, CA

Date: March 7, 2005

Attendees:

Brown and Caldwell	CALFED
Sarahann Dow	Lisa Holm
Eian Lynch	

Water Agency/Facility	
David Huey	Manager of Water Operations
Patrick Panus	Water Treatment Superintendent
Larry McCollum	Water Quality Superintendent

Treatment Plants: Randall-Bold (RBWTP); Oakley, CA (40 MGD): direct filtration, pre/post ozonation, mixed media GAC filtration.

Bollman (BWTP); Concord, CA (75 MGD): conventional treatment, intermediate ozonation, mixed media GAC filtration

Intake Summary: Delta water from Mallard Slough, Rock Slough and Old River via the Contra Costa Canal (48 mi), Los Vasqueros Reservoir (LVR; 100,000 acre-ft)

Drinking Water Treatment Plant Goals	
Water Quality Goals	1. Officially approved by board of directors 2. Regulatory compliance a. Not just meeting the D/DBP Stage 2 Rule, going beyond b. Historically strive to minimize all COCs c. Maintaining low turbidity that was established in 1968
Challenges with Current/Up and Coming Regulations	1. Stage 2 D/DBP Rule-Bromate formation at RBWTP a. Process additions/modifications to be made to reduce bromate formation
Assistance Needed/Suggested from CALFED	1. More research needed on Delta water source water and treatment a. Point and non-point sources of water quality degradation b. Carbon fractionation mechanisms c. Shared experiences with new treatment modifications and technologies implemented, success and failure stories d. Taking disparate research and increasing its applicability, BMPs for multiple treatment/disinfection strategies i. CCWD created a treatment matrix to evaluate the effects of different treatment strategies on different processes ii. Archive discussions, shared info--reduces the reoccurrence of common mistakes in process implementation/combinations (alum overdose) 2. Half-day seminars/workshops for operators involved with treating Delta water

Delta Source Water Reliability	
Definition of reliable source water	1. Predictability seen as more realistic and practical than stability or reliability a. Raw water relatively stable but the Delta produces different water quality (WQ) naturally--retailers see different WQ based on the original intake location b. Treatment facilities can better utilize their capabilities/resources if they can anticipate spikes in raw water composition
Concerns with the Reliability of Delta Source Water	1. Reliability of Delta structure: fragile network of Delta levees a. Failures result in acute spikes in raw water TOC which cause treatment difficulty b. Minimal lapses in levees result in huge treatment/compliance failure costs for water agencies c. Jones Tract levee failure i. Actual event led to spikes in TOC at many treatment plants ii. Pump off resulted in consistently high TOC concentrations d. Clifton Court Forebay i. Experienced bulk of the high TOC from Jones Tract event ii. Jan 2005 highest TOC levels recorded in Delta source water 2. Aesthetic Issues a. Delta water seen as having "full bodied flavor" b. Some algal issues in LVR and other reservoirs i. Mitigation tailored to each reservoir ii. Chemical treatments used, but operational and mechanical means utilized where possible to minimize chemical usage 3. Improving/maintaining storage reservoirs a. Recent additions and expansions implemented to improve water quality, increase raw water storage and secure alternate raw water sources i. Contra Loma Reservoir Swim Lagoon constructed ii. Los Vaqueros Reservoir constructed in 1998 to improve water quality and water supply reliability for CCWD customers ▪ Helped reduce salinity ▪ Has withdrawal locations at multiple depths ▪ Supply levels from 100k, 75k, and 44k acre-ft iii. Mallard and Martinez Reservoir maintenance b. Allows good blending capability with use of multi-purpose pipeline (MPP) for treated water transfers between WTPs 4. New/alternative intake project searching for better location of Delta water intake to improve water quality and reliability of supply

Delta Source Water Reliability (Continued)	
Concerns with the Reliability of Delta Source Water (Continued)	5. Increasing agricultural operations and urban growth a. increased discharges from runoff enhances Delta water quality degradation b. increased intake pumping limitations because of agricultural needs 6. Intake limitations a. Currently operating 3 intakes and accommodating other industries but must withstand "no pump" periods by drawing from LVR
Suggestions for CALFED Future Efforts	1. New/alternative intake project 2. Increasing prediction capabilities, constituent source identification and location 3. More applied research on carbon constituent fractionation 4. Levee network re-evaluation a. Reduce Delta island pumping/drainage b. One possibility: purchasing Delta islands and keeping them flooded
Treatment	
Parameters Governing Disinfectant Choice	1. DBP formation, compliance with MCLs a. No ability to anticipate TOC, bromide spikes in incoming raw water or locations of spike sources at intakes in order to make adjustments to intake pumping, use MPP b. Switched residual from free chlorine to chloramines c. Implemented ozonation at both treatment plants to lower THM/HAA5 levels d. Bromate formation caused pre-ozonation to be moved to intermediate ozonation 2. Redundancy, maintaining flexibility in treatment a. Allows backups when one disinfection system fails because of high bromate MCLs or power outage b. Implemented multi-barrier approach with different forms of disinfection 3. Aesthetics, consumer feedback a. Ozone helpful in reducing T&O but dose-limited i. Off-gassing a problem ii. Turbidity increase from filter degradation due to high ozone residual iii. BWTP and RBWTP looking into adding sequestering agent (calcium thiosulfate) b. Occasional algal blooms in reservoirs treated chemically Macrophytes mechanically harvested

Treatment (Continued)	
Parameters Governing Disinfectant Choice (Continued)	4. Cost a. Chlorine dioxide full-scale application study b. Chlorine dioxide deemed impractical at this time because of high complexity and cost
Areas of Concern/Increasing Difficulty	1. Maintaining redundancy at RBWTP, "no silver bullet" to treating Delta water a. Direct filtration seen as very limited, lacks sedimentation basins and considered a design error in regards to lack of "forgiveness" or flexibility b. RBWTP pre-ozonation being switched to intermediate with small amounts of free-chlorine addition early in process train i. Need for alternative pre-ozonation agent ii. Redesign at RBWTP also incorporates sedimentation 2. TOC monitoring a. Need reliable and affordable measurement device b. Must function without intense human interaction, be rugged enough for remote, unattended operation 3. Simultaneously maintaining regulatory compliance and consumer approval with aesthetic water quality a. T&O reduction while controlling bromate formation 4. Nitrification at BWTP a. Direct consequence of switch to chloramines disinfection b. No effective mechanism to reduce nitrification discovered yet c. Reluctant to do a system-wide breakpoint to free chlorine 5. Transition between blended sources and adjusting treatment to different water qualities 6. Maintaining redundancy in disinfection/contingency planning a. Ozonation prone to shutdowns from power fluctuations at plant and high power demand of the process
Conveyance/Distribution Issues	
Improvements for Delta Water Conveyance	1. Locate and eliminate/reduce contaminant loading close to drinking water intakes a. Urban runoff and agricultural drainage, sediment loading b. Cannot effectively predict or locate sources of cyclic, reoccurring oxygen demands 2. Increase Delta water transfer capabilities to counter-effect variability in different areas, increased blending capabilities
Improvements for Distribution	1. Most customers/retailers located on the Contra Costa Canal (CCC) a. CALFED funded encasement project for CCC (1900 m) b. No further significant improvements expressed

Conveyance/Distribution Issues (Continued)	
Alternative Water Sources	1. Currently studying expanding/improving storage reservoirs 2. Utilize MPP to supplement treated water between WTPs when treatment of incoming raw water at one WTP becomes too difficult, poses compliance or aesthetic issue
Future Communications	
Current Data Tracking	1. In-house tracking of raw and treated water quality data a. 3 major data systems i. Supervisory Control and Data Acquisition (SCADA) ii. Distributed Control System for individual treatment processes iii. Laboratory analytical data b. Includes extensive historical archives c. Storing all data on LVR, new reservoir, recent new expansions, little known about water quality trends thus far 2. 2 major future CCWD data system projects a. Enterprise database i. Single queryable location, starting with SCADA system b. Enhanced external data sharing with Retailers i. "quasi-real-time" operational data available 3. External sources also utilized to analyze water from California Aqueduct and other water sources a. CDEC database for organics and salinity data 4. Strongly suggested increase in "Delta intelligence", reliable real-time forecasting of all significant COCs
External Communication Level	1. Moderate level of communication with retailers, improving a. Supply and discuss source and treated water quality information b. Water quality information also available to retailers on CCWD website 2. Bay Area Superintendents meetings a. Limited to operations management and does not include operators 3. Overall gap seen in information sharing a. Need for Delta-focused forum especially for operators

Future Communications	
Thoughts on Potential "Delta Users" Web Forum	1. Strong support exhibited for Delta-users website or web forum a. Need information specific to treatment facilities and agencies utilizing Delta water i. Database defining point source characteristics ii. Describe locations, historical trends to better anticipate influences of source water quality changes iii. Gap in information sharing between Delta water, especially in practical applications of research and pilot study results b. User-friendly with relevant and accessible project, research, and funding information available in PDF or other downloadable form c. Tailor to up and coming issues with Delta water quality/regulatory changes that specifically effect Delta-users d. Need to communicate with retailers as well, not just a water resources focus 2. Conferences/seminars/workshops a. Competing interests for treatment facilities and operators at major conferences (AWWA), i. separate focus for Delta water issues would be beneficial ii. delta water issues need more than just a water resources spotlight b. Conferences lack "hands-on" subject areas c. Need more operator-oriented opportunities, hands-on workshops d. Accommodate complex and limited schedules of treatment staff i. Difficult for operators to attend long conferences

CBDA Treatment Meeting Summary

Meeting Location: Santa Clara Valley Water District
San Jose, CA

Date: March 21, 2005

Attendees:

Brown and Caldwell

Jill Cunningham	Senior Project Engineer
Eian Lynch	Project Engineer

Water Agency/Facility

Bruce Cabral	Water Quality Unit Manager
Sandy Oblonski	Assistant Operating Officer, Water Utility Operations

Treatment Plants:

- Penitencia Water Treatment Plant (PWTP)(42 MGD)
  Conventional treatment train (sedimentation basins, filtration), GAC filtration, chlorine primary disinfectant, chloramines residual.
- Rinconada Water Treatment Plant (RWTP)(80 MGD)
  Conventional treatment train (upflow clarifiers), chlorine primary disinfectant, chloramines residual.
- Santa Teresa Water Treatment Plant (STWTP)(100 MGD)
  Conventional (sedimentation basins, filtration) chlorine primary disinfectant, chloramines for residual disinfection.

Note: PWTP and STWTP currently switching to ozone disinfection and RWTP switching in next five years through system-wide Water Treatment Improvement Project.

Intake Summary:

- Delta Sources: About 90% of raw water to treatment plants
  - First intake (contract amount: 100,000 ac-ft/yr) at Banks Pumping Plant and delivered via the South Bay Aqueduct
  - Second intake (contract amount: 152,500 ac-ft/yr) at Tracy Pumping Plant and delivered through the Central Valley Project via Delta Mendota Canal, San Luis Reservoir, and San Felipe Unit
- Other Sources - 50% of County supply
  - Remaining water from local groundwater and runoff from surrounding watersheds of 10 storage reservoirs
    - 4 local storage reservoirs (Anderson, Coyote, Calero, and Almaden) provide emergency backup supplies to the treatment plants

Drinking Water Treatment Plant Goals	
Water Quality Goals	1. Stay ahead of existing and future regulations a. Maintain water quality at 80% of regulatory MCLs b. Meet Stage 2 D/DBP Rule by 2010 2. Resolve T&O problems with incoming raw water
Challenges with Current/Up and Coming Regulations	1. Stage 2 D/DBP Rule a. High bromide concentrations in raw water i. Unexpected spikes experienced ii. May have bromate formation problems when ozone disinfection implemented iii. Problems with simultaneous T&O events and bromate formation 2. Stage 1 Surface Water Treatment Rule a. Cryptosporidium removal i. Looking into implementing UV disinfection if crypto inactivation is required in future regs.
Assistance Needed/Suggested from CALFED	N/A
Delta Source Water Reliability	
Definition of reliable source water	1. High quality and consistent source water a. Short term i. Reliability on a day-day basis ii. Buffer spikes in TOC, bromide, T&O-causing factors b. Long term i. Formulate contingency plans for future water quality degradations due to natural disasters, unforeseeable events
Concerns with the Reliability of Delta Source Water	1. T&O problems a. Lack of effective plan to reduce algal blooms ii. Clifton Court Forebay iii. SBA iv. Bethany reservoir v. Del Valle Reservoir (currently DWR can't copper sulfate it if needed) b. Experienced problems after levee failures, pump-offs vi. High levels of MIB, geosmin experienced c. Customer dissatisfaction 2. Variability/spikes in raw water concentrations a. Bromide i. Bromate formation with installation of ozone disinfection system ii. Little to no warning of incoming spikes iii. Sulfuric acid for pH control has limited pH suppression capability for reduction of bromate formation b. Seasonal TOC spikes.

Delta Source Water Reliability (Continued)	
Concerns with the Reliability of Delta Source Water (Continued)	c. Turbidity spikes i. Believed from Clifton Court Forebay, Bethany Reservoir 3. Contributions to water quality degradation from agricultural and wastewater discharges in Delta a. Nutrient loads, contribution to algae and aquatic weed growth b. Pathogen releases c. PCPPs. 4. Operation of Delta Cross Channel gate a. Opening/closing changes water quality without prior notification 1. Aquatic weeds in Delta impact fish screens in CCFB
Suggestions for CALFED Future Efforts	2. Implement BMPs at Clifton Court Forebay a. Algae reduction i. More consistent, effective treatments (copper sulfate additions) b. Dredging plan i. Shallowness creates water quality problems ii. Reduce turbidity (from high winds), algae growth 3. Develop long term contingency plan for unexpected events a. Levee failures, earthquakes, forest fires i. Jones Tract created lasting T&O problems in raw water ii. Avoid future Jones Tract pump out communication problems iii. No mechanism exists to shut down pumping if impacts to water quality are present b. Develop communication plan to incorporate water quality concerns into normal emergency operations i. Similar to consideration of energy costs in project operations c. Construction/improvement activities to SBA i. 2003 sections of delaminated epoxy liner from SBA released and entered water treatment system ii. No warning received, unexpectedly clogged filters, fouled processes iii. Results in Delta water quality degradation, service interruptions
Treatment	
Parameters Governing Disinfectant Choice	1. DBP formation, Stage 2 D/DBP rule a. Switching to ozone to reduce THM and HAA formation b. Chloramines used for residual c. Pre-chlorination implemented until ozone online d. Control of algae growth in our sedimentation basins

Treatment (Continued)	
Areas of Increasing Difficulty	1. Concentration of constituents in raw water and waste stream a. Expected problems when ozonation online b. Arsenic in sludge ponds at RWTP c. Problematic to recycling streams 2. Future constituents of concern a. PCPPs i. Little research/knowledge on potential sources, health effects, removal during wastewater treatment, etc. b. Perchlorate i. Rocket fuel manufacturer (United Tech Corp) in proximity to Andersen reservoir 3. T&O problems a. High MIB, geosmin spikes b. Lack of effective action to reduce algae at intakes and along conveyance
Conveyance/Distribution Issues	
Improvements for Delta Water Conveyance	1. Development and continued improvements to monitoring capabilities along Delta water conveyance systems a. Rely heavily on MWQI data b. RTDF does not produce "timely" data to use for predictions in Delta raw water quality 2. Better storage systems needed a. Currently just two storage reservoirs feeding WTPs i. Calero and Andersen reservoirs (local watershed runoff) 3. Reduce impacts of increases in Agricultural drainage along conveyance systems 4. Better management of activities in Delta a. Understanding of effects of certain operations/activities i. Increases in wastewater discharges b. Increased farming, wetland usage
Improvements for Distribution	1. Corrosion prevention a. Recently switched from zinc orthophosphate to phosphoric acid b. Requires long study for implementation 2. Using chloramines for CT, residual since 1984 a. No concerns over DBP formation in system b. Monitor DBPs at turnouts i. Will not be required to change locations because of Stage 2 D/DBP Rule

Conveyance/Distribution Issues (Continued)	
Alternative Water Sources	1. Local groundwater makes up about 50% of the County's total water supply 2. Watersheds surrounding raw water storage reservoirs a. Calero and Andersen 3. Annual supplies highly variable 4. Currently working on establishing water banking system
Future Communications	
Current Data Tracking	1. Use MWQI data a. SCVWD helped implement online bromide analyzers in MWQI b. Rely heavily on MWQI data but not always useful as "real time" 2. Internal monitoring of sources 3. Monitor distribution DBP levels at turnouts to wholesale customers 4. DWR remote water quality stations on SBA and San Luis Reservoir a. O&M b. Use data produced by Jeff Janik
External Communication Level	1. Communications with other water agencies and treatment facilities a. MWD, CCWD i. UV, ozone disinfection information exchanges b. Zone 7 water agency, ACWD i. Information regarding ozone and membrane filtration ii. Similar raw water issues iii. Employ different treatment strategies c. EBMUD i. Limited communication about general treatment issues d. South Bay Aqueduct Contractors Group (Zone 7 & ACWD) 2. National and Local Organizations a. AWWA i. Very beneficial but don't communicate well ii. Delta- focused workshop would be very beneficial iii. More local sessions would be helpful b. DWR i. Operators in constant communication ii. Would like more information on water exchanges, decision making on raw water quantity issues and involvement in source water improvements
Thoughts on Potential "Delta Users" Web Forum	1. Website viewed as beneficial a. Post treatment technology pilot study results i. Different strategies, data and results ii. pH suppression to reduce bromate formation iii. Algae treatment, T&O reduction strategies b. Notification of the completion of new reports posted on a website

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CBDA Treatment Meeting Summary

Meeting Location: Fleming Hill Water Treatment Plant Vallejo, CA
Date: February 24, 2005

Attendees:

Brown and Caldwell
Bill Faisst
Eian Lynch

CALFED CBDA WQP
Lisa Holm

Water Agency/Facility

Franz Nestlerode	Deputy Water Superintendent of Maintenance and Operations
Glenn Pelletier	Supervisor of Maintenance and Operations

Treatment Plants: Fleming Hill Water Treatment Plant (FHWTP): 42 MGD
Travis WTP (TWTP): 7.5 MGD
Green Valley WTP (GVWTP)

Intake Summary: North Bay Aqueduct (NBA) 5,600 acre-ft (100% Sept-Dec), Lake Berryesa (100% Jan-Mar)

Drinking Water Treatment Plant Goals	
Water Quality Goals	1. Meet current and future federal drinking water regulations a. Timescale depends on the funding unit, the City of Vallejo (the City) b. City will usually implement funding when absolutely necessary, i.e. when non-compliance a possibility c. Serves the City well, don't spend limited funds on stranded assets, understand the complexity of funding issues and the difficulties the City of Vallejo endures in allocating these funds i. Strategy successful for the City of Vallejo ii. Ozone intermediate treatment Fleming Hill WTP, major improvement and capability in comparison to pre/post treatment iii. Implementation of the MIEX treatment at Green Valley WTP (mostly unmanned, treats local lake water [Lake Frye]) meets dissolved organic carbon (DOC) reduction necessities for the WTP

Drinking Water Treatment Plant Goals (Continued)	
Challenges with Current/Up and Coming Regulations	1. Disinfectant/Disinfectant Byproduct (DBP) Stage 2 Rule a. Would rather see DBP issues approached at the source by reducing DBP precursors before treatment b. Knowledge and research on DBP precursors and formation potential very limited. c. Stage 2 D/DBP Rule would "devastate" smaller drinking water treatment systems i. Lack of alternative resources, inability to adapt to source water quality changes larger systems with larger flows can handle ii. Don't have the support of large water agencies to assist in making engineering decisions, investments. (City of Vallejo has assistance of Solano County Water Authority (SCWA) and East Bay Municipal District (EBMUD))
Assistance Needed/Suggestions for CALFED	1. Conveyance improvements if funding was available. a. Supply water quality at a level that allows users to treat it (Travis Air Force base) effectively 2. Operate the Green Valley System unmanned as it did before MIEX implementation a. Currently there are 3-4 operators adjusting treatment to accommodate delta water quality variability
Delta Source Water Reliability	
Definition of reliable source water	1. Decreased DBP precursors (DBPP) and DBP formation potential a. would improve raw water treatability and require less frequent implementation of costly treatment technologies 2. Believe that Delta water will never be reliable
Concerns with the Reliability of Delta Source Water	1. Delta water "variable by the minute," realistically believe Delta Water quality very hard/impossible to improve to the levels identified in the CALFED ROD a. High water quality variability during both summer and winter periods i. 100 percent NBA raw water intake September through December ii. DOC concentration high and variable, also variable in comparison to TOC loads 2. Blending vital to successful operation a. All of SCWA, except Napa, blends Delta water with alternative sources b. Delta water intake capacity (30-35 MGD) is smaller than their treatment capacity (42 MGD) c. FH WTP blends most of raw water during the summertime

Delta Source Water Reliability (Continued)	
Concerns with the Reliability of Delta Source Water (Continued)	i. Consists of NBA and Lake Berryessa water intakes (among other smaller alternatives) d. North Bay Regional Water Treatment Plant originally designed to handle the variability in Delta water but is now blending other water sources to improve quality 3. CALFED Water Quality Program (WQP) Equivalent Level of Public Health (ELPH) DBP precursor recommended targets not applicable to Vallejo system intakes 1. 3 mg/L total organic carbon (TOC) target for delivered water quality, identified in the protection, does not affect Vallejo facilities because they are far upstream from the Clifton Court Forebay.
Suggestions for CALFED Focus on Delta Water Quality Reliability	2. Reduction of DBP precursors in source water 3. Research relating factors in Delta water governing dissolved fraction of TOC (DOC) and fraction of bio-available organic carbon (AOC) 4. On-line, real-time data monitoring studies on NBA a. Would allow water treatment plants to adjust treatment parameters ahead of time and maintain good finished water quality despite variability
Treatment	
Parameters Governing Disinfectant Choice	1. Free chlorine primary disinfectant at all Vallejo water treatment facilities, continual use in the future desired a. Pre-chlorination undesired at all Vallejo treatment plants 2. Intermediate ozone treatment at Fleming Hill (FH) 3. MIEX treatment implemented at the Green Valley System (GVS) a. Concerns and problems with DBPPs in raw water and D/DBP Stage 2 Rule
Areas of Increasing Difficulty	1. DBP formation: treatment problems are largely engineering-based a. Solids removal a major issue, specifically DOC removal b. Knowledge limited on determining fraction of DOC in TOC loads and concerning treatment methods targeting DOC cost effectively c. TWTP experienced process problems with flocculation, primary clarification (long detention times and net upward velocities), and flash mixing. i. Despite obstacles, WTP exhibits "excellent" TOC removal and meets compliance in comparison to what expected ii. TWTP said to "rival" the North Bay Regional WTP in performance and expectations

Treatment (Continued)	
Areas of Increasing Difficulty (Continued)	d. Enhanced coagulation used (as recommended by the EPA to reduce DBPPs) before the MIEX system considered. i. Ineffective and costly (< $1 million) temporary option e. Only two treatment technologies believed to accomplish DBPP reduction to meet compliance with the stage 2 D/DBP Rule i. Granular Activated Carbon (GAC) contactors ii. MIEX ion-exchange system 1. Cost-effective and resulted in compliance DBP MCLs 2. Implemented based on the data from the CALFED-funded MIEX pilot study at the North Bay regional WTP which treated similar (NBA) intake waters 3. GVS no longer run unmanned , system requires daily monitoring and adjustments to treat the highly variable DOC loads in raw water 2. Desired use of lime for buffering/pH control instead of orthophosphates for corrosion control a. Regarded as "scary", unnatural to water treatment philosophy b. North Bay Aqueduct source water poorly buffered 3. Excessive use of chemicals with residuals large concern: effects on consumer health.
Conveyance/Distribution Issues	
Improvements for Delta Water Conveyance	1. Highest raw water pumping costs of all SCWA members a. Pump NBA and other water sources long distances and lift water to high elevations (~400 ft). 2. Limitations to intake pumping a. FHWTP cannot convey maximum plant capacity b. Water allotments changed unexpectedly with construction of NBA i. Before had water rights from Cache Slough (22,000 acre-feet) ii. NBA finished, rights for Cache water were slowly removed. c. Have allotments for Lake Berryessa source water, makes up 100 percent of raw water supply for Fleming Hill January through March. d. Local storage of approx. 64 million gallons (2-3 days of supply) 3. Contingency planning for protection against disasters/seismic events 4. Links to larger facilities beneficial to smaller treatment plants

Conveyance/Distribution Issues (Continued)	
Improvements for Distribution	1. Preference is to treat water to a higher quality before distribution to counter the effects of water quality degradation that occurs in the pipelines 2. Improvements desirable to ensure Vallejo could supply treatable water to the Travis Air Force base and other locally treating customers a. Treated water quality containing 2 mg/L DOC leaving the treatment plant will fail DBP compliance by the time it reaches the Air Force base. 3. Inadequate system a. 24 inch diameter pipeline is over 13 miles long, highly vulnerable area for service interruption b. Two-week detention time for finished water observed in the last 9 miles of distribution 4. Contingency planning for protection against disasters/seismic events a. Long vulnerable system b. Extremely limited by financial restraints
Alternative Water Sources	1. Alternative sources and inter/cross agency assistance vital to the successful operation a. Lake Berryessa, small local sources around GVS i. Supply GVS with non-Delta water year-round b. Allow blending Delta water with higher quality water during periods of high variability in water quality (summertime) c. Smaller treatment systems may not have these benefits.
Future Communications	
Current Data Tracking	1. Little information given
External Communication Level	1. Limited to SCWA organizations, periodic communication with EBMUD a. Share similar source water (NBA) with SCWA 2. Wish to extend communication with other agencies and treatment facilities to gain from their experiences a. Smaller organizations would benefit from this type of exchange of information, easily accessed source like a website/web-forum b. Expensive/time consuming to send representatives to large water conferences 3. Communication with public consumers a hard task a. New and potential contaminants and treatment practices b. "Annual Water Quality Report" difficult to convey c. Limited information on both sides d. Residents want best product without having to pay for high quality

Future Communications (Continued)	
Thoughts on Potential "Delta Users" Web Forum	1. Enthusiasm and excitement toward possibility of website/web-based Delta water users forum to exchange data and information. 2. Problems/frustration experienced with using CALFED website, locating projects/data related to Delta water. 3. Results from pilot study projects for new treatment technology, new research on DBPPs (treatment and formation) and other new contaminants of concern (COCs) (byproducts of Pharmaceutical and Personal Care Products (PPCP)) extremely useful. 4. Data on TOC, DOC and other DBPP levels in Delta source water. a. Little or no understanding of DBPP-formation, research and communication a necessity. 5. More accessible information about CALFED-funded projects and up and coming opportunities for research grants a. PDF files of past and present projects and research 6. Assistance in developing and expanding real-time data monitoring capabilities to NBA water sources a. Apply Municipal Water Quality Investigations (MWQI) approach and resources to areas in the North Delta

APPENDIX D

SAN JOAQUIN VALLEY MEETING SUMMARIES

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CBDA Treatment Meeting Summary

Meeting Location: City of Avenal Town Hall
Avenal, CA

Date: Thursday, March 17 2005

Attendees:

Brown and Caldwell

Sarahann Dow	Project Manager
Eian Lynch	Project Engineer

Water Agency/Facility

Rick Cunningham	General Manager

Treatment Plants: 2 adjacent WTPs, 2.2 MGD (1972) conventional with updraft clarifiers and pressure filtration, 3.1 MGD (1987) conventional with gravity filtration

Intake Summary: 100% State Water Project (SWP) water from the California Aqueduct

Drinking Water Treatment Plant Goals	
Water Quality Goals	1. Compliance with regulations a. Not just meeting regulations, exceeding them i. Act as contingency for unexpected jumps in raw water quality degradation ii. Ensures healthy and safe drinking water for the town in which most staff and family live in b. Stage 2 D/DBP Rule i. Already in non-compliance with DBP MCLs, more stringent regulations without source water improvement increases treatment difficulty 2. Establish treated water storage facilities to accommodate community development 3. Certification of staff by December 2006
Challenges with Current/Up and Coming Regulations	1. Stage 2 DBP Rule a. Implementing new technologies/disinfectant system (Chloramines) to maintain compliance very difficult and costly b. Raw water is unstable i. Seasonal challenges not a problem, unexpected fluctuations are ii. Changes in raw water seen overnight iii. Unexpected fluctuations may trigger non-compliance regardless of new disinfectant
Assistance Needed/Suggested from CALFED	1. Source water quality stability improvements a. Reduction in TOC and turbidity variability i. Spikes in TOC thought to cause non-compliance in THM MCLs

	ii. Turbidity fluctuated in the past from 18-20 to 60 NTU 2. Treatment guidance/assistance before non-compliance a. Pro-active management desired b. Assistance (DHS) only came after non-compliance 3. More user-friendly information from/about CALFED a. Available funding for disadvantaged communities b. Pilot scale results, research information, successes and failures, studies of new management practices and technologies
Delta Source Water Reliability	
Definition of reliable source water	1. Stable, without drastic fluctuations a. State water project water highly variable, spikes seen in various constituents sometimes overnight i. TOC, alkalinity, turbidity b. Instability increases costs and effects consumer health i. Non-compliance, drastic ranges in chemical dosing (coagulant, free chlorine)
Concerns with the Reliability of Delta Source Water	1. Wish for source water improvements within a treatable range a. TOC: 3 mg/L level at Delta intakes is too limiting i. High influent TOC (4-5 mg/L) results in DBP-formation and threats of non-compliance ii. Low influent TOC (less than 3 mg/L) increases % reduction difficulty iii. Optimum would be 2 mg/l or less. b. Frequent and rapid turbidity spikes experienced (often overnight) i. Increases chemical use requirement unexpectedly, sometimes cannot adjust treatment quick enough c. More control/enforcement of agricultural drainage restrictions 2. No existing alternative sources, 100% SWP water at all times a. Lack blending capabilities, entirely dependent on Delta water
Suggestions for CALFED Focus on Delta Water Quality Reliability	1. Reducing constituent fluctuation/improving source water consistency a. SWP water is the only intake source, no alternative storage or conveyance capabilities b. Capabilities to predict/foresee incoming deviations from "normal" levels, information on what spikes are coming 2. Dredging sediment buildup at intakes (Clifton Court)
Treatment	
Parameters Governing Disinfectant Choice	1. Compliance with DBP MCLs a. Avenal in non-compliance with TTHM MCLs Jan '02 to Mar '03 b. Required by EPA to develop master plan to lower TTHM formation c. Implementing most cost-effective solution recommended by DHS: chloramination for primary disinfection 2. Cost a. Disadvantaged community receiving little revenue from consumers (nearly half population consists of prison inmates)

	b. Cannot afford to invest in pilot studies, unusable assets, needed proven and reliable system i. After non-compliance vendors were "knocking down the door" but investments couldn't be made, no available data that strongly supported new technologies ii. Chlorine dioxide system initial first choice (automated), but discouraged by potential nitrification issues iii. DHS very helpful but only after non-compliance occurred, promoted only chloramine disinfection iv. Visits made to other treatment plants (EBMUD) to investigate chloramination
Areas of Increasing Difficulty	1. Treating variable source water a. Costly effort i. Chemical usage sometimes sporadically high when spikes come through ii. Practice rudimentary "Enhanced Coagulation" by using highest possible chemical dosage to remove high TOC b. Unpredictable TOC fluctuations i. Only indicator is increase in residual chlorine, no changes in color, taste, other parameters ii. Unexplainable, no information on causes, trends, consistency (DOC fraction) c. No alternative (non-Delta) source water to blend with 2. Compliance with DBP MCLs
Conveyance/Distribution Issues	
Improvements for Delta Water Conveyance	1. Looking to move intake farther upstream, in front of gate on SWP a. EDA federal grant acquired to fund project b. WTPs located "on the bank of the California Aqueduct" c. Gate increases turbulence in raw water i. Different turbidity readings experienced on either side of gate d. Gate collects aquatic weeds and algae i. Algae and weeds prevented from entering the plant by intake screens regardless of gate 2. Dredging a. Clifton Court Forebay i. High turbidity as a result from high winds and sediment buildup b. California Aqueduct i. Also has sediment buildup problems 3. Protect against unforeseeable, localized events causing water quality degradation a. Levee integrity: Jones Tract failure lead to major TOC spikes b. Major event noted in 2002, caused DBP non-compliance for THMs c. Other SWP discharges

	i. Drainage from flood at construction site at Arroyo Pasajero in Heron (1995) ii. Direct agricultural drainage events unregulated iii. Stormwater releases
Improvements for Distribution	1. System is technically not the responsibility of the WTPs a. Public Works (PW) department handles the distribution O&M i. PW staff has limited drinking water treatment knowledge, not certified technicians ii. Major goal of WTP manager (Rick) to get PW staff certified by December 2006 (Distribution certitication) iii. WTP staff works closely with PW to solve problems with distribution iv. PW cannot afford to send multiple staff to workshops for training b. PW and WTP staff mutually concerned about Stage 2 D/DBP Rule and sampling for DBPs at multiple points in distribution 2. Storage of treated water planned to accommodate new development a. Two 1 million-gallon storage tanks to be installed
Alternative Water Sources	1. No alternatives to SWP water exist for Avenal a. No storage capabilities for local water sources i. Local water highly saline, of lesser quality than Delta water ii. High oil drilling activities degrade groundwater
Future Communications	
Current Data Tracking	N/A
External Communication Level	1. Local water facilities a. Some communication with Coalinga and Heron i. Not by choice, no fault of any one group b. Joint-venture to develop agricultural BMPs failed i. Grant was acquired but other cities backed out 2. California Rural Water Agency a. Developed for small water facilities, discuss different issues i. Up and coming regulations ii. Free workshops, technical classes, disinfection iii. General water topics but many groundwater issues b. Avenal a paying but not a voting member i. Population (15,000) greater than 10,000 cannot vote c. Representative meets with Avenal monthly i. Clarified Proposition 50 grant application information d. Lacks Delta water focus 3. AWWA a. Cannot afford to send staff to conferences and workshops i. Small staff (5 people), limited time and budget b. Organization viewed as too big and bureaucratic to be beneficial for their small facility c. Encouraged a Delta-focused workshop that operators could

	attend i. Multiple meeting dates/times at the same location may better suit operators' schedules 4. CALFED a. Little direct involvement i. Receive mailings only, information received very confusing, nomenclature hard to understand ii. Grant/funding proposal guidelines and criteria not well defined and explained b. Noted high interest in increased involvement after the meeting
Thoughts on Potential "Delta Users" Web Forum	1. Website seen as very beneficial if user-friendly a. DHS and EPA websites mentioned as "useless" b. More efficient use of time i. Reading all mailings time consuming, use internet frequently 2. Posting Delta-focused information seen as highly beneficial a. New technology i. Pilot study data, results and experiences from full-scale implementation b. Treatment strategies for Delta source water i. Forum could be used to discuss different approaches used by different treatment facilities c. New research on existing and future constituents, treatment

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CBDA Treatment Meeting Summary

Meeting Location: Coalinga Water Treatment Plant
Coalinga, CA

Date: March 17 2005

Attendees:

Brown and Caldwell

Sarahann Dow	Project Manager
Eian Lynch	Project Engineer

Water Agency/Facility

Tim Hawk	Water Treatment Operations Manager
Mark Ysusi	Boyle Engineering, Assistant Managing Engineer

Treatment Plants: (12 MGD) Conventional treatment (sedimentation basins), dual-media filtration, chlorine disinfection (switching to chloramines for secondary disinfection, residual), orthophosphate addition for distribution corrosion control

Intake Summary: 100% SWP water from the California Aqueduct
Coalinga Canal - 3 MGD capacity, directly receives SWP water, acts as small buffer zone

Drinking Water Treatment Plant Goals	
Water Quality Goals	1. Meet all current regulations a. Compliance with DBP MCLs are paramount concern i. TTHM levels 40-50 µg/L, goal to reduce TTHM levels ii. Changing secondary disinfection system to chloramines, residual in distribution system b. Lead and copper MCLs i. Previously in non-compliance
Challenges with Current/Up and Coming Regulations	1. Stage 2 D/DBP Rule is a major concern a. THM concentrations very close to MCL b. High THM formation potentials noted in SWP water c. Cannot blend, no alternative sources to Delta water 2. Future pathogen analysis requirements a. Methods for cryptosporidium testing unclear 3. Copper MCL a. Unrelated to Delta water quality 4. Variability a. Strong seasonal variations i. Lowest water quality seen from Feb to April ii. High organics
Assistance Needed/Suggested from	N/A

CALFED	
Delta Source Water Reliability	
Definition of reliable source water	1. Treatable source water based on existing treatment scheme a. Reduced organics in source water b. Lower THM formation potentials in SWP
Concerns with the Reliability of Delta Source Water	1. Focus on DBP formation overriding ability to acknowledge other water quality issues that may be problematic 2. Strong variability and high organics in SWP water a. Springtime yields high TOC, increases in turbidity and color problems b. Experience non-seasonal spikes in TOC c. THM formation potential believed to increase southerly along SWP d. Limited buffering from Coalinga Canal 3. Periodic T&O problems a. Unpredictable events b. Unclear whether related to algal blooms i. Coalinga Canal fairly stable 4. Predictability low a. Limited monitoring capabilities for upstream SWP degradations in water quality i. Effective use of Coalinga Canal dependent on ability to foresee low quality water in SWP
Suggestions for CALFED Focus on Delta Water Quality Reliability	1. Lower THM formation potential in SWP 2. Improved storage/blending capabilities a. Investigate water banking projects for local facilities 3. Strategize to reduce frequent immobility of low water quality in SWP 4. Pilot studies with new treatment technologies a. Reduction of high TOC concentrations b. Disinfection strategies to lower THM formation
Treatment	
Parameters Governing Disinfectant Choice	1. Compliance with DBP MCLs, high TOC a. THM formation paramount concern, recent non-compliance issues b. Currently switching secondary/residual disinfectant from chlorine to chloramines c. Other disinfection options to costly and do not have staff availability for complex treatment processes. d. Interested in pre-treatment to remove organics prior to disinfection
Areas of Increasing Difficulty	1. Compliance with THM MCLs 2. Upgrading treatment without internal support

	a. Not enough resources to keep up with available technology and improved methods b. Limited operations staff and opportunities for staff training 3. Periodic T&O problems a. About every two years need to use PAC a few times in response to T&O
Conveyance/Distribution Issues	
Improvements for Delta Water Conveyance	1. Decrease residence time of low quality water a. Can remain in California Aqueduct for 2-3 days depending on mobility/usage of facilities further south (MWD) 2. Blending capability with alternate sources a. Allow storage of high quality SWP water b. Local reservoir that could store water directly from California Aqueduct i. Coalinga Canal limited buffering capabilities 3. Concerns over security monitoring of open channel SWP a. Potential terrorist actions 4. Agricultural drainage into SWP a. Little regulation of short term direct drainage events
Improvements for Distribution	1. Established treated water storage reservoirs/tanks a. Currently have 7.6 million gallon treated water reservoir (tank) i. Creates pressure head for distribution to the city b. Northwest and Kings reservoirs i. Primarily for oil operations, drilling c. Calaveras reservoir (5 million gallons) i. Currently serves jail using 12 inch pipeline 2. Copper problems, non-compliant levels within distribution system a. Unrelated to Delta water characteristics
Alternative Water Sources	1. No alternate water sources a. Poor local GW quality, highly saline b. Coalinga Canal allows some buffering capabilities i. Performs like a small reservoir ii. Maintained by Westlands Water District, mechanically removes aquatic flora, other maintenance 2. Alternative treated water sources for state jail and hospital a. Project underway (Proposition 50 grant) to use small stream from tertiary-treated wastewater as irrigation water b. Indirectly provides increased availability of treated drinking water
Future Communications	
Current Data Tracking	N/A
External Communication Level	1. Valley County Water Association a. Operations staff/representatives i. Hanford and Kern County Water Agency

	b. Continuing education meetings/presentations i. Lacking common thread of similar water issues (Hanford utilizes GW, has arsenic and hydrogen sulfide problems) ii. Content can be technically limited and poor 2. Some communication with local water agencies/treatment facilities, could be improved a. Avenal, Taft, Heron 3. Engineering consultation provided by external contracted source a. No local large treatment facilities that can provide guidance on similar water quality issues
Thoughts on Potential "Delta Users" Web Forum	1. Extremely supportive of website/web forum a. Posting of information on demonstration/pilot studies beneficial i. May be very influential in supporting requests for funding from Coalinga City Council (Ion exchange for TOC removal), assist them in defense for further funding ii. Currently do not have access to information on new technology, pilot study results b. Information sharing between facilities using Delta water i. Treatment strategies in response to seasonal and random Delta water variability ii. Notifications of incoming water quality degradation in SWP water 2. Supportive of workshops focused on Delta water issues a. Operator-tailored b. Training sessions, Delta-specific c. Accommodate strict schedules/limited availability accompanying small staff

CBDA Treatment Meeting Summary

Meeting Location: Kern County Water Agency
Bakersfield, CA

Date: March 18 2005

Attendees:

Brown and Caldwell

Sarahann Dow	Project Manager
Eian Lynch	Project Engineer

Water Agency/Facility

James Beck	General Manager
Eric Averett	Improvement District 4 Manager

Treatment Plants:

- Henry C. Garnett Water Purification Plant (45 MGD):
  - Conventional treatment
  - Chlorine primary disinfectant, pre-oxidation with potassium per-manganate, PAC for taste and odor control, gravity multi-media filtration, orthophosphate addition for corrosion control in distribution system
  - 25,000 acre-ft treated annually for wholesale to Purveyors
    - 100,000 residents served
    - Remaining surface water used for GW recharge
  - Purveyors served
    - North of the River Municipal Water District
    - California Water Service Company
    - East Niles Community Services District

Intake Summary: Unique raw water exchange system: Improvement District 4

- Annual entitlement
  - 93,456 acre-ft includes:
    - 77,000 acre-ft SWP M&I
    - 5,946 acre-ft firm agricultural water
    - 1,554 acre-ft surplus of agricultural supplies
    - Approx. 10,000 acre-ft from SWP long term M&I pool
    - Acquisition of other supplies as available (Article 21, DWR Pool water)
- Delta water sources:
  - SWP via California Aqueduct (KCWA contracted for 25% of total available SWP water).
    - ID4 is roughly 10% of the KCWA total SWP supply.
    - ID4 SWP water is used mainly for exchange with Kern River interests and to recharge storage facilities and overlying aquifer, can exchange 100% of SWP supply with Kern River water
- Other water sources (used to minimize shortages, maximize water quality maximize replenishment options)
  - Kern River
  - Central Valley Project/Friant-Kern Canal
  - ID4 Water Banking

Drinking Water Treatment Plant Goals	
Water Quality Goals	1. Prepare for future regulations a. Long record of investing to "stay ahead of the curve" 2. Maintain flexibility in water management a. Unique water supply exchanges i. Continue SWP exchanges for Kern River water, without which would degrade system water quality ii. Continue recharge of SWP water into groundwater storage system b. Optimize raw water supply and transfers to minimize treatment costs and maintain compliance
Challenges with Current/Up and Coming Regulations	1. Stage 2 D/DBP Rule, but not as concerned as most facilities using Delta water a. DBP concentrations typically 15-20% of MCLs leaving treatment plant b. DBP formation primarily in distribution system 2. Treatment waste stream arsenic concentrations a. Concern over high arsenic levels concentrated in waste stream from treating GW. i. Background Kern River & SWP levels 3-7 μg/L ii. Concern of potential hazardous waste classification in the future b. Arsenic not an issue with source water or treated water
Suggestions for CALFED future efforts	1. Increased access/exchange of information a. More pilot scale studies, make results/data available i. UV disinfection, arsenic removal ii. Studies on new disinfection systems, support merit and value of switching disinfectant b. Overall increased sharing of information between facilities treating Delta water c. Viewed as benefit to entire water treatment industry 2. Maintenance of SWP supply a. Strongly against sacrificing water supply quantity for quality 3. Support isolated facility for Delta water conveyance a. Entire KCWA, including board of directors, supports the idea b. Also referred to as "dual channel, peripheral canal"
Assistance Needed/Suggested from CALFED	N/A
Delta Source Water Reliability	
Definition of reliable source water	1. Consistent quantity with a predictable quality 2. Water quality at treatment plant highly dependent on source shifting a. Water management practices strongly reduce effects of Delta water variability b. Invest in cost-effective source water exchanges instead of new treatment technologies

	c. Monitoring SWP water quality upstream allows switching to higher quality water to be made in advance d. Agricultural customers also satisfied with water quality
Concerns with the Reliability of Delta Source Water	1. Potential reductions in SWP water quantity due to improvements in quality through CBDA a. Reductions in quantity would limit exchange capability and severely affect treatment i. Quality not embedded in SWP water allotment contracts b. Very supportive of water quality improvements that increase yield or don't reduce supply 2. Instability of levee system a. Huge threat of devastating Delta water quality
Suggestions for CALFED Focus on Delta Water Quality Reliability	1. Increase quality without losses to quantity 2. Improve exchange capabilities for facilities using Delta water a. More cost effective way to increase source water quality than direct efforts at source
Treatment	
Parameters Governing Disinfectant Choice	1. More cost-effective to invest in source exchange system than treatment a. Blending /source shifting reduces high TOC and concerns over DBP formation, suppresses SWP water variability b. Treatment costs reduced by use of simple disinfection system (free chlorine addition) c. Chlorine to remain as primary disinfectant, see no merit or value in changing disinfectant
Areas of Increasing Difficulty	1. TOC levels always a concern a. If source shifting cannot reduce TOC then may have a problem with DBP formation, meeting MCLs 2. Algae low level concern a. Use PAC seasonally parallel to algae growth cycles
Other Treatment Issues	1. Treatment plant expansion due to growth, opportunity for optimization a. Expansion from 45 to 72 MGD b. Conducting feasibility study for expansion and optimization of existing facilities
Conveyance/Distribution Issues	
Improvements for Delta Water Conveyance	1. Maintain progress in real-time data forecasting and quality monitoring of conveyed water in SWP a. Essential to optimized usage of source switching in response to water quality degradation (now 2-3 days advance notice) b. Maintains treatment plant efficiency 2. Maintain quantity a. Continued acceptance of return of KCWA water to California Aqueduct
Improvements for Distribution	1. Reduction of DBP-formation within distribution system a. DBP concentrations differ i. Treated water leaving plant: approx. 20-30 μg/L ii. Distribution system/terminal reservoirs: approx 50-60 μg/L

	b. Looking into reducing residence time of treated water in terminus reservoirs (Oswell, 6.8 million gallons, and Terminal Reservoirs) i. Maximum residence time typically a few days, never weeks ii. Investigating changing design to flow-through storage iii. More cost-effective to make improvements in distribution than in treatment iv. "comfortable" with DBP reduction achieved through conventional treatment c. Purveyors can make adjustments when receiving treated water i. Local, separate treatment facilities 2. Modified clearwell to reduce DBP-precursors a. Included as part of plans for plant expansion/optimization
Alternative Water Sources Due to Treatment Costs	1. Breakdown of alternative (to SWP water) source water options a. SWP brought into exchange system during early part of year i. Stop intake of SWP into treatment plant before high variability, TOC spikes ii. Maximize exchanges for Kern River water b. Kern River i. Highest water quality source, exchanged for SWP water (SWP water/recharged GW pumped directly into river) ii. No significant urban runoff or large developments near watershed, naturally protected iii. TOC concentrations 2-3 mg/L c. Cross Valley Canal i. 27 mi pipeline from California Aqueduct to storage/buffer pond ii. remaining water discharged to groundwater to raise water table affected by pump-offs from local aquifers d. Kern Water Bank i. 30,000 acres or recharge land (approx. 1.5 million acre-ft supply) ii. Allows banking of water iii. Subsurface conditions (alluvial fan) provide excellent GW quality iv. System of GW wells for recovery e. Pioneer Project i. Available recharge land with system of GW wells for recovery of GW ii. Subsurface conditions (alluvial fan) provide excellent GW quality f. Friant-Kern Canal i. Emergency source ii. High quality source with periodically high levels of nutrients/pathogens due to agricultural discharges (peak during high flow event 1998/1999)

Future Communications	
Current Data Tracking	1. Internal real-time data tracking at treatment plant (SCADA) a. Raw water monitoring at influent b. Treated water monitoring at effluent c. Record grab samples analyses 2. External use of MWQI monitoring and RTDF a. "Value found in RTDF data" b. MWQI database "very helpful" in predicting trends months beforehand c. Allows treatment plant to shift strategies in source exchange in response
External Communication Level	1. AWWA a. Maintains a good network of contacts of state-wide water agencies through national and CA/NV section i. Palmdale, MWD, Zone 7 Water Agencies, ACWD ii. Have great familiarity with other treatment plants b. AWWA is too broad i. Supportive of Delta-focused workshop/forum ii. Focus and support for operators seen as beneficial iii. KCWA "small staff" also has trouble sending many delegates to conferences 2. Maintain local communications on SWP water quality a. Frequently exchange information with Central Coast Water Authority 3. California Farm Water Coalition a. Agriculture major part of consumer concern i. major water customers ii. Agriculture core part of community, life, economy in the area 4. California State Water Contractors a. KCWA one of funding agencies
Thoughts on Potential "Delta Users" Web Forum	1. Very supportive of website a. Research on current and future contaminants of concern b. TOC, DBP precursors and formation, PCPPs c. Enhance communication with other facilities treating SWP and other Delta source water d. Must not be redundant with existing forums

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APPENDIX E

SOUTHERN CALIFORNIA MEETING SUMMARIES

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CBDA Treatment Meeting Summary

Meeting Location: Central Coast Water Authority (CCWA)
Buellton, CA

Date: March 31, 2005

Attendees:

Brown and Caldwell

Jill Cunningham	Senior Project Engineer
Eian Lynch	Project Engineer

Water Agency/Facility

Shannon Sweeney	Staff Engineer
William Brennan	Executive Director

Treatment Plants: Polonio Pass Water Treatment Plant (PPWTP)(43 MGD)
Pre-oxidation with free chlorine, enhanced coagulation, post filtration chlorine disinfection, GAC filters, chloramines for residual in distribution (ammonia and chlorine addition)

Intake Summary: 100% SWP water from the Coastal Branch of the California Aqueduct

Drinking Water Treatment Plant Goals	
Water Quality Goals	1. Meet goals and needs of contractors that receive treated water from CCWA, member agencies, and project participants a. CCWA is a wholesaler of treated water 2. Stay ahead of all drinking water regulations a. Continue good compliance record
Challenges with Current/Up and Coming Regulations	1. Taste and Odor a. Becoming a seasonal problem
Assistance Needed/Suggested from CALFED	1. Make source improvements to water quality so that water agencies and treatment facilities can meet current and future regulations a. Have handled the treatment side with investments but cannot improve the source 2. Increase conveyance capability through and out of the delta
Delta Source Water Reliability	
Definition of reliable source water	1. Dependable and consistent water quality and quantity a. Treatment capability very flexible, can handle most deviations in water quality if known in advance i. High TOC levels are treatable but expensive ii. T&O problems less controllable, leads to dissatisfied customers 2. Supply is equally critical, quantity of Delta water supply never stable a. Variability in supply a huge concern

	b. The majority of the costs of Delta water are fixed, yet we rarely receive full allocation c. State recoups all of its costs regardless of the quantity of water delivered d. All costs are eventually passed down to consumers
Concerns with the Reliability of Delta Source Water	1. High organic carbon concentrations a. Levels exceeding 7 mg/L experienced in raw water from SWP b. High variability in regards to fraction of DOC in TOC i. Particulate organic carbon problematic during flood events c. Increases treatment costs, rising chemical dosage for enhanced coagulation 2. Huge variability in water quality a. Have experienced dramatic changes within hours i. pH, turbidity, alkalinity 3. Levee structure stability in Delta a. Failures in past resulted in organic carbon concentrations 5-10 times higher than normal i. Jones Tract ii. Were not severely affected by failure but understood large impact on upstream State Water Contractors b. Concerned about benefits from levee improvements i. Do not want to pay for improvements that primarily benefit agriculture ii. Water agencies should not have to pay for improvements that provide no direct benefit. 4. Algae growth in SWP intakes and along SWP a. T&O problems not addressed effectively through DWR actions i. Copper sulfate additions made inconsistently for maintenance reasons only ii. Removal of algae solely to prevent/reduce pumping equipment clogging/interference b. Aquatic weeds also problematic i. Need balance between chemical additions (herbicides) in Delta and mechanical removal at Banks Pumping Plant ii. New trash rakes only marginally effective c. Shallowness of Clifton Court Forebay plays big factor i. Dredging strongly suggested at Clifton Court ii. Losing pumping capacity at intakes
Suggestions for CALFED Future Efforts	1. Address algae growth problem more effectively with balanced approach a. Must be backed by sound science 2. Improve water supply reliability a. Actually deliver contracted water a. Willing to participate in funding improvements backed by sound science and with direct benefits to urban contractors

	3. Improvements to water quality a. Source water i. Identify sources of water quality degradation ii. Reduce organic carbon concentrations b. Identify and control discharges, gain comprehensive understanding of impacts i. Agricultural drainage and urban runoff ii. Wastewater discharges, study a proper fix beyond just current treatment requirements c. Not unrealistic for CALFED to address high background arsenic concentrations in Central Valley groundwater i. Several banking/exchange projects in place and more envisioned in the future ii. Potential threat to SWP water quality 4. Improve monitoring so incoming water quality and quantity is predictable and reliable a. MWQI must include flow data with constituent concentration data i. Can't determine when poor quality water arriving at WTP without appropriate flow data b. Data must be more timely to be useful 5. Improve circulation of water in Delta a. Research changing water movement around levee systems i. Studies involving using remnants of old levee systems to channel/ control direction of water (Frank's Tract) b. Look into effects on dissolved oxygen (DO), algae growth, salinity, etc. 6. Research effects of water quality on endangered species
Treatment	
Parameters Governing Disinfectant Choice	1. Chlorine remains primary disinfectant a. Cost is lower than more modern technology b. Ozone is being considered i. Bromate formation will then be a major concern c. Overall treatment needs have already been met at PPWTP 2. DBP formation a concern but not a driving force a. Sufficient TOC removal achieved by enhanced coagulation, GAC filtration i. 50-60% removal
Areas of Increasing Difficulty	1. Huge T&O problems a. Upstream on Coastal Branch extension b. Benthic algae growth c. Rise in T&O problems from levee failures i. Jones Tract ii. Hard to differentiate with forebay and aqueduct algae growth

	2. Increasing chemical costs a. Flexible treatment system but variability in water quality can get costly to treat i. GAC filters lose efficiency for taste and odor reduction after three months (down to 10% removal) ii. Alum for coagulation and sulfuric acid for pH buffer increasing costs b. No sign of incoming TOC concentrations decreasing 3. Future constituents of concern a. Pharmaceutical and Personal Care Products i. CCWA keeping up to date on limited research b. Arsenic from pumping of recharged groundwater into SWP i. Local water sources in Central Valley c. Asbestos and sediment from Arroyo Pasajero flooding into aqueduct
Conveyance/Distribution Issues	
Improvements for Delta Water Conveyance	1. Improve intake conditions a. Dredging operations (Clifton Court Forebay) b. Reducing algal growth to remedy T&O problems c. Resolve low DO conditions d. Treat aquatic weed problems in Delta 2. Regulate activity, discharges along SWP a. Agricultural drainage, urban runoff b. Less obvious activities i. Arroyo Pasajero asbestos contamination ii. Exchanges into SWP from local water sources with background concentrations higher than Delta water (arsenic)
Improvements for Distribution	1. Monitoring required under Stage 2 D/DBP Rule not a concern a. Monitoring at multiple points along distribution system already practiced at CCWA b. THMs experienced in the 50 µg/L range i. Treated water can have long detention times (3 weeks) ii. Still not a concern, under control 2. Some nitrification issues, overall not a problem a. Storage tanks i. Encourage mixing of treated water in storage tanks
Alternative Water Sources	1. No alternative to SWP water 2. Interested in groundwater banking opportunities a. Project members/customers shown interest b. Less risk than utilizing in county surface water storage i. Although background arsenic concentrations a concern i. Concentration of As in waste stream

Future Communications	
Current Data Tracking	1. RTDF a. Member of research board, use data b. Concentration data not useful without matching flow data i. Cannot estimate timeframe for arrival and length of persistence of poor quality water at WTP influent
External Communication Level	1. Other water agencies/treatment facilities a. Great network of information/research exchanges i. MWD, ACWD, CCWD, KCWA 2. Good communication with State Water Contractors 3. National and local organizations a. AWWA conferences i. All staff (supervisors, operators, distribution) encouraged to attend, need continuing education credits (CEU) ii. Good research but many times has no impact on CCWA operations iii. Water Quality Technology Conferences (WQTC) ▪ Updates on future regulations, EPA diagrams ▪ Preparation methods/tools discussed b. ACWA conferences c. Don't see need for large scale new Delta-focused conference i. Several forums already in existence ii. Implemented at local/section level 1. Solid in-house training of staff Maintain CEUs
Thoughts on Potential "Delta Users" Web Forum	1. CCWA expressed support for Delta-focused web forum a. Need accessible location for information concentrated just on Delta water treatment, source water quality i. Quality data and information scattered across multiple websites (DWR, CALFED) ii. User-friendliness is vital iii. Post raw research related to Delta, best available technologies (BAT), BMPs b. Data posted must be useful iii. Include all important constituents with necessary parameters (flow) to allow prediction capabilities iv. Must be peer-reviewed, well-established v. Information must be applicable to individual facilities

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CBDA Treatment Meeting Summary

Meeting Location: Crestline Lake Arrowhead Water Authority at Lake Silverwood Water Treatment Plant
Lake Silverwood, CA

Date: March 30, 2005

Attendees:

Brown and Caldwell

Jill Cunningham	Senior Project Engineer
Eian Lynch	Project Engineer

Water Agency/Facility

Thomas Newell	*Superintendent* Crestline Lake Arrowhead Water Agency (CLAWA) Lake Silverwood Water Treatment Plant (LSWTP)

Albert A. Webb Associates

Brian Knoll	Treatment Plant Engineering Consultant

Treatment Plants: LSWTP (5 MGD): Conventional treatment, upflow clarifier (coagulation and sedimentation), multi-media pressure filters, granular activated carbon (GAC) filters, MIOX primary disinfection (hypochlorite), free chlorine residual in distribution

Intake Summary: 100% SWP water stored in Lake Silverwood, blended naturally with water from surrounding watershed

Drinking Water Treatment Plant Goals	
Water Quality Goals	1. Meet all current regulations a. THM MCLs a major focus b. Turbidity 2. Operator training/certification a. Described as "paramount" to function of LSWTP b. Currently not a problem for CLAWA
Challenges with Current/Up and Coming Regulations	1. Instability of regulations a. Constantly changing regulations hard to keep up with i. Staying ahead difficult b. Currently under control at WTP 2. Stage 2 Surface Water Treatment Rule (SWTR) a. Concerns with potential requirement for Cryptosporidium analysis and reduction i. Lack modern in-house laboratory at LSWTP ii. Unclear of potential regulatory requirements iii. Considering implementing UV disinfection if necessary to meet Stage 2 requirements
Assistance Needed/Suggested from	1. Clarify Stage 2 SWTR a. Make information readily available

CALFED	
Delta Source Water Reliability	
Definition of reliable source water	1. Stable quantity and predictable quality a. raw water quality no longer a severe concern i. Treatment modified to reduce high incoming organic carbon ii. Variability and spikes buffered by Lake Silverwood, considered "wide part in the road" of California Aqueduct b. Source water quality improvements would ease treatment costs
Concerns with the Reliability of Delta Source Water	1. Consistently high TOC concentrations a. TOC was the "thorn in the saddle" for over 20 years at LSWTP b. Experience high 1st quarter spikes, seasonality i. High THM formation potentials experienced, 250-500 max potential c. Treatment O&M costs high and expected to rise 2. High turbidity loads a. Lake Silverwood i. Levels up to 150 NTU reached during storm events ii. Forest fires in surrounding area cause large sediment loads iii. Incoming high turbidity from SWP water adds to problem b. Algal blooms coming down SWP i. Enter Lake Silverwood and "explode", grow considerably
Suggestions for CALFED Future Efforts	1. Reduce point and non-point sources of water quality degradation in Delta 2. Minimize TOC concentrations at Delta water intakes 3. Minimize algal blooms along California Aqueduct
Treatment	
Parameters Governing Disinfectant Choice	1. Installation of MIOX (mixed oxidants) disinfection system a. Initially for risk management, safety issues i. Replaced chlorine gas system ii. Installed under emergency construction b. Not in response to DBP formation, Stage 2 D/DBP Rule i. Unclear if MIOX had any influence on THM formation ii. Installation of GAC filters necessary, for ultimate THM reduction iii. "Solved" DBP MCL compliance issue
Areas of Increasing Difficulty	1. TOC removal/percent reduction a. Target effluent TOC 2 mg/L b. High concentrations causes high changeout rate for GAC filters c. High O&M costs d. Upflow clarifier very good removal efficiency but has limitations 2. Potential Cryptosporidium disinfection requirements

	3. Operating LSWTP during forest fires a. Hard to maintain staff onsite during fire events i. Essential for operation of LSWTP b. Deliveries for O&M materials very difficult to obtain
Suggestions for CALFED Future Efforts	1. Less focus on new technology a. Concentrate pilot studies/projects on modifications to conventional treatment i. Shown to be effective at LSWTP through installation of GAC filters b. Enhance real time monitoring capabilities i. Extend to multiple sites along conveyance, SWP ii. Improve timeliness so facilities can predict incoming water quality c. Characterize factors/loads contributing to Delta water quality degradation
Conveyance/Distribution Issues	
Improvements for Delta Water Conveyance	1. Algae growth along SWP and into Lake Silverwood a. T&O controlled through use of GAC filters b. California aqueduct shallow, perfect environment for algae to thrive i. Major source of algae in Lake Silverwood
Improvements for Distribution	1. Simple distribution line, no real problems noted a. 30 mile straight "spaghetti" line i. Large initial lift, 750 pounds of head ii. Residual maintained without problems, no need for rechlorination iii. 20 million gallons of treated water storage b. Experience some long detention times i. Not a circulating system, cannot regularly flush 2. Stage 2 D/DBP monitoring a. Formation of DBPs a potential concern i. Existing monitoring sites along distribution system, ii. If additional sites required will be difficult due to remote locations, power sources in mountains
Alternative Water Sources	1. LSWTP currently shut down due to high rainfall a. Runoff supplying large quantity of local water sources b. No immediate need for Lake Silverwood/SWP water i. Wholesalers using only 260 GPM of LSWTP treated water from storage
Future Communications	
Current Data Tracking	1. TOC analyzer on site a. Considered "most valuable" piece of analytical equipment in WTP i. Allows operators optimize treatment based on incoming raw water quality (chemical dosing, additional filter trains, etc.) ii. Cuts treatment costs significantly iii. Operators very enthusiastic about use of equipment,

	capability it creates b. Results in 15 minutes 2. Water quantity and quality prediction capabilities seen as highly beneficial a. Timely water data needed i. Would allow operations staff to more effectively adjust treatment ii. Data useless when water has already come and gone b. Monitoring upstream would be extremely helpful
External Communication Level	1. Little communication with other water agencies, treatment facilities a. Generally during emergency situations only i. Poor water quality events in Delta, drastic spikes exhibited in SWP water ii. Forest fires, natural disasters 2. Involvement/memberships with water organizations a. AWWA i. Very good resource, send operators to training workshops, conferences, etc. ii. Delta-water focus would be helpful, but not seen as largely effective
Thoughts on Potential "Delta Users" Web Forum	1. Viewed as beneficial a. Posting valuable Delta-focused information i. Real-time monitoring data ii. Different treatment strategies, modifications to conventional treatment, success and failure stories iii. Pilot study results, data b. Increase information sharing between facilities treating Delta water from similar and different intakes

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CBDA Treatment Meeting Summary

Meeting Location: The Metropolitan Water District of Southern California
Henry J. Mills Treatment Plant
Riverside, CA
Date: March 29, 2005

Attendees:

Brown and Caldwell	
Sarahann Dow	Project Manager
Eian Lynch	Project Engineer
Water Agency/Facility	
Brad Coffey	Water Purification Unit Manager
Richard Mann	Team Manager VI, Operations Compliance Team
Gary Syfers	Mills Treatment Plant Unit Manager

Treatment Plants: Mills Water Treatment Plant (MWFP) (1 of 5 MWD treatment plants)
160 MGD capacity conventional filtration, coagulation, sedimentation basins
Ozone primary disinfectant, chlorine backup and chloramines as secondary disinfectant

Intake Summary: 100 percent SWP water from the East Branch of the California Aqueduct
Emergency supply from Colorado River Aqueduct

Drinking Water Treatment Plant Goals	
Water Quality Goals	1. Established system-wide water quality goals (for all of MWD WTPs) a. Used as guide to stay ahead of compliance problems b. Source water TOC: < 4 mg/L i. To avoid need for enhanced coagulation c. Turbidity: < 0.1 NTU d. Total dissolved solids (TDS): < 500 mg/L e. T&O i. Geosmin: < 5 ng/L ii. MIB: <5 ng/L f. Nitrate: non-detectable g. TTHMs: < 80 μg/L at any time; <64 μg/L as RAA h. Bromate: 8 μg/L i. No consumer complaints 2. Installation of ozone disinfection systems at all MWD WFPs 3. Optimize usage of available local water sources
Challenges with Current/Up and Coming Regulations	1. Stage 2 D/DBP Rule a. Bromate formation from ozone disinfection system i. Currently researching different methods for bromate control measures b. Increasing operating costs to reduce DBPs i. TOC removal, chemical addition costs ii. Do not have concerns over DBP-formation in distribution system, no "hot spots" acknowledged
Suggestions for CALFED Future Efforts	1. Quicker response to changing regulations a. Regulations and standards getting more stringent

	i. Need more improvements made in Delta water quality ii. As MWD invests heavily in treatment improvements, investments in source water quality improvements become less cost effective 2. Assessment of effects on Delta water quality of increased discharges a. Increasing population in watershed leading to further degradation of water quality b. Wastewater treatment discharge i. Sacramento Regional WWTP increased discharge, seen as significant future increase in nutrient, pathogen, carbon, and salinity point source ii. Lack of data on wastewater fraction (recycled water) at Banks intake, interested in seeing a study on this c. Urban runoff d. Limited understanding of where the water quality degradation is coming, need to prevent continued degradation. e. Farming on Delta islands, increased organic carbon loads
Delta Source Water Reliability	
Definition of reliable source water	1. Water quality improved to meet reliability defined by the CALFED ROD a. 50 μg/L bromide, 3 mg/L TOC not a feasible objective b. Not achievable by current Delta Improvements as proposed 2. Predictable quality and quantity a. Some notification to allow treatment modifications and source shifting
Concerns with the Reliability of Delta Source Water	1. Continued degradation of entire Delta system a. Lack of understanding of sources i. Cannot identify causes of variability, spikes in TOC b. Quality and quantity changing more quickly than ability of WTPs to respond i. Source water improvements need to "catch up" b. Lack of contingency planning for levee failures 2. High levels of TOC and bromide a. DBP formation a concern 3. Taste and odor problems, algal growth a. Planktonic and benthic algae growth i. High in California Aqueduct, Southern California sections ii. Problems in Lake Silverwood, Castaic b. Lack of remedial action i. No dosing of copper sulfate upstream above Check 41 c. Levee pumping events release high levels of MIB and Geosmin 3. Increasing turbidity a. High input from watersheds, river systems b. Arroyo Pasajero large contributor c. Forest fires increase sediment loading into reservoirs
Suggestions for CALFED Future Efforts	1. Limiting/treating discharges into Delta system 2. Augment reliable supply system through local projects 3. Establish solid contingency plans for Levee system 4. Enhance capabilities of Water Quality Monitoring program (MWQI, RTDF) a. Treatment capabilities wasted without similar level of monitoring b. Need to know when spikes (TOC, Br) expected, magnitude, and

	persistence c. RTDF timely but very comprehensive, "a lot to read through"
Treatment	
Parameters Governing Disinfectant Choice	1. Ozone retrofit implemented for several reasons a. Reduce DBP formation (TTHM, HAA5) i. Stage 2 D/DBP Rule b. Stage 1 surface water rule i. Single step pre-ozonation/oxidation ii. Avoids implementing enhanced coagulation (similar total costs but less O&M intensive) c. Reduce T&O problems, 90% removal of MIB and geosmin d. Chosen over chlorine dioxide i. During feasibility study state regulations had lower MCLs for chlorite (now switched to less stringent federal standards) ii. Poor control over T&O, no MIB and geosmin reduction
Areas of Increasing Difficulty	1. TOC removal a. Potential need for enhanced coagulation i. More frequent high organic carbon levels and DOC spikes without knowledge of cause (Castaic Lake) ii. Mills WFP experience 1/20 samples above 4 mg/L in 2000, now 1/3 samples above 4 mg/L 2. pH control a. pH suppression for bromate control a major agenda b. Switching coagulant from ferric chloride to alum i. More influential on pH levels, must monitor pH more closely c. Addition of sulfuric acid for pH suppression (achieve pH of 6.75) i. Looking into alternatives 3. T&O problems a. Ozone provides good removal but problem expected to worsen i. Increased nutrient concentrations in Delta water ii. No existing plans to reduce algae formation at Delta intakes and along SWP
Conveyance/Distribution Issues	
Improvements for Delta Water Conveyance	1. Increased project work at Lake Perris 2. Monitor water quality along the SWP a. Extend MWQI, RTDF 3. DWR draft policies on pumping programs into SWP a. Facilitate water exchanges without degrading water quality for downstream SWP users i. Groundwater recharged by Delta water being pumped back into SWP ii. Increased nitrate, arsenic, or other constituents concentrations from background levels in groundwater pumped into SWP b. Delayed effects from storage of poor quality Delta water i. San Luis reservoir, results in unexpected changes in water quality downstream from releases
Improvements for Distribution	1. Increase understanding/benefits of chloramines a. Improve industry's design and implementation capabilities through projects

	b. Provide assistance on how to manage chloramines in distribution system i. Optimize residual concentration ii. Preventing DBP formation iii. Controlling nitrification
Alternative Water Sources	1. Colorado River water a. Receive surplus water, allocations expected to change in immediate future b. Highly saline
Future Communications	
Current Data Tracking	
External Communication Level	1. Good level of communication with: a. local State Water Contractors b. Other large agencies i. CCWD, ACWD, KCWA 2. Limited operations-based communication between agencies a. Untimely and infrequent "heads up" notification of water quality degradation i. Communications from upstream facilities often received after poor quality water arrives at WTP b. Majority of information exchanged only during highly problematic periods c. Increase in communication seen as beneficial 3. Strong involvement in research groups, conferences a. Co-investigator in multiple projects i. CALFED "DBP-forming material in SWP", UV and multiple disinfectants project ii. 10 USGS projects b. Heavily involved in AWWA forums i. AWWA, CA/NV Section, AWWARF ii. Send multiple staff and operators for training, etc. iii. Feel as though these are great resources to address Delta water problems c. CALFED workshops tend to be dominated by ecosystem interests i. Beneficial to have more water quality focused workshops
Thoughts on Potential "Delta Users" Web Forum	1. Many overlapping forums exist already and are sufficient a. Delta focused forum could be attached to AWWA CA/NV Section meetings 2. Beneficial to enhance DWR a. Could be better resource for agencies/facilities b. Increase user-friendliness of website c. Add more research/data postings in downloadable formats i. Enhance monitoring and timely data, need better information on "what's coming down the SWP and why"