



Goal: Provide Safe and Reliable Potable Water			
Strategy	Action	Measurable Criteria	
Comply with all drinking water regulations.	<ul style="list-style-type: none"> <li>Continue high quality treatment</li> <li>Evaluate DBP compliance forecast and establish DBP reduction plan, if needed.</li> <li>Perform LT2 monitoring, establish treatment bin, and install treatment as required.</li> </ul>	Achieve 100% compliance for all standards	
Use best practices to maintain high quality treated water.	<ul style="list-style-type: none"> <li>Jar test regularly</li> <li>Evaluate filter media on a regular basis</li> <li>Investigate problem filters when they become apparent</li> </ul>	<b>BRWTP:</b> <ul style="list-style-type: none"> <li>SCD: <math>0 \pm 0.5</math></li> <li>Zeta Potential: 0 – -5</li> <li>Settled Turbidity: &lt; 1 NTU 90% of time sampling every 15 minutes</li> <li>Settled Turbidity: &lt; 2 NTU at all times</li> <li>Start-up Filter Turb: <math>\leq 0.3</math> NTU at end of 30 minutes</li> <li>Filter Turb: <math>\leq 0.1</math> NTU in 95% of IFE 15 minutes samples;</li> <li>Filter Turb: <math>\leq 0.15</math> NTU at all times</li> <li>Filter Particle Count: &lt;25/mL for particles &gt; 2 <math>\mu</math>m in 95% of</li> <li>Filter Loading Rate: <math>\leq 5</math> gpm/sqft</li> <li>Filter Run Time: &gt; 60 hours</li> <li>Filter Rest Before Start-up: <math>\geq 3</math> hours</li> <li>Inactivation: &gt; 95% of</li> </ul>	<b>Betasso WTP:</b> <ul style="list-style-type: none"> <li>SCD: 0</li> <li>Zeta Potential: -3</li> <li>Zeta Alkalinity: <math>\geq 9.0</math> mg/L</li> <li>Settled Turbidity: &lt; 3.0 NTU</li> <li>Settled pH: 6.4 – 6.8</li> <li>Settled Cl<sub>2</sub>: 0.5 mg/L</li> <li>Filter Run time: <math>\leq 40</math> hours</li> <li>Filtration Rate: 5 gpm/sf or 5 mgd max</li> <li>Hydraulic change/filter: &lt; 1.0 mgd</li> <li>Filter Rest Time: 3 hours</li> <li>Start-up Filter Turb: &lt; 1 NTU w/in 15 min of startup</li> <li>Filter turbidity: &lt; 0.15 NTU</li> </ul>



**BRWTF INTEGRATED SOURCE WATER AND TREATMENT STUDY**  
**Appendix 1 – City Water Quality and Operational Goals**

		minimum performance measure <ul style="list-style-type: none"> <li>• Cl<sub>2</sub> Dose: &lt; 2.0 mg/L</li> <li>• Combined filter effluent Cl<sub>2</sub>: 0.4 mg/L</li> </ul>	<ul style="list-style-type: none"> <li>• Filter particle count: &lt; 25 total counts</li> <li>• Combined filter turbidity: &lt; 0.1 NTU</li> <li>• Combined filter particle counts: &lt; 25 total counts</li> <li>• Combined filter Cl<sub>2</sub>: 0.1 mg/L</li> </ul>
Seek alternative methods to increase delivered water quality.	<ul style="list-style-type: none"> <li>• Implement necessary upgrades to the BRWTF to ensure a multi-barrier system.</li> <li>• Improve clarification treatment.</li> <li>• Partnership for Safe Water – Phase III</li> <li>• Implement the AWWA Standard for Water Treatment Plant Operations and Management (G200-05)</li> <li>• Join AwwaRF (American Water Works Association Research Foundation)</li> </ul>	BRWTF finished water: <ul style="list-style-type: none"> <li>• pH: 7.8 ± 0.2</li> <li>• Alkalinity: 40 to 50 mg/L CaCO<sub>3</sub></li> <li>• Hardness: &lt;60 ppm</li> <li>• Turbidity: &lt; 0.1 NTU</li> <li>• Sulfate: &lt; 20 ppm</li> <li>• Sodium: 5-20ppm</li> <li>• TDS: &lt; 100 ppm</li> <li>• Conductivity: &lt; 200 μmhos/cm</li> <li>• Temperature: &lt; 20 °C</li> <li>• Fluoride: 0.9 ± 0.1 mg/L</li> <li>• Cl<sub>2</sub>: 1.1+ 0.1 mg/L</li> <li>• Manganese: &lt; 0.03 mg/L</li> </ul>	Betasso finished water: <ul style="list-style-type: none"> <li>• pH: 7.8+ 0.2</li> <li>• Alkalinity: 45 + 3 mg/L CaCO<sub>3</sub></li> <li>• Turbidity: &lt; 0.1 NTU</li> <li>• Fluoride: 0.9 + 0.1 mg/L</li> <li>• Cl<sub>2</sub>: 1.2 + 0.1 mg/L</li> </ul>
	<ul style="list-style-type: none"> <li>• Improve disinfection</li> </ul>	Meet minimum daily control levels: <ul style="list-style-type: none"> <li>• 99.99% removal of <i>Giardia</i></li> <li>• 99.999% removal of <i>Cryptosporidium</i></li> <li>• 99.999% removal of enteric viruses</li> </ul>	



<p>Deliver similar and consistent finished water quality from both plants.</p>	<ul style="list-style-type: none"> <li>• Set uniform levels for water quality parameters.</li> <li>• Develop program to bring water from both plants into consistent range for measured parameters.</li> <li>• Control pH and/or ORP of finished water.</li> </ul>	<p>Maintain finished water:</p> <ul style="list-style-type: none"> <li>• Hardness &lt; 60 mg/L</li> <li>• Alkalinity 40 to 50 mg/L</li> <li>• pH: 7.8 ± 0.2</li> <li>• Turbidity &lt; 0.1 NTU</li> <li>• Sulfate &lt; 20 mg/L</li> <li>• Sodium: 5-20 mg/L</li> <li>• TDS &lt; 100 mg/L</li> <li>• Specific Conductance &lt; 200 umhos/cm</li> <li>• Temperature &lt; 20 oC</li> <li>• No detectable taste and odor</li> <li>• Manganese &lt; 0.03 mg/L</li> <li>• Fluoride: 0.9 ± 0.1 mg/L</li> </ul>
<p>Maintain consistent water quality throughout the distribution system.</p>	<ul style="list-style-type: none"> <li>• Minimize effect of mixing regions by implementing consistent multiple-plant finished water quality program</li> <li>• Implement the AWWA Standard for Distribution System Operations and Maintenance (G200-04)</li> </ul>	
	<ul style="list-style-type: none"> <li>• Develop a monitoring program for the distribution system and a plan for adjusting water quality where necessary.</li> </ul>	<p>pH: 7.8 ± 0.3 at 95% of locations sampled monthly for total coliforms            Free Cl<sub>2</sub>: 0.5 ± 0.1 mg/L at 95% of locations samples monthly</p>
	<ul style="list-style-type: none"> <li>• Investigate Pb/Cu corrosion behavior and status.</li> </ul>	<p>No Lead and Copper Rule violations</p>
	<ul style="list-style-type: none"> <li>• Develop a bacterial regrowth action plan.</li> </ul>	<p>Maintain heterotrophic plate count bacteria levels &lt; 100 counts/mL in 95% of monthly distribution system samples</p>
	<ul style="list-style-type: none"> <li>• Develop a plan to meet DBP criteria for reduced monitoring under Stage 1 DBPR and Stage 2 DBPR.</li> </ul>	<p>Maintain locational running annual average TTHM and HAA5 levels less than 40 ug/L and 30 ug/L, respectively.</p>
	<ul style="list-style-type: none"> <li>• Develop a plan to maintain water quality in distribution system reservoirs</li> </ul>	



Reinforce distribution system integrity	Implement and maintain effective backflow prevention program. <ul style="list-style-type: none"> <li>• Require mandatory installations for all new construction</li> <li>• Create a retrofit program for existing connections</li> <li>• Require and perform an annual check of all BFPs</li> <li>• Require mandatory installation of BFPs for temporary connections during construction</li> <li>• Perform routine inspection of construction sites to assure compliance</li> <li>• Require mandatory BFPs for source water hydrants</li> <li>• Assess staffing needs for implementation</li> </ul>	
	<ul style="list-style-type: none"> <li>• Ensure integrity of all distribution system storage tanks.</li> </ul>	Pass weekly inspection of all tanks to assure integrity.
Meet all customer demands during normal operations and critical demands during emergencies or droughts.	<ul style="list-style-type: none"> <li>• Acquire adequate water rights</li> </ul>	Maintain <ul style="list-style-type: none"> <li>• &gt; 20 years: No interruption of outdoor use</li> <li>• &gt; 100 years: No interruption of outdoor use with major loss</li> <li>• 1,000 years: No interruption of indoor essential use</li> </ul>
	Deliver sufficient raw water to treatment plants	<ul style="list-style-type: none"> <li>• Minimum storage: 3-5 MG</li> <li>• Minimum source delivery to WTPs:             <ul style="list-style-type: none"> <li>○ Betasso – greater of 5 MGD or Zone 3 indoor use</li> <li>○ Boulder Reservoir – 5 MGD</li> </ul> </li> </ul>
Ensure daily reliable plant operations at design flows	Implement plant maintenance management program	<ul style="list-style-type: none"> <li>• Minimum production:             <ul style="list-style-type: none"> <li>○ Betasso – greater of 5 MGD or Zone 3 indoor use</li> <li>○ Boulder Reservoir – 5 MGD</li> </ul> </li> <li>• Maximum production:             <ul style="list-style-type: none"> <li>○ Betasso - entire system demand:</li> </ul> </li> </ul>



		<p>internal use demand plus a margin of safety (16 MGD)</p> <ul style="list-style-type: none"> <li>○ Minimize unscheduled shutdowns of BRWTP</li> </ul>
Meet daily demand fluctuations and maintain minimum fire flow protection levels	<ul style="list-style-type: none"> <li>● Provide sufficient storage</li> <li>● Operate to meet demands and to optimize water quality in the distribution system.</li> </ul>	<p>Maintain total storage:</p> <ul style="list-style-type: none"> <li>● Winter Daily: &gt; 18 MG</li> <li>● Summer Daily: &gt; 28 MG</li> <li>● Absolute Minimum: 5 MG</li> <li>● Maintain zone-specific storage:</li> <li>● Daily: &gt;</li> <li>● Absolute Minimum:</li> <li>● Firm Yield Capacity Requirements by Zone:</li> </ul>
Improve source water quality protection	<ul style="list-style-type: none"> <li>● Develop a source water protection rules</li> <li>● Implement source water reservoir management plans</li> <li>● Continue source water monitoring program to track water quality conditions temporally and spatially</li> <li>● Implementation of a mid-level intake at Boulder Reservoir (completed 2005)</li> <li>● Implementation of a manganese control strategy using source management techniques (e.g., in situ aeration)</li> <li>● Improve communication and coordination for source water selection</li> <li>● Develop and communicate a Risk Index</li> <li>● Coordinate with NCWCD to maximize flow through Boulder Reservoir</li> <li>● Determine best source based on treatability and quality</li> <li>● Coordinate with County Planning to ensure watershed protection in planning process</li> </ul>	<ul style="list-style-type: none"> <li>● Hold routine weekly meetings of appropriate staff to make source water selection decisions</li> </ul>
Integrate public health risk factors into source water and treatment management decisions.	<ul style="list-style-type: none"> <li>● Develop a Public Health Protection Index (PHPI) or Risk Index</li> </ul>	



	<ul style="list-style-type: none"> <li>Establish Stakeholder group to assist in PHPI process</li> <li>Establish consensus of internal and external decision-makers on the PHPI applications.</li> </ul>	
Improve knowledge of emerging contaminant occurrence	<ul style="list-style-type: none"> <li>Perform the monitoring program included in the Unregulated Contaminant Monitoring Regulation.</li> <li>Continue to track unregulated contaminants to determine risk and evaluate monitoring need.</li> </ul>	<ul style="list-style-type: none"> <li>Volunteer for AwwaRF participation in research projects of interest</li> </ul>
<b>Goal: Provide Responsive Customer Service</b>		
<b>Strategy</b>	<b>Action</b>	<b>Measurable Criteria</b>
Deliver aesthetically pleasing and safe water	<ul style="list-style-type: none"> <li>Evaluate causes of past customer complaints</li> <li>Develop program for system flushing</li> <li>Implement program for customer response to complaints</li> </ul>	Continuous decrease in water quality customer complaint calls
Disseminate water quality and utility information to the public	<ul style="list-style-type: none"> <li>Update web site with:               <ul style="list-style-type: none"> <li>Summarized customer survey results</li> <li>Water quality “frequently asked questions”</li> <li>Water quality data</li> </ul> </li> <li>Distribute annual CCR</li> </ul>	
Identify areas of improvement for customer service and utility management	<ul style="list-style-type: none"> <li>Participate in Qual Serve (AWWA)</li> </ul>	
Develop public education programs	<ul style="list-style-type: none"> <li>Source water quality</li> <li>Source water protection</li> </ul>	
<b>Goal: Operate Cost Effectively</b>		
<b>Strategy</b>	<b>Action</b>	<b>Measurable Criteria</b>
Establish utility rates that reflect water services delivered to customers, including <ol style="list-style-type: none"> <li>Quality</li> <li>Volume</li> <li>Education</li> <li>Source management and protection</li> <li>Demand management</li> </ol>	<ul style="list-style-type: none"> <li>Complete economic analysis of rates</li> <li>Establish new water rates as appropriate</li> </ul>	



6. Treatment 7. Distribution		
<b>Goal: Promote Environmental Stewardship of our Natural Resources</b>		
<b>Strategy</b>	<b>Action</b>	<b>Measurable Criteria</b>
Reduce total system demands	<ul style="list-style-type: none"> <li>Implement and support the Board-approved water conservation program “Comprehensive Conservation Program”</li> </ul>	Reduce total system demands as follows: <ul style="list-style-type: none"> <li>Single Family: 6.22 MGD</li> <li>Multiple Family: 4.94 MGD</li> <li>Commercial/Industrial: 6.16 MGD</li> <li>Municipal: 0.76 MGD</li> <li>Unaccounted-for-water: 1.28 MDG</li> <li>Total Demand: 19.4 MGD</li> </ul>
Definitions: Goal = End toward which effort is directed Strategy = Blueprint, design, game plan, project, scheme Action = Something done or effected Criteria = Measurable standard on which a judgment or decision may be based.		