

## CHAPTER 3. WATER SUPPLY SHORTAGE

**E**BMUD evaluates the availability and reliability of its supply each year in accordance with its Water Supply Availability and Deficiency Policy. During times of water shortages, EBMUD's regulations restrict customer water use to maintain system reliability. During non-drought conditions, water use efficiency measures are implemented to eliminate wasteful practices. EBMUD's water use restrictions are based on water supply conditions. During times of extreme conditions, often associated with a catastrophic interruption of water supply, EBMUD implements the Water Shortage Contingency Plan. EBMUD also coordinates with other water suppliers to procure and distribute potable water during an emergency through mutual aid.

### DROUGHT PLANNING SEQUENCE

During some historical dry periods, runoff from the Mokelumne River Basin was insufficient to meet service area demands. EBMUD relies on stored water in its reservoirs to meet most of customer water needs during dry periods. The worst drought event in EBMUD's history was the 1976-77 drought, when runoff was only 25 percent of average and total reservoir storage decreased to 39 percent of normal. In September 1977 at the end of the 1977 "water year", precipitation and runoff forecasts could not provide enough certainty that the following year would not be a dry year. Thus, EBMUD operators could not allow system storage to deplete at the end of 1977 in anticipation of plentiful water in the following year. Fortunately, the critically dry year of 1977 was followed by a very wet year (1978), allowing the system to recover rapidly. If EBMUD had operated differently, and if 1978 had turned out to be a third dry year, EBMUD would not have had sufficient water to meet customer needs or its downstream obligations.

Although 1976-77 was the worst drought on record, a similar or an extremely dry event could occur in the future where a very wet year like 1978 would not immediately follow two very dry years. To plan for the possibility of an event like this in the future, EBMUD uses a three-year "drought planning sequence" to assess adequacy of its water supply. This maximum credible drought event defines EBMUD's need for additional water in its integrated water resources planning, as reflected in the 1993 Updated Water Supply Management Program (WSMP). The first and second years of this drought planning sequence were modeled with the same runoff that had occurred in 1976 and 1977, the driest recorded two-year period. The runoff in the third year was assumed to be 185 TAF, which is an average of the runoff from 1976 and 1977. It was further assumed that such a severe drought would not continue beyond the third year of this sequence and that all accessible storage would be depleted during the third drought year.

Chapter 4 of this Plan provides a discussion of EBMUD's current and projected demand and supply during normal and drought periods.

### WATER SUPPLY AVAILABILITY AND DEFICIENCY POLICY

EBMUD Board of Directors evaluates the adequacy of its water supply each year in accordance with its Water Supply Availability and Deficiency Policy (Policy 9.03 in Appendix

E). As part of its policy, EBMUD limits the frequency and severity of rationing imposed on its customers to 25 percent of total customer demand on an annual basis. Ongoing water conservation and reclamation has reduced the flexibility of District customers to further reduce demand during droughts. EBMUD incorporates its rationing policy into its water supply reliability planning. Based on this criterion, EBMUD assesses the availability of stored water to meet customer water needs.

### WATER SHORTAGE CONTINGENCY PLAN

EBMUD's water shortage contingency planning anticipates for water supply interruptions due to droughts and potentially other catastrophes. The EBMUD water supply system is vulnerable to several potential disasters, including regional power outages, earthquakes, and water contamination. Furthermore, extreme water shortage events that could result from these disasters may compromise availability of water for fire fighting, drinking, and treating wastewater.

EBMUD's *Urban Water Shortage Contingency Plan*, adopted in 1992 by the EBMUD Board, plans for events that could include these specific situations. The resolution is included in Appendix D.

### DROUGHT MANAGEMENT PROGRAM

The storage capacity within the EBMUD system allows for continued though limited service to its customers during dry-year events. EBMUD determines the level of customer rationing based on the projected storage available by the end of September. By imposing moderate rationing in the early years of potentially prolonged drought periods, EBMUD operates its system to minimize the severity of rationing in subsequent years of the drought periods while continuing to meet its current and subsequent-year fishery flow release requirements and obligations to downstream agencies.

#### Stage of Action

EBMUD determines its water supply availability in April of each year (and as necessary during dry year periods) and initiates water reduction programs if the projected water supply is unable to fully meet customer needs. EBMUD's Drought Management Program (DMP) follows guidelines based on the projected storage criteria shown in Table 3-1. The DMP process is as follows:

- Based on water year runoff predicted in April, estimate storage available at end of water year (September 30).

**Table 3-1. Drought Management Program Guidelines**

Stage	If the Projected Storage (in Thousand Acre-Feet) on September 30 Forecasted in April is:	Percent of Maximum System Storage <sup>(1)</sup>	Rationing Reduction Goal
Moderate	500 TAF or more	65% and greater	None
Severe	500 - 450 TAF	65 to 59%	0 to 15%
Critical	450 - 300 TAF	59 to 39%	15 to 25%
	Less than 300 TAF	39% and below	25%

<sup>(1)</sup>Maximum system storage represents the maximum reservoir capacity of approximately 767 TAF.

- If storage is less than 500 thousand acre-feet (TAF), prepare a Drought Management Program.
- Adjust the Drought Management Program as conditions change during an extended dry period.

In February 1977, EBMUD responded to a severe drought of 1976-1977 by imposing a rationing program to cut water use by 25 percent of total customer demand, which was later increased to 35 percent as severity of the drought became clearer. EBMUD customers responded by cutting use by 39 percent. Since 1977, EBMUD has adopted Drought Management Programs that establish voluntary and mandatory water conservation goals for customers. Water use reduction measures become mandatory when EBMUD declares a water shortage emergency. These programs have enabled EBMUD to better manage its response to droughts and to limit water rationing to 25 percent or less of total customer demand on an annual basis even when the available supply from the Mokelumne River runoff was reduced by over 50 percent, such as during the 6-year extended drought of 1987-92.

Table 3-2 illustrates typical agency actions at each stage of a drought. EBMUD’s response to the Critical Drought Stage is applicable even for system storage at less than 50 percent of maximum.

Required reductions in water use would vary across customer categories if rationing were to achieve a targeted 25 percent of total customer demand on an annual basis. Table 3-3 displays the customer category reductions. The actual savings from each customer category could vary due to several factors including methods of implementation and enforcement. The reduction targets would be set by the Board of Directors after a drought situation is declared.

**Mandatory Provisions**

EBMUD’s regulations and restrictions on water use are included in Appendix E. Section 29 (Prohibiting Wasteful Use of Water) in the Regulations Governing Water Service to Customers of EBMUD describes actions aimed at eliminating wasteful use. These are ongoing provisions and are augmented by actions taken under drought management programs.

Section 28 (Water Use During Water Shortage) in the Regulations Governing Water Service to Customers of EBMUD, provides for special restrictions on water use. These regulations are enforced with warnings, installation of flow restrictors and finally disconnection of service. Section 28 is adopted by the Board only during a water short-

age emergency as part of the implementation of the Drought Management Program. Previous mandatory prohibitions included activities for filling and operating decorative fountains, lakes, and ponds; washing vehicles by hose without a shutoff nozzle; washing hard-surfaced areas not necessarily for public health or safety; excessive wasteful run-off; flushing sewers, hydrants, or washing streets not for emergency or not for essential operations applicable to non-residential customers. Implementation of Section 28 has included a two-step drought rate setting process. The regulation is rescinded after the emergency is over. Currently no emergency situation exists, and Section 28 has been rescinded since April 1, 1993.

**Consumption Limits**

Consumption is limited under EBMUD mandatory drought management plans by a combination of an inclining block rate structure, allotments and maximum use limitations tied to past use and customer categories, and restrictions on specific uses. Elements for various customer account categories under the plan currently in effect are inclining block rates for residential accounts, penalties and charges for excessive use, financial impact analysis and reduction monitoring.

**Single-Family Residential Accounts**

As part of the mandatory drought management program, EBMUD imposes an inclining block rate structure on customer water use above the basic allotment. The basic rate for single-family residential use remains unchanged from non-drought rates for the first block, which has been found to reflect average interior household use. This base allocation is adjusted for households exceeding four members and for medical needs and livestock. The next blocks of the rate structure are related to exterior water uses. Water use above the base allocation is billed at increasing rates by use blocks to encourage conservation. The last block is set at the highest rate to provide a strong incentive for conservation. The largest residential customers, whose water use fall within this last block, are provided an allotment limited to 80 percent of their pre-drought use during an implementation of the mandatory drought management program.

**Other Customer Accounts**

Historically, an inclining rate structure was imposed on customers not classified as single-family accounts for using water above a basic allotment based on pre-drought use.

**Table 3-2. Drought Management Program Elements**

DROUGHT STAGE	AGENCY ACTIONS
<b>Moderate</b> 0 to 15% Shortage	<ul style="list-style-type: none"> <li>● Initiate public information campaign specifically addressing the drought situation. Explain other stages and forecast future actions.</li> <li>● Institute mandatory or voluntary water use goals and use restrictions (depending on available supplies for future years.)</li> <li>● Institute rate changes to elicit conservation, if a mandatory program. Explain new rate schedules to customers. Explain further reductions planned for succeeding rationing stages.</li> <li>● Increase advertising of water-saving devices provided free to customers and other free conservation programs.</li> <li>● Increase efficiency of system water supplies, e.g.: Intensify enforcement of hydrant-opening regulations; Increase meter-reading efficiency and meter maintenance; Intensify leak detection and repair program.</li> <li>● Prepare and disseminate educational brochures, bill inserts, etc., specifically addressing the drought situation and ways in which customers can save water. Disseminate technical information to specific customer types on ways to save water.</li> <li>● Intensify and target media outreach program. Issue news releases to the media. Intensify advertising campaign to remind consumers of the need to save water.</li> </ul>
<b>Severe</b> 15 to 25% Shortage	<ul style="list-style-type: none"> <li>● Intensify actions taken during the moderate stage. Institute mandatory water use reductions.</li> <li>● Declare a water shortage emergency (depending on available supplies for future years).</li> <li>● Seek and procure a supplemental water supply (depending on available supplies for future years).</li> <li>● Implement rate and water use restriction changes appropriate to shortage.</li> </ul>
<b>Critical Shortage</b> of 25% or more	<ul style="list-style-type: none"> <li>● Intensify all of the Severe Stage steps.</li> </ul>

**Penalties and Charges for Excessive Use**

EBMUD’s enforcement options include penalties for excessive or wasteful use and violations of the cap on single family residential use or other restrictions. The enforcement measures range from warnings using flow restrictions to discontinued service. Section 29 of Regulations Governing Water Service to Customers of EBMUD and Section 28 when adopted describe the range of enforcement measures used to control consumption.

**Financial Impact**

Water sales typically provide about 75% of EBMUD’s operating revenues, the balance of which includes fees and charges, taxes, hydropower sales revenue, and interest. In addition, EBMUD sells bonds and maintains financial reserves. These funding sources affect EBMUD’s annual operating budget and corresponding rate analysis for water sales. EBMUD’s budget and related rates and charges are affected by two types of project costs that are related to disaster and drought related water shortages: the (1) multi-year large capital projects to mitigate disaster and drought related water shortages, and (2) annual project costs for projects in the drought management programs adopted under water shortage emergencies.

EBMUD prepares for disaster or drought related shortages by investing in major capital improvements that are funded

by a variety of revenue sources in order to minimize impacts on customers, and to distribute the costs equitably to both existing and future customers through water rates, fees and charges. For example, EBMUD’s \$202 million Seismic Improvement Program and other major capital projects, such as the seismic strengthening of the Mokelumne Aqueducts, as well as development of EBMUD’s supplemental water supply, are discussed in Chapter 2 of this Plan.

EBMUD assesses its water availability or deficiency, which is integrated into its financial planning and annual rate review for budget purposes. In the past, when mandatory water

**Table 3-3. Customer Drought Reduction Goals**

Customer Category	Reduction Goal (%) <sup>(1)</sup>
Single-Family Residential	32
Multi-Family Residential	15
Commercial/Institutional	20
Industrial	5
Irrigation	45
<b>Total Customer Demand Rationing Goal</b>	<b>25</b>

<sup>(1)</sup>Reduction goals are based on the projected average minimum monthly demand for year 2020.

use reductions were implemented based on this assessment, an inclining block rate structure was adopted as part of the Drought Management Program that has been designed to encourage consumers to conserve water and to fully mitigate the revenue and expenditure impacts. The rates and charges associated with EBMUD’s drought management programs are developed to distribute the financial impacts equitably to customer categories and to avoid long-term financial impacts to EBMUD. The reduction goals for customer categories and associated distribution of rate adjustments for revenue recovery are the result of analyzing consumption by customer categories in both normal years and under drought management programs.

In addition to offsetting the decrease in water sales, revenue recovery covers the extraordinary expenses of the Drought Management Program. As an example, budget items, totaling \$1.8 million, for the Program implemented during the drought in 1988 included:

- Additional staff and training to administer water-conserving rate structure . . . . . \$116,000
- Additional field staff to enforce restrictions on water waste . . . . . \$171,000
- Public information program costs, including public relations firm. . . . . \$1,185,500
- Water conservation kits. . . . . \$50,000
- Moisture sensors. . . . . \$125,000
- Additional staff for water audits and irrigation workshops . . . . . \$117,000
- Additional staff for hydrant meter monitoring. . . . \$37,000
- Bay Area public relations campaign . . . . . \$20,000

Although the above costs for program elements were adjusted during the course of the Program and in following drought years, they are illustrative of the nature of these costs.

**Reduction Monitoring**

EBMUD individual accounts are metered, and overall EBMUD water production and supply is continuously monitored. EBMUD sets allocations and monitors individual accounts through the customer account system. Customers track their success in meeting their reduction goals with their bills. With water production facility data, EBMUD evaluates on a daily basis its overall success in meeting reduction goals and assesses the impact on remaining and projected water supply.

EBMUD’s base year of 1986 is used to monitor consumption reduction during the programs adopted from 1987 through 1992. EBMUD considers 1986 as the last year when consumption was not significantly influenced by dry weather or a drought management program. This benchmark at that time served as the basis for customer allocations as well as the measure by which achievements of conservation goals are monitored. The 1986 consumption has been adjusted to reflect growth in the number of customer accounts.

The monitoring of customers is reviewed on a continual basis by customer category, monthly use, and relation to water production. Monitoring enables EBMUD to evaluate the success of a current drought management program, and it serves as a foundation for future programs.

**EMERGENCY PREPAREDNESS PROGRAM**

When a disaster strikes, in accordance with Emergency Preparedness (Policy 7.03 in Appendix E), the General Manager in consultation with the Board of Directors can declare a “District Emergency.” This proclamation will put into effect EBMUD’s Emergency Operations Plan (EOP). EBMUD maintains an active emergency preparedness program and coordinates the emergency responses with other public and private organizations.

During a declared emergency, a team of personnel forms the Emergency Operations Team (EOT) to carry out the five Standardized Emergency Management System (SEMS) functions (Management, Operations, Planning/Intelligence, Logistics, Finance/Administration). Operating under the EOP, the Operations Section Chief of the EOT establishes response priorities based on the nature of the emergency, established EBMUD priorities, and system status information available at the time. Furthermore, the Operations Section of the EOT will determine the need for mutual aid/assistance resources.

EBMUD assigns priorities in restoring water service for the following starting with the most urgent:

- firefighting efforts
- critical facilities, including hospitals
- other utilities, including power, communications, and transportation agencies
- mass care shelters and schools
- residences and businesses

These priorities may shift during response to the emergency depending on the situation.

**EMERGENCY AID PARTNERSHIPS**

Coordination with state and local agencies can be critical in responding to a catastrophic event. EBMUD is one of the eight major water suppliers in the San Francisco Bay Area that has established and maintains the Emergency Response Directory (ERD).

EBMUD is also a member of the Water Agency Response Network (WARN), which is an Omnibus Mutual Aid/Assistance Agreement with water agencies throughout the state. The signatories may be called upon during an emergency to provide resources if they are available.

The State Office of Emergency Services (OES) regulates the SEMS, which was created by Government Code 8607 following the East Bay Hills Firestorm of 1991. To ensure reimbursement for claims filed after a disaster, all EBMUD emergency plans, procedures, and training follow the SEMS regulations, and coordinate with EBMUD’s EOP. In 2005, the Department of Homeland Security published the National Response Plan (NRP) and National Incident Management System (NIMS). EBMUD’s EOP will comply with the mandates of both NIMS and the NRP.

In 1995, EBMUD partnered with 14 federal, state, and public agencies to develop procedures for obtaining potable water in an emergency. This California Potable Water Task Force published its report, *Multi-Agency Emergency Response Procedures for Potable Water Procurement and Distribution*, in January 1996. These procedures were designed to facilitate acquisition and distribution of alternative potable water to

populations in California during a state or local emergency. The report includes specific activities that each level of an Emergency Operation Center considers when evaluating emergency situations for the procurement and distribution of potable water to critical locations.

The procedures are based on SEMS and are to be used in conjunction with *SEMS Guidelines* and *OES Guidance for*

*California's Mutual Aid System*. EBMUD follows those procedures and implements the organizational structure through its Security and Emergency Preparedness (SEP) Section. The SEP coordinates and publishes EBMUD's EOP, which details the internal organizational structure used in the response to any type of emergency.

