

## **CHAPTER 9**

### **WATER SHORTAGE CONTINGENCY PLAN**

This chapter provides the District's water shortage contingency plan, as required under the Urban Water Management Planning Act. Although it is the District's water supply reliability goal to sustain a shortage of no more than 10% during dry and critically dry conditions, the potential exists for interruptions to either our imported or local water supplies (due to earthquakes, etc.) that may result in significantly greater shortages. As such, this contingency plan includes scenarios for shortages of up to 50%.

#### **9.1 CONTINGENCY PLAN OVERVIEW**

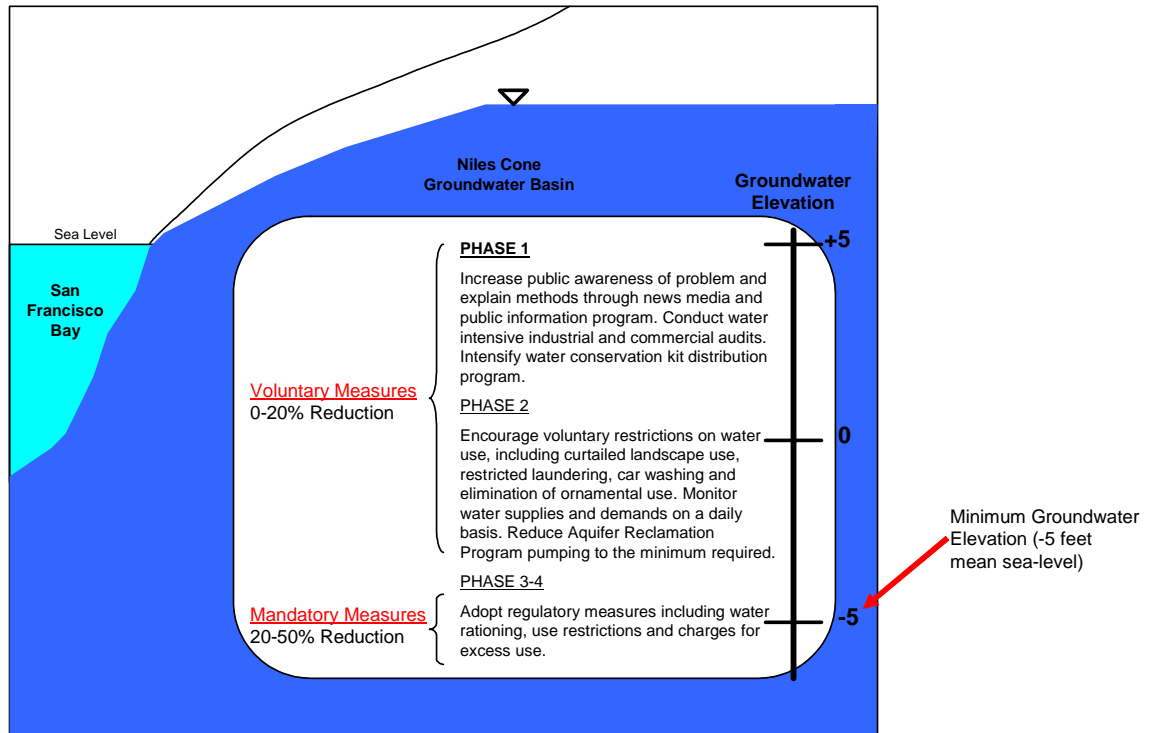
The District has sufficient water supplies to meet demands in most years, but deficiencies can occur as a result of dry winter weather or through extended interruption of imported supplies. Under normal circumstances the Niles Cone Groundwater Basin provides the storage capacity needed to protect against short-term water supply deficiencies or disruptions. ACWD will also utilize off-site storage at the Semitropic Water Storage District's Groundwater Banking Program to help meet dry year water supply needs. However, long-term shortfall between available water supply and demand will eventually appear in the form of lower water levels in the upper aquifer (Newark Aquifer) of the Niles Cone Groundwater Basin.

The Newark Aquifer is subject to saltwater intrusion particularly if inland groundwater levels remain at or near sea-level for a protracted period of time, or if inland groundwater levels drop further than five feet below sea level for any period of time. For this reason the District has been operating the basin to maintain a water level in the Newark Aquifer of at least five feet above sea level. ACWD has an ongoing program to assess water supply and demand imbalances. Each year during the months of December, January and February, the impacts of demand and supply balance are assessed, including the effects of potential reductions in imported San Francisco Regional supplies and State Water Project supplies, (*Annual Survey Report on Groundwater Conditions*). On the basis of this assessment, the groundwater levels in the Niles Cone Groundwater Basin for the following September can be estimated. These September levels are generally the lowest of the year due to high summer consumption and low rainfall. As such, they are key indicators of the presence of potential shortage. A change in the water level of five feet represents about 5,000 acre-feet of water or roughly one average month of District water supplies at current consumption levels. Figure 9-1 summarizes the management measures that go into effect at the various levels of projected reduction. Based on the anticipated September groundwater levels, Figure 9-2 summarizes the steps the District would take to implement a Water Deficiency Action Plan in response to determining that a water supply shortfall exists.

#### **9.2 THREE YEAR DROUGHT ANALYSIS**

An estimate of the minimum water supply available to ACWD over the next three years (2006-2008) was developed based on the driest three year sequence that is incorporated in ACWD's planning model, and is summarized in Table 9-1. The planning model utilizes the 72-year historical hydrologic conditions of 1922-94 for projections of local and imported supply availability. A review of the projected local and imported supply availability over the 72-year planning period indicates that the minimum cumulative imported and local water supply available to ACWD over a three-year sequence occurs under the 1931-1933 drought conditions. Modeling analysis indicates that this three year drought, if it occurred in the next three years would not result in significant shortages to ACWD. ACWD's ability to withstand a severe, three year drought without shortages is a result of: (1) the recent completion of the Newark Desalination Facility which provides up to 5,600 AF/Yr of supply; (2) the investment in off-site groundwater banking at Semitropic which could provide a total estimated supply of over 50,000 AF during the three-year drought sequence; and (3) the use of local groundwater storage in the Niles Cone Groundwater Basin which could provide over 14,000 AF of total supply over the three year drought scenario.

**Figure 9-1  
District Water Deficiency Response**



### 9.3 WATER SHORTAGE MITIGATION OPTIONS

The following is a discussion of options that ACWD can utilize to offset the impacts of water supply shortages:

#### Augmentation of Supply

In any given year ACWD strives to achieve a balance between basin supply and overall demand requirements. The goal of this effort is to maintain a basin level that is either at or above sea level, to prevent overdraft and/or saltwater intrusion. In order to meet ACWD's water supply reliability goals, the District's water supply strategy includes the development of desalination, recycled water, and off-site groundwater banking programs. In addition, the temporary drawdown of the groundwater basin to below sea-level (-5 feet, minimum level) may be allowed to meet short term demands. All aspects of supply management are discussed in Chapter 8.

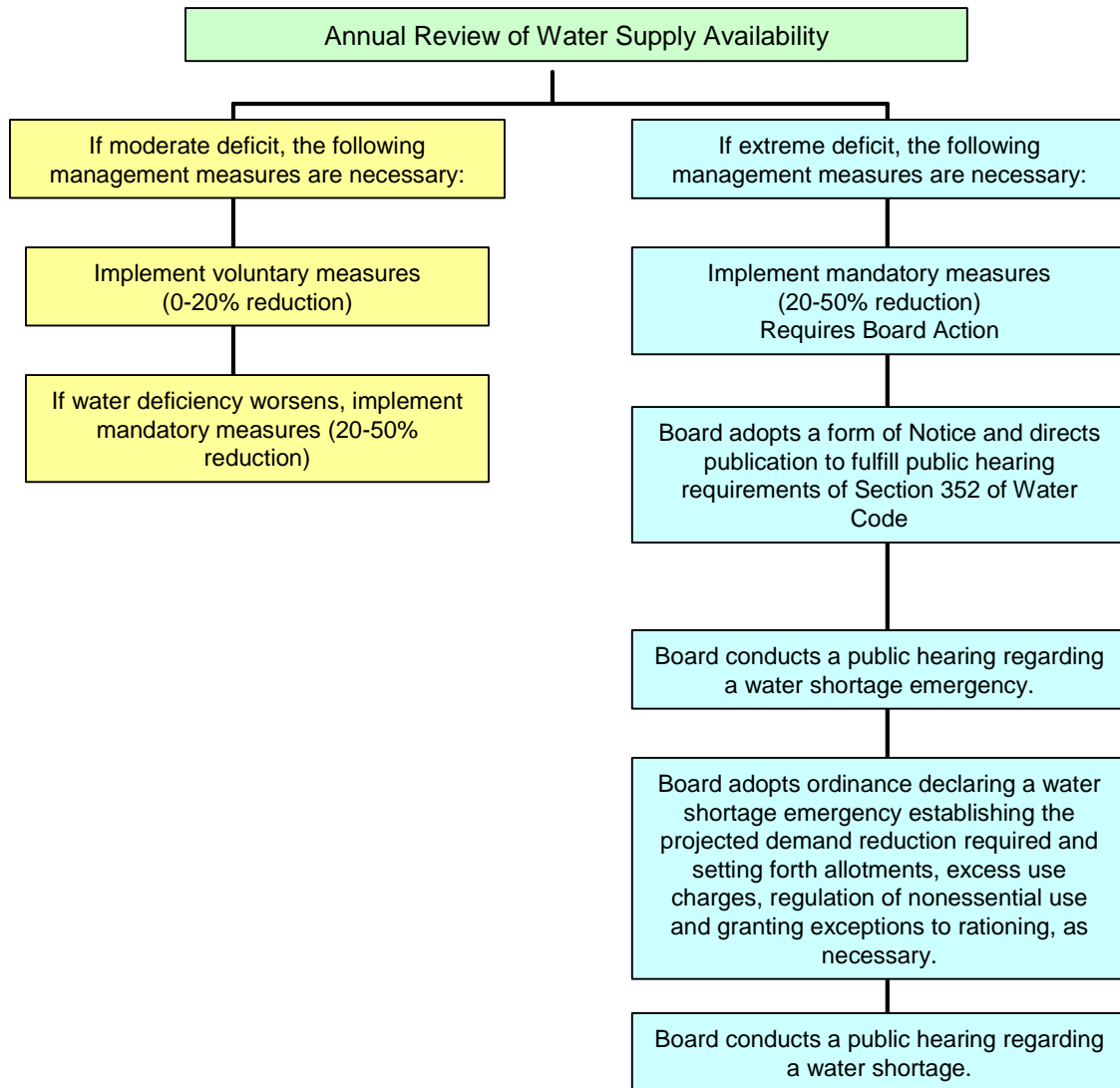
#### Evaporation

All District distribution reservoirs are covered to minimize evaporation while protecting the water from contamination.

#### Percolation

ACWD has percolation ponds which are necessary for the replenishment of its groundwater supply. Since the District's service area covers roughly the same area as the Niles Cone Groundwater Basin, recharge through the District's percolation facilities is an important District supply.

**Figure 9-2  
District Water Deficiency Action Plan**



**System Audits**

The District has conducted an annual leak detection and repair program since 1987. This program will continue as a regular part of our operations.

**Modifications to Operations**

A blending facility which blends softer San Francisco Regional Water System supplies with harder groundwater has been in operation since 1992. This facility, along with other planned facilities, will help to meet ACWD’s hardness goals and to help insure an equalized level of taste and hardness for all ACWD customers. However, under severe drought or emergency situations when sufficient San Francisco supplies are not available, the hardness criteria may be relaxed and additional, higher hardness groundwater may be utilized.

**Table 9-1  
Estimated Worst Case Three Year Drought Scenario**

<b><i>SUPPLY/DEMAND</i></b>	<b><i>Drought Year 1 - 2006</i></b>	<b><i>Drought Year 2 - 2007</i></b>	<b><i>Drought Year 3 - 2008</i></b>
<b><i>Supply</i></b>			
<b><i>Imported Supplies</i></b> -State Water Project -San Francisco Regional	10,400 13,500	14,400 15,300	13,600 15,300
<b><i>Local Supplies</i></b> - Groundwater Recharge - Local Groundwater Storage - Del Valle Release - Desalination	9,000 10,000 1,000 5,600	20,900 0 3,400 5,600	13,700 4,100 1,000 5,600
<b><i>Banking/Transfers</i></b> - Semitropic Banking Program	15,600	17,900	17,400
<b><i>Total Supplies</i></b>	<b><i>65,100</i></b>	<b><i>77,500</i></b>	<b><i>70,700</i></b>
<b><i>Demand</i></b>			
Distribution System Demand Estimated Conservation Savings Groundwater System Demand	57,300 (100) 8,800	57,800 (300) 13,800	58,300 (400) 8,700
<b><i>Total Demand</i></b>	<b><i>66,000</i></b>	<b><i>71,300</i></b>	<b><i>66,600</i></b>
<b><i>% Short to Meet Demand</i></b>	<b><i>1%</i></b>	<b><i>0%</i></b>	<b><i>0%</i></b>

Notes:

- Under critically dry conditions, the groundwater system demands may be reduced from Normal Year conditions, which would occur as a result of temporarily lowering groundwater levels in the Newark Aquifer (in the Forebay area) to slightly below sea-level (minimum elevation of -5 feet mean sea-level). This temporary drawdown of the Newark Aquifer may subsequently reduce the quantity of saline groundwater outflows to San Francisco Bay, thereby reducing the overall groundwater system demands.

## **Emergency Inter-ties**

ACWD also has water distribution system pipeline interconnections with the City of Hayward and the City of Milpitas. These have been planned to be used during emergencies such as earthquakes. If appropriate, these interconnections could be used during a water supply emergency. In addition, as a SFPUC wholesale customer, ACWD may also receive emergency supply benefits from a recent inter-tie between the EBMUD system and the San Francisco Regional System,

## **Drawing from Reserve Supplies**

ACWD is participating in the Semitropic Groundwater Banking Program. ACWD has 150,000 AF of storage capacity reserved at Semitropic, with over 100,000 AF currently in storage. In a drought situation, ACWD can retrieve water previously stored at Semitropic to help meet service area demands.

In addition, groundwater modeling of the Niles Cone Groundwater Basin has indicated that the basin groundwater levels may be temporarily drawn down to below sea-level without causing long-term water quality impacts to the Basin. In a severe drought or water shortage emergency, as documented in ACWD's Integrated Resources Planning Study, ACWD may allow the Basin groundwater elevation to be temporarily drawn down as low as 5 feet below sea-level.

## **Reduction of Demand**

ACWD is committed to providing a reliable supply of water to its customers. The District strives to provide the highest standard of service possible to all customers within its service area. During a time of water supply shortage, first priority is given to meeting health, safety and human consumption requirements.

Since the options for supply augmentation are limited, the District's need to reduce demand during the drought emergency is very important. By adhering to the BMPs in the water conservation MOU, we are working to reduce demand in all customer categories. Chapter 7 provides a detailed description of these programs.

It is also important that business and industry be allowed to continue to operate, therefore, some consideration is made for these customer classes when demand reduction levels are developed. These levels extend to a potential 50 percent shortfall, in compliance with the requirements of Water Code Section 10631. However, it should be noted that if this level of reduction were to actually occur, there is a potential for major economic impacts among the more water intensive industries in the District's service area. Table 9-2 shows billed water consumption by customer class for FY 2003/04. Using these figures as a base, Table 9-3 shows a typical sensitivity analysis for demand reduction by customer category.

Once the demand reduction level has been determined, ACWD will enact a program that will include actions required by each customer group. The Drought Management Action Plan for various levels of supply shortage is described in Tables 9-4a through 9-4d.

**Table 9-2  
FY 2003/04 Consumption by Customer Class**

<i>Customer Class</i>	<i>Consumption (AF)</i>
Residential	34,100
Industry	4,100
Business	5,200
Institutional	2,300
Landscape	6,300
<b>Total</b>	<b>52,000</b>

**Table 9-3  
Example Sensitivity Analysis for Reduction in Levels of Consumption**

<i>Water Consumption</i>	<i>No Deficiency</i>		<i>10% Deficiency</i>		<i>20% Deficiency</i>		<i>30% Deficiency</i>		<i>50% Deficiency</i>	
	%	<i>Amt. (AF)</i>	%	<i>Amt. (AF)</i>	%	<i>Amt. (AF)</i>	%	<i>Amt. (AF)</i>	%	<i>Amt. (AF)</i>
1. Total FY03/04 consumption (excludes hydrants/firelines)		52,000		52,000		52,000		52,000		52,000
2. Required overall reduction	0	0	10	5,200	20	10,400	30	15,600	50	26,000
3. Required level of consumption		52,000		46,800		41,600		36,400		26,000
4. Example level of reduced consumption:										
<i>Residential</i> <sup>1</sup>	100	34,100	90	30,690	80	27,280	68	23,188	57	19,437
<i>Industrial</i> <sup>1</sup>	100	4,100	90	3,690	85	3,485	85	3,485	70	2,870
<i>Business</i> <sup>1</sup>	100	5,200	90	4,680	85	4,420	85	4,420	50	2,600
<i>Institutional</i> <sup>1</sup>	100	2,300	90	2,070	85	1,955	85	1,955	50	1,150
<i>Landscape</i>	100	6,300	90	5,670	70	4,410	54	3,402	0	0
<b>Total</b>		<b>52,000</b>		<b>46,800</b>		<b>41,550</b>		<b>36,450</b>		<b>26,057</b>
5. Residential level of consumption-										
<i>Avg. gpd per units served</i> <sup>2</sup>		293		264		234		199		167
<i>Avg. gpd per capita</i> <sup>3</sup>		94		84		75		Lifeline 64		Lifeline 53

**Notes:**

<sup>1</sup> Does not include water use for dedicated landscape accounts (i.e. residential, industrial, business and institutional landscape accounts). This water use is listed separately under the "Landscape" category.

<sup>2</sup> Based on a total of 103,970 single-family and multi-family residential units in 2005 (source: ABAG).

<sup>3</sup> Based on January 2005 Department of Finance population estimate of 324,838 for Fremont, Union City and Newark.

**Table 9-4a**  
**Drought Management Action Plan**  
**Minimal Shortage (5-10%)**

<p><b>ACWD Action</b></p> <ul style="list-style-type: none"> <li>• Initiate public information campaign.</li> <li>• Explain drought situation to the public and governmental bodies.</li> <li>• Explain other stages and forecast future actions.</li> <li>• Request voluntary water conservation.</li> <li>• Prepare and disseminate educational brochures, bills inserts, etc.</li> <li>• Send technical information to specific customer types on ways to save water.</li> <li>• Display information at Public Programs.</li> <li>• Notify media.</li> <li>• Begin advertising campaign.</li> </ul>
<p><b>Requested Customer Actions</b></p> <p><b>Residential</b></p> <ul style="list-style-type: none"> <li>• Implement voluntary water use reductions.</li> <li>• Adhere to water waste ordinance.</li> </ul> <p><b>Business/Industrial</b></p> <ul style="list-style-type: none"> <li>• Research reuse options.</li> <li>• Improve cooling tower efficiency.</li> </ul> <p><b>Cities/Schools</b></p> <ul style="list-style-type: none"> <li>• Request water conservation measures be instituted.</li> </ul>
<p><b>Enforcement</b></p> <ol style="list-style-type: none"> <li>1. Educational letter, call or visit.</li> <li>2. Educational visit and warning.</li> </ol>

**Table 9-4b  
Drought Management Action Plan  
Moderate Shortage (10-20%)**

**ACWD Actions**

- Adopt ordinance banning water waste such as: hosing of paved surfaces, irrigation during daylight hours, unrepaired leaks water running into the street, fountains, except those using recirculated water.
- Set Allocations by customer type.
- Accelerate public information program.
- Disseminate technical information.
- Institute rate program to support conservation.
- Ask consumers for water use reductions at proscribed levels.
- Lobby for passage of drought ordinances by cities in service area.
- Encourage use of ET rate for landscape watering.
- Train staff for more interaction with the public especially leak detection and irrigation problems.
- Increase efficiency of ACWD operation to ensure supply.
- Increase advertising.
- Minimize hydrant flushing.
- Conduct water audit program.

**Requested Customer Actions**

**Residential**

- Adhere to water waste ordinance.
- Remain within water allocation or request an exception.
- Urge use of water saving plumbing devices in the home.

**Commercial/Industrial**

- Adhere to ordinance.
- Stay within allocation, or request an exception.
- Recycle wherever possible.
- Water served to restaurant customers on request only.
- Use of ET for watering of landscaping.

**Cities/Schools**

- Reduce landscape watering.

**Enforcement**

1. Educational letter, call or visit.

**Table 9-4c  
Drought Management Action Plan  
Severe Shortage (20-30%)**

**ACWD Actions**

- Adopt Base Consumption Allowance for each customer class and establish use charges.
- Advise area planning staffs of possible short-term inability to supply new developments/ annexations due to shortages to existing customers.
- Continue public information program at accelerated pace.
- Implement rate program to include fines for water wasters.
- Require all homes and businesses to adhere to mandatory regulations.
- Main flushing for emergencies only.
- Water audit program expanded.

**Customer Actions**

**Residential**

- Adhere to allocations, and restrictions as stated in ordinance.
- Use of ET for landscape watering needs.
- Use of greywater encouraged for landscape.

**Business/Industrial**

- Limit landscape watering.
- Submit audit of company water use demonstrating conservation efforts.

**Cities/Schools**

- Limit landscape watering.
- Cover pools.
- All fountains turned off.

**Enforcement**

1. Educational letter and visit. Fine for overuse/waste.
2. Final warning. Fine for overuse/waste.
3. Installation of flow restrictor. Fine for overuse/waste.
4. Shutoff, and reconnection fee.

**Table 9-4d  
Drought Management Action Plan  
Critical Shortage (30-50%)**

**ACWD Actions**

- All steps intensified.
- No potable water used by landscape meters.
- Reassess allocation plan for possible per capita residential allowance.

**Customer Actions**

**Residential**

- Adhere to ordinance.
- Remain within allocation.
- Car washing prohibited.
- Suggest monitoring water meter.
- Pools filled with water from tank truck services.
- Drip irrigation, greywater or reclaimed water used for landscaping.

**Business/Industry**

- Landscape watering limited to tank truck services or reclaimed water.
- Recycling of water required wherever feasible in process.
- Fountains turned off.

**Cities/Schools**

- Landscape watering limited to tank truck services or reclaimed water for playing fields.
- Pools filled with tank truck water only.
- All public water not required for health or safety prohibited, except if tank truck water can be used.

**Enforcement**

1. Educational letter and visit. Fine for overuse/waste.
2. Final Notice. Fine for overuse/waste.
3. Flow restrictor. Fine for overuse/waste.
4. Shutoff and reconnection fee.

## 9.4 ADMINISTRATION OF PROGRAM

In keeping with ACWD's Water Deficiency Action Plan, after comprehensive study the Board will enact, and staff will implement, a water demand management plan based on actual conditions. As done in 1991, a drought rate structure would be developed to augment and support the demand reduction program. Shown in Table 9-5 is an example of drought rate structures based on the four levels of supply deficit.

**Table 9-5  
Example Rate Structures Based on Deficit**

<b>Residential</b>				
<b>Cutback</b>	<b>10%</b>	<b>20%</b>	<b>30%</b>	<b>50%</b>
Base Consumption Allowance (gpd)	N/A	350	250	200
Base Rate ("BR")	BR	Up to 350	Up to 250	Up to 200
2 x Base Rate		351 to 475	251 to 350	201 to 300
3 x Base Rate		476 to 600	351 to 500	310 to 400
4 x Base Rate		601+	501+	400+
Greater than 4 x Base Rate			<i>Flow restrictor Threat to shut off</i>	
<b>Business/Industrial Governmental/Multi-Family Residential</b>				
Base Consumption Allowance (BCA)			Base Rate	
20% above BCA			2x Base Rate	
30% above BCA			3x Base Rate	
40% above BCA			4x Base Rate	
Above 40%, full audit and possible flow restrictors or shut off.				

Note: Actual rate structure and base consumption allowance to be set by ACWD Board at the time the water demand management plan is implemented.

### Impacts on Revenues/Expenditures

In 1987, the District's Board of Directors established a Dry Year Contingency Reserve that was designed to minimize the impacts of future short-term demand reduction on rates. The reserve was based on the assumption that two out of every ten years could be expected to require demand reduction efforts due to drought. When fully funded, it would be able to maintain the District in a revenue-neutral position through two successive years of 25 percent reductions below normal demand levels. The reserve was applied during fiscal year 1991-92 to offset the effects of the drought emergency, and rates did not have to be raised to offset revenue losses caused by the demand reduction.

In 1996 the District replaced the Dry Year Contingency Fund with a Dry Year Water Supply component in the District's Capital Improvement Program. The purpose of this CIP component is to provide funding for the District's dry year water supply program, including the costs of the Semitropic Banking Program, and other potential programs such as purchases from a Drought Water Bank. This CIP component is currently funded at approximately \$2.8 million per year, with a provision for unused funds being carried over from year to year. This fund will help to reduce impacts on rates during dry years that occur as a result of reduced revenue due to reduced water sales, and additional costs of securing supplies during shortages.

In addition, the adoption of the District's water supply emergency plan (Ordinance #30, see below) would also include the implementation of excess use charges. The revenue from the excess use charges would help to offset impacts from reductions in revenues due to cutbacks in water supplies.

### **Adoption of Plan**

During a water supply shortage, the ACWD Board would take action to declare a water supply emergency and enact appropriate ordinances as required by California Water Code Section 350-358. In May of 1991, Ordinance #30 (Appendix C) was put into effect. This Drought Emergency Ordinance delineated the elements of the mandatory conservation program for the ACWD service including waste restrictions and excess use charges. The ordinance is updated as base rates change.

### **Impact on the Billing System**

In order to implement a comprehensive billing program that could include differing rate levels for the drought, a new computerized system was installed. This system is capable of making changes in billing, and allows maximum flexibility for data retrieval.

### **Monitoring Use**

The District monitors water use in two ways: total water production at each of the District's production facilities is monitored daily and monthly by the Operations Department, and billed consumption is monitored monthly through the Finance Department. The District reads each customer's water meter, and provides a water bill (with consumption information) on a bi-monthly basis.

### **Coordination with Other Agencies**

ACWD serves the Cities of Fremont, Newark, and Union City. During the 1991 Drought Emergency, Union City enacted an ordinance that supported ACWD's restrictions, and the City of Fremont set forth a Resolution that supported the District's actions. During a future water emergency, ACWD will coordinate with the three cities to help resolve the situation. The District also has developed emergency inter-ties with the City of Hayward and the City of Milpitas.

### **Customer Notification and Assistance**

ACWD has an active Public Information Program that shares information with the public in a variety of forms. The District's web-site, bill insertions, direct mailings, newspaper articles, a speaker's bureau, school materials, and purchased brochures are examples of this program. All District departments assist customers in need of help. Leak detection, service verification, bill adjustments, and engineering support are all offered to our customers at no extra charge.

## 9.5 CATASTROPHIC INTERRUPTION OF WATER SUPPLIES

### Emergency Response Planning

In addition to preparation for water supply shortages due to droughts, ACWD's planning also includes preparation for catastrophic loss of supplies due to earthquakes, power outages, hazardous material spills, fire emergencies, water quality emergencies and malevolent acts and events. ACWD has in place an emergency response procedure that documents the responsibilities and response procedures for these types of events. These procedures are documented in detail in the District's Emergency Response Manual, and the key actions are summarized below:

- Mobilize using the Standardized Emergency Management System/Incident Command System.
- Assess damage to water system and its infrastructure.
- Evaluate damage and develop remedial action plan.
- Initiate repair and restore water service.
- Monitor progress of repairs and restoration.
- Communicate with health officials, the media, and water users on supply status.
- Coordinate with local, county and State in accordance with established emergency management guidelines.
- Document damage and repairs.

### Evaluation of Catastrophic Loss of SWP Water Supplies

In 2004 ACWD completed an analysis of the potential water supply impacts of the loss of SWP supplies due to a catastrophic failure of Delta levees. This evaluation focused on the District's SWP supplies because the SWP provides the greatest quantity of imported supplies to the District service area. The emergency supply scenario evaluated by ACWD was based on concerns surrounding the 2004 Jones Tract levee failure that threatened use of the Harvey O. Banks Pumping Plant to provide ACWD its SWP supplies. Under the scenario evaluated, it is assumed the South Bay Aqueduct is functional with its sole supply coming from Del Valle Reservoir (i.e. no supplies from the Delta are available). Thus, the analysis evaluated ACWD's ability to provide water to its customers considering no State Water Project or Semitropic/transfer water supply available and all applicable production and hydraulic constraints. The analysis assumes the current (2005) distribution system demands and no emergency conservation benefit.

The analysis assumed existing conditions from May 2004, specifically average groundwater levels, median SFPUC allocation, and 6,000 AF of emergency storage from Del Valle with no additional ACWD storage. The following rain year replenishment of local supplies assumed 2003 conditions for ground water and available diversions as well as 3,000 AF of inflow to Del Valle with no additional emergency storage. Median SFPUC supply is assumed for the following year as well.

Findings from the analysis show that ACWD could continue to provide full water deliveries to its customers for over 12 months, including the projected annual increase in water demand, before supply and production constraints limit further deliveries. ACWD's estimates of its ability to withstand an extended outage of its SWP supplies is attributed to the projected availability of its local supplies (groundwater, desalination), emergency storage from Del Valle Reservoir in the Alameda Creek Watershed, and continued purchases of San Francisco Regional Water System supplies.