

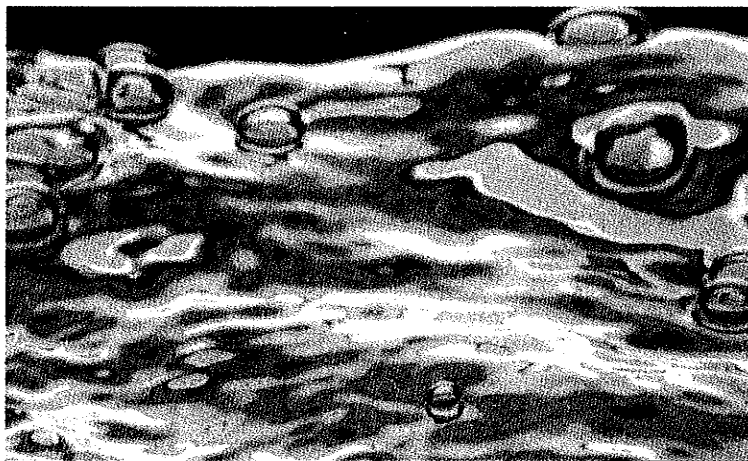
Appendix G

OSE Guidance for Drought Management Plans

A WATER CONSERVATION -GUIDE FOR- PUBLIC UTILITIES

**NEW MEXICO OFFICE OF THE
STATE ENGINEER**

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EMERGENCY ACTION PLAN FOR DROUGHT MANAGEMENT

PLANNING AHEAD TO AVOID CONFUSION

Recurring drought is a natural part of New Mexico's arid climate. Drought, which is defined as a prolonged period of below-normal rainfall, can have a widespread impact on communities—especially if those communities have not prepared for periods of drought or water shortages.

Drought contingency plans improve a water utility's efficiency and response time during a drought or water emergency. Planning ahead will enable the water utility to avoid confusion during a crisis when immediate action is required and ensure better results from water use reduction programs. The following procedure may be used to develop an emergency action plan for drought management.

DEVELOPING AN EMERGENCY ACTION PLAN

Water shortages may not be predictable, but preparations can be made so that the effect of water shortages—whether caused by drought, natural disaster, or other emergency—can be minimized.

Step 1: Form a Drought Task Force and Define its Structure and Membership

The responsibilities of the Drought Task Force must be clearly defined, and will typically include:

- (1) supervising and coordinating the development of the plan
- (2) public education
- (3) monitoring reservoir levels, groundwater levels, and precipitation to estimate water shortages
- (4) assessing the impact of shortages on each customer class and the economic livelihood of the community
- (5) coordinating the implementation of drought mitigation actions
- (6) monitoring compliance

Step 2: Prepare a History of Droughts in the Area

Prepare a chronological history of droughts in the study area and describe the effects on the community based upon articles published in newspapers, journals, professional papers, public records, and interviews with the public. Determine the reductions in demand that were necessary to provide adequate amounts of water to customers. Based on this information, what will be the impacts on the community with reduced allocations of water in the next drought? This information will play an important role in educating the public and gaining their support for the emergency action plan.

Step 3: Identify Supply Constraints

Identify constraints affecting the water utility's ability to meet water demand. These will include limits on supply and limits on system capacity.

- **Limits on Supply.** What are the limits on the utility's sources of water such as stream diversions, reservoir levels, aquifer yield, and water supply contracts? The firm yield of surface water and groundwater supplies should be established. The firm or sustainable yield of a stream or reservoir may be defined as the maximum quantity of water that can be withdrawn on a dependable basis, during a repetition of the most critical drought on record. The firm or sustainable yield of an aquifer may be defined as the average annual recharge from snowmelt and precipitation, seepage

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from watercourses, and return flow from surface and groundwater withdrawals for water-use activities. Sustainable aquifer yield may also be defined as the annual withdrawal that does not result in a long-term decline in the water table.

- **Limits on System Capacity.** What are the limits on production, treatment, storage, and distribution capacity? During droughts, customer demand typically increases. However, older systems or systems serving rapidly growing areas may not have the infrastructure capacity to meet above-average demands.

Step 4: Examine Additional Supply Options

If the available supply is the limiting factor in meeting demand, evaluate supply augmentation options. The following questions must be asked:

- Are there existing wells or reservoirs that can be used?
- Can water be purchased from another water utility?
- Can unaccounted-for-water losses be reduced?
- Can wastewater be reused for non-potable water requirements?

In the event that a community is close to exhausting its water supplies entirely, additional options must be considered. These can include actions such as setting up agreements with neighboring communities to lease or share supplies and laying emergency pipelines to supply water on a temporary basis.

Step 5: Identify Necessary Infrastructure Improvements

If system capacity is the limiting factor in meeting demand, identify the critical system components that are vulnerable to failure or need to be upgraded and enlarged to meet the projected peak demand. Evaluate the feasibility of making infrastructure improvements and rank each option based on (1) feasibility of implementation and (2) effectiveness in increasing capacity.

When evaluating the effectiveness of a proposed change, the relationships between system components must be considered. For example, increasing pumping capacity at the source of supply will not increase the amount of water that can be delivered to customers if the treatment plant or distribution mains cannot handle the increased flow rate.

Step 6: Define Criteria That Will Trigger Drought Responses

Define trigger criteria that will determine the level of response required based upon the severity of drought. Acceptable triggers include the Palmer Index, precipitation, reservoir/lake storage, streamflow, groundwater levels, soil moisture, or any combination of these parameters. Criteria for the phaseout or a downgrade of the condition's severity should also be considered. The following are examples of trigger conditions that might be used for various levels of severity.

Phase 1 Trigger: Water Shortage Advisory

Snowpack, precipitation, streamflows, and reservoir levels are only 70% of normal.

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Phase 2 Trigger: Water Shortage Watch

- (1) Water demand has reached or exceeded a specific percentage of the firm capacity of the system.
- (2) Reservoir or well levels are still high enough to provide an adequate supply, but the levels (specify level) are low enough to disrupt some other beneficial activity, such as recreation.
- (3) The water supply is still adequate, but the reservoir or well levels are low enough that there is a possibility that the supply situation may become critical if the drought or emergency continues. An example is a reservoir that has a 12-month supply in storage, if no more rain occurs, or a well that has dropped to a specified level.

Phase 3 Trigger: Water Shortage Warning

- (1) Water demand has reached the predetermined limit of the system, beyond which the failure of a pump or some other piece of equipment could cause a serious disruption of service to part or all of the system. An example might be that daily demand has exceeded 90% of the capacity of the system for three consecutive days.
- (2) Reservoir levels, well levels, or streamflows have reached the second impact level, beyond which operational problems will occur.
- (3) Water supply storage levels have declined to the second impact level.

Phase 4 Trigger: Water Shortage Emergency

- (1) The imminent or actual failure of a major component of the system has occurred which will cause an immediate health or safety hazard.
- (2) Water demand has reached or exceeded the third impact level. An example might be that demand exceeds the system's capacity on a regular basis, thereby presenting the imminent danger of a major system failure.
- (3) Reservoir levels, well levels, or streamflows have declined to the third impact level. An example might be that reservoir levels (specify a level in feet above mean sea level) are so low that diversion or pumping equipment will not function properly.
- (4) Water levels in the distribution storage reservoirs are too low to provide adequate fire protection.

Step 7: Specify Actions To Be Taken

Define the level of response and actions that will be taken in each phase. The following are examples of actions that might be taken for various levels of severity.

Phase 1 Response: Voluntary Conservation

- (1) Provide the public with information on current storage levels in reservoirs and streamflows and the long-range forecasts for precipitation. Alert water customers to the possibility of implementing mandatory conservation measures if drought conditions persist.
- (2) Inform the public by mail and through the news media that they should try to reduce their water use.
- (3) Inform the public daily whether they should water or not water their lawns.

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Phase 2 Response: Mandatory Conservation—Level 1

It is important that the water utility take a lead role in setting an example on efficient water use. Before the utility can expect cooperation from its customers, it must put its own house in order. The utility can demonstrate its intent to improve the efficiency of operations and minimize waste by pursuing any or all of the first three actions listed in this section.

- (1) Implement leak detection and repair program.
- (2) Reduce flushing of water mains, sewers, storm drains, and streets to the minimum necessary to maintain sanitary conditions.
- (3) Reduce frequency and duration of irrigation at public landscape sites such as golf courses, athletic fields, parks, cemeteries, and greenbelts. Adopt irrigation schedules based on the results of water audits if available.
- (4) Impose a mandatory lawn watering schedule such as alternate day sprinkling and restrictions on time of day for watering.
- (5) Prohibit nonessential water uses such as ornamental fountains; pool filling; car, bus, and heavy equipment washing; washing and steam cleaning of building exteriors.

Phase 3 Response: Mandatory Conservation-Level—2

In addition to the above:

- (1) Implement a special pricing structure.
- (2) Distribute water-saving plumbing fixture kits.
- (3) Curtail irrigation at athletic fields, parks, cemeteries, and greenbelts.
- (4) Curtail fairway irrigation at all public and private golf courses using public water supplies, and reduce watering of tees and greens to a minimum.
- (5) Prohibit all outdoor water use.

Phase 4 Response: Rationing

In addition to the above:

Limit the amount of water each customer can use and take legal action as needed to achieve compliance. For example, restrict residential water users to 45 gallons per capita per day and require a percentage reduction by commercial, institutional, and industrial users.

Step 8: Establish a Public Education Program

No drought plan will be successful without a comprehensive public education program. Customers must understand why their cooperation is needed before they will sacrifice water uses.

Customers must also be instructed in how to conserve. Often they are willing to cooperate but do not know how. The utility's credibility is crucial to the success of any drought program. Customers must believe that the utility is an authority on the drought situation and that the emergency action programs are necessary and effective. To maintain credibility, the utility must be consistent:

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- each spokesperson must report the same data or advice
- each education effort must be coordinated
- programs should proceed without major changes.

Step 9: Establish Implementation Procedures

Procedures for the implementation of the emergency action plan should define when and how customers, other utilities, and government agencies are informed that the emergency action plan is going into effect. Procedures may include:

- (1) automatic regulatory implementation provisions
- (2) prearranged media notification or press release procedures
- (3) direct notification procedures including mail, or, if needed, telephone notification systems
- (4) prearranged contract procedures to obtain emergency water supplies from other sources if needed
- (5) checklists or operating procedures as necessary.

Step 10: Establish Procedures for Termination Notification

The termination of water restrictions procedure should define when and how customers and others are informed that the emergency has passed and the program is being shut down. The establishment of termination triggers and the decision to terminate must be based on sound judgment by appropriate city or utility authorities.

Step 11: Obtain Legal Authority

Obtain the required legal authority and regulatory permits for implementing the individual measures in the emergency action plan. It is generally advantageous to adopt an ordinance or regulation providing authorization to a designated official to begin immediate implementation of contingency measures when a trigger condition is reached.

Prepare memorandums of agreement (MOA), and contracts as needed, with all agencies that will be players in the implementation of the drought action plan so that the role of all participants is clearly understood. Because verbal agreements are easily forgotten or compromised by changes in priorities or personnel within an agency, agreements must be documented in writing to ensure that they will be honored in time of need.

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SANTA FE WATER ORDINANCE RESTRICTIONS CHART

This table highlights the four stages of water restrictions outlined in the water conservation ordinance adopted by the Santa Fe City Council on June 25, 1997. Each of the stages is tied to projected shortages of water. This drought management plan was instrumental in the summer of 2000 when water shortages prompted Santa Fe to declare its first Stage 2 Water Alert and Stage 3 Water Warning. (For more information, see the Santa Fe case study on page 157.)

	Stage 1 Water Watch	Stage 2 Water Alert (City Manager)	Stage 3 Water Warning (City Council)	Stage 4 Water Emergency
Voluntary (V) or Mandatory (M)	V	M	M	M
Demand deficiency*	15%	16% - 35%	36% - 50%	> 50%
Residential				
Outdoor landscape watering	All elements of Stage 2 apply on voluntary basis from 10 a.m. to 4 p.m.	All elements of Stage 2 apply on voluntary basis from 10 a.m. to 4 p.m. No watering on Mondays, then every other day depending on address; No watering between 10 a.m. and 4 p.m. Handheld buckets, shut-off hoses can be used anytime. Reclaimed and greywater may be used anytime.	Permitted only on Tuesdays and Fridays, even for hose with shut-off. May water anytime if by hand-held container or drip irrigation, or if using reclaimed or greywater.	Prohibited except for plants that are rare, exceptionally valuable or essential to well being of public or rare animals. Trees and shrubs only with shut-off hose, hand-held container or drip. Greywater okay on fruit trees, ornamental trees and shrubs.
Car washing		Anytime if bucket or shut-off hose is used.	All vehicle washing at a residence is prohibited.	Prohibited
Spas and Swimming Pools		One initial filling for recirculating pools only, no draining and refilling.	Filling and refilling prohibited except when used for water storage. Pool must be covered when not in use.	Prohibited except as water storage
Water runoff from property; washing down pavement, sidewalk		Prohibited	Prohibited	Prohibited
Ornamental Fountains		Allowed only if water is recirculated	Prohibited	Prohibited

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SANTA FE WATER ORDINANCE RESTRICTIONS CHART (cont.)

	Stage 1 Water Watch	Stage 2 Water Alert (City Manager)	Stage 3 Water Warning (City Council)	Stage 4 Water Emergency
Voluntary (V) or Mandatory (M)	V	M	M	M
Demand deficiency*	15%	16% - 35%	36% - 50%	> 50%
Commercial				
Car washing	All elements of Stage 2 apply on voluntary basis from 10 a.m. to 4 p.m.	Anytime on immediate premises	Anytime on premises, but if business does not use reclaimed or recycled water, volume will have to be reduced.	All car washes must reduce usage.
Nurseries		Must curtail all non-essential watering and encouraged to use conservation practices, but exempt from irrigation restrictions.	Reduce use.	Reduce use; may use greywater to irrigate fruit trees, groundcovers and ornamental trees and shrubs.
Restaurants		Only serve water on request	Only serve water on request	Only serve water on request
Construction Projects		Limited to water use required by regulatory agencies (e.g. dust control). Must use reclaimed water if reasonably available.	Limit to new construction meters; water used only for purposes required by regulatory agencies. Effluent water used for dust control only.	No new construction meters will be issued. Construction water not used for earth work or road construction. Effluent water used for dust control only.
Golf courses		Only during designated hours/days	Only during designated hours/days	Prohibited

*Applies during periods when the possibility exists that the utility will not be able to meet all of the water demands of its customers by up to X% of the annual demand projection.