

# RECLAMATION

*Managing Water in the West*

## Tool for Planning Temporary Water Supply Response in Drought Emergencies

Brought to you by:  
Bureau of Reclamation,  
Texas Water Development Board, and  
Texas Division of Emergency Management




U.S. Department of the Interior  
Bureau of Reclamation

Texas Water  
Development Board

# **Tool for Planning Temporary Water Supply Response in Drought Emergencies**

- **This Tool is offered to support water resource and utility professionals with the challenge of providing water to communities under the influence of severe drought.**
- **The objective of the Tool is to assist in planning for water shortages by familiarizing users with alternative sources, treatment processes, distribution options, short term equipment solutions for treatment, and the regulatory process as it relates to emergency drought situations.**

# How to use this Tool

- This Tool contains links to websites (@).
- Each Section provides information on a decision that must be made to prepare a practical plan for emergency water supplies.
- Home button returns the user to the main menu: 
- Use forward and back arrows on your keyboard to go to next or previous page.
- Labeled arrow buttons are provided to advance to the next or previous sections.



# How to use this Tool

- Slides or bullets marked with these symbols are applicable to the following supply sources:



**Further Indoor Conservation**



**Fresh & Brackish Groundwater**



**Reclaimed Wastewater**



**Brackish Surface Water**



**Seawater**



**Hauled Water**

- Slides marked with this symbol  are applicable to every supply source.

# How to use this Tool

- If you would like assistance with this tool, please contact one of the following agency representatives:

## Bureau of Reclamation

Oklahoma-Texas Area Office

Collins Balcombe

512-899-4162

[cbalcombe@usbr.gov](mailto:cbalcombe@usbr.gov)

Technical Service Center

Michelle Chapman

303-445-2264

[mchapman@usbr.gov](mailto:mchapman@usbr.gov)

## Texas Water Development Board

Sanjeev Kalaswad

512-936-0838

[sanjeev.kalaswad@twdb.texas.gov](mailto:sanjeev.kalaswad@twdb.texas.gov)

## Texas Department of Emergency Management

512-424-2208

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# What will I have at the end?

- Knowledge of the State's drought planning resources,
- An estimate of emergency water supply requirements,
- List of potential sources of emergency water,
- Knowledge of how those sources need to be treated, waste that will be generated and how to manage waste,
- Ideas for distribution of emergency water,
- A clear plan for navigating the regulatory process,
- Ideas for possible sources of equipment, and
- Strategies for involving the public.

# Texas Success Stories

- Many communities have successfully resolved emergency drought supply problems by working with the Emergency Drinking Water Task Force (see section **A**<sup>1</sup> for additional information). This tool includes many references and resources to help you along the way. Please open the link below to learn about these real Texas success stories.

 [High Priority Water System List Success Stories](#)

# Disclaimers

- **The Bureau of Reclamation provides the information contained in this Tool as a service to the public. We offer a wide range of information, including links to other organizational sites, to meet as many needs as possible. Reclamation makes every effort to provide accurate data according to the resources available to us. However, neither the authors, Reclamation, nor any other party involved in the preparation of the material and data available on or through this tool, represent that the information provided here is in every respect complete and accurate and are not responsible for errors or omissions.**
- **Presentation of information on commercial products does not constitute an endorsement of that product or commercial enterprise.**
- **Additional sources may be available locally for any equipment or service needs.**

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Home icon  
takes you  
back here!



# Main Menu

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- N** Public Communications and Involvement

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# A Preparation

- Now is the best time to think about what to do in an emergency. The State of Texas, Environmental Protection Agency (EPA), Federal Emergency Management Agency (FEMA), Centers for Disease Control (CDC), Department of Homeland Security (DHS), American Water Works Association (AWWA), and the United Nations, have produced documents to assist in preparing emergency plans for a wide range of events, including drought.
- The objective of this section is to introduce State, Federal, and Professional Organization resources for drought planning and to alert you to potential health issues in drought conditions other than lack of water.

1 State Drought Preparedness

2 Federal Resources

3 Professional Organizations

Number Buttons take you to the Subsection.



B Health Issues

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A

1

# State Drought Preparedness

## Texas State Drought Preparedness Council

- **Responsible for:**
  - **Assessment and public reporting of drought monitoring and water supply conditions,**
  - **Advising the governor,**
  - **Recommending provisions for drought in the state emergency management plan and state water plan,**
  - **Advising regional water planning groups,**
  - **Ensuring effective coordination among state, local, and federal agencies, and**
  - **Reporting to legislature regarding significant drought conditions.**



B Health Issues

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A

1

# State Drought Preparedness (continued)

## @ State Drought Preparedness Plan

- Identifies the local, state, federal and private sector entities that are involved with state drought management and defines their responsibilities.
- Defines a process to be followed in addressing drought-related activities, including monitoring, impact assessment, and response.
- Identifies long and short-term activities that can be implemented to prevent and mitigate drought impacts.
- Acts as a catalyst for creation and implementation of local drought planning and response efforts.



B Health Issues

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A

1

# State Drought Preparedness (continued)

## @ Emergency Drinking Water provisions (Annex A)

- Supplement to the State Drought Preparedness Plan focusing specifically on developing procedures to enable public water systems to provide adequate potable water for drinking and sanitation to ensure public health and safety.
- Defines the organization, operational concepts, responsibilities of participating agencies, and procedures for providing immediate and longer-term emergency assistance to public water systems (PWSs) for obtaining, transporting, and distributing potable drinking and sanitation water.



B Health Issues

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A

1

# State Drought Preparedness (continued)

## @ Emergency Drinking Water Task Force (link to member list)

- Composed of representatives from Texas Division of Emergency Management (TDEM), Commission on Environmental Quality (TCEQ), Department of Agriculture (TDA) and Water Development Board (TWDB). The Task Force may also call on other state or federal agencies for support.

## @ Activated by TDEM with TCEQ and TWDB when the Governor issues a Disaster Proclamation for Drought.

- Coordinates members in order to respond to the need of providing emergency drinking water to a community when that community determines that they have 180 days or less of water resources.



B Health Issues

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1

# State Drought Preparedness (continued)

- **Emergency Drinking Water Task Force (continued)**

- **@ Public water systems in this condition must identify themselves to [TCEQ](#) (follow link to reporting form).**

- TCEQ informs the Task Force.

- The classification of an emergency condition is the state's trigger to begin responding to a community's lack of, or anticipated lack of, drinking water and water for sanitation uses.

- **@ [High Priority Water System List Success Stories](#)**



B Health Issues

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A

1

# State Drought Preparedness (continued)

## Drought Assistance Directory

- Guide to resources for Mitigation Assistance and Emergency Response Assistance – mitigation before there is an emergency.
- Process for Responding to Public Water Supply Problems (on page 2 of above link).
- Flow chart directs user to responsible organizations for resources to enable the public water utility to handle the situation.
- This document guides the public water utility in handling the situation with the resources outlined in the Drought Assistance Directory.



B Health Issues

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# A Federal Resources

2



## EPA: Natural Disasters and Weather Emergencies

- What to do before and during a severe drought



## EPA: Tabletop exercise tool for Water Systems: Emergency Preparedness, Response & Climate Resiliency.

- Description of the Table Top Exercise Tool (TTX Tool) for Water Systems . Register at this web site and download the TTX Tool and guidance documents.
- TTX Tool Includes scenarios for many types of emergencies including extreme drought under climate change scenarios.



B Health Issues

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A

2

# Federal Resources (continued)

## EPA Response Protocol Toolbox: Planning for and Responding to Drinking Water Contamination Threats and Incidents

- Threat Evaluation, Site Characterization and Sampling, Sample Analysis, Response Actions, example decision trees for containment and public notification.



B Health Issues

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A

3

# Professional Organizations

## American Water Works Assoc. – Drought Preparedness and Response

- Discusses forming a water shortage response team; forecasting supply in relation to demand; balancing supply, demand, and assessing mitigation options; establishing triggering levels; developing a staged demand reduction program; and involving the community in plan adoption and implementation.



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**A****3**

# Professional Organizations (continued)



## Water Environment Research Federation

- Information and Planning resources many aspects of water resource management, treatment, delivery, security & emergency response. Select specific knowledge area from list on the right of the web site.



## Water Environment Federation

- Water education materials for public relations
- Online Education
- Free webcasts

**B Health Issues****RECLAMATION**



# B Drought Health Issues

## @ CDC & EPA: Health Issues - When Every Drop Counts

- When surface or groundwater supplies are diminished other health concerns arise. The CDC and EPA collaborated on a document describing health concerns that can develop with prolonged drought and how to prepare for public health protection at each stage of drought.

## @ Treatment process for Cyano-toxins & Added section on Microcystin LR Treatment and Control

- Cyanobacteria (blue-green algae) can become a problem in warm surface water. They produce cyanotoxins that can be harmful to animals and humans. This dissertation describes the treatment of surface water to remove cyanotoxins using powdered activated carbon and ultrafiltration.





# **c** Water Capacity Requirements

- How much water do you need? Here are some considerations for narrowing in on the critical supply for an emergency.
  - The minimum necessary for health and sanitation.
  - The minimum necessary to keep the distribution system functioning.
  - The maximum that you can get and treat reliably.
- The next pages provide references to help define your emergency water requirement.








# **c** Water Capacity Requirements (continued)

- Texas Regulations

- Texas Administrative Code Requirements for municipal water systems:

-  Maintain 35 psi throughout the distribution system [30 TAC § 290.45\(a\)\(2\)](#) In emergencies the minimum pressure is 20 psi.
-  Generally systems must provide 0.6 gpm per connection with pressure tank of sufficient capacity ([30 TAC § 290.45\(b\)\(1\)](#) and(2))
-  Non-community water systems such as schools and hospitals must provide minimum water supply according to [30 TAC § 290.45\(d\)\(1\)](#)





# **c** Water Capacity Requirements (continued)

- **Additional Resources**

- **@ [World Health Organization - Emergency Water Supply.](#)**

- Establishing and protecting centralized and decentralized water supplies.
- Recommends a minimum of 4 gallons per person per day.

- **@ [Centers for Disease Control – Emergency Preparedness – Water Supplies.](#)**

- Store at least 1 gallon per person per day and keep a 3-day supply.

- **@ [Emergency Water Supply Planning Guide for Hospitals and Health Care Facilities](#) – Methods for estimating critical water supply needs.**

- **@ [The Sphere Project Handbook](#) – Humanitarian Charter and Minimum Standards in Humanitarian Response.**

- Section on minimum standards in water supply, sanitation and hygiene promotion.







# D Alternative Sources

- Review potential sources of additional water such as:



1

Further Indoor Conservation



2

Fresh & Brackish Groundwater



3

Reclaimed Wastewater



4

Brackish Surface Water



5

Seawater



6

Water Hauling

Number Buttons take you to the Subsection.





D

1

# Further Indoor Conservation

## @ Drop by Drop

- Sierra Club & National Wildlife Foundation Study
- Suggestions for improving conservation through pricing while still supporting the water district

## @ Water Conservation Tips for the Home

- Many suggestions for reducing water use indoors.

## @ Water Conservation Promotion

- Educational material and media resources that promote conservation
- See also Public Communications and Involvement section “M”





D

2

# Fresh & Brackish Groundwater

## @ [TWDB Groundwater Resources website](#)

- Information on everything to do with groundwater in Texas

## @ [TWDB “Water for Texas Summary of the 2011 Regional Water Plans”](#)

- Describes water management strategies for each region of Texas. Regional summaries include maps showing aquifers in the region.

## @ [TWC Report 89-01 – Ground Water Quality of Texas – An Overview of Natural and Man-Affected Conditions](#) (now TCEQ)

- Maps of TDS, Major Ions, and specific contaminants for Texas Aquifers.

## @ [Map of Major Aquifers](#) provided by TWDB

## @ [Map of Minor Aquifers](#) provided by TWDB



**D****2**

# Fresh & Brackish Groundwater

(continued)

- Contact TWDB Groundwater Technical Assistance for help locating existing wells and groundwater resource data.
  - (512) 936-0871
- Well Jetting opens up clogged screens, packing material, restoring well productivity
- Companies that restore wells:
  - @ WellJet/Hydropressure Cleaning: [website](#)
  - @ Well Jetting Service: [website](#)
    - Some of the pump sources also provide well renovation





# D Reclaimed Wastewater

3

@ What is Water Reuse? “History of Water Reuse” from TWDB

@ Findings of the National Academies Press: Water Reuse: Expanding the Nation’s Water Supply Through Reuse of Municipal Wastewater

- “Municipal wastewater reuse offers the potential to significantly increase the nation’s total available water resources.”
- “De facto reuse of wastewater effluent as a water supply is common in many of the nation’s water systems”
- “Natural systems are employed in most potable water reuse systems to provide an environmental buffer. However, it cannot be demonstrated that such “natural” barriers provide any public health protection that is not also available by other engineered processes”
- Reclamation facilities should develop monitoring and operational plans to respond to variability, equipment malfunctions, and operator error to ensure that reclaimed water released meets the appropriate quality standards for its use.

@ See: <http://www.usbr.gov/research/AWT/reuse.html> for more information on water reuse.



# D Reclaimed Wastewater (continued)

3

@ [Click here](#) to read an NSF/EPA Environmental Technology Verification study documenting treatment of municipal wastewater with UF/RO.



Gallup, NM Wastewater Reclamation Study

**D**

3

# Reclaimed Wastewater (continued)

- The WRRF Report 06-008, “Low cost treatment technologies for small-scale water reclamation plants”
  - “Identifies and evaluates established and innovative technologies that provide treatment of flows of less than one million gallons per day. The report includes an extensive cost database, where the cost and operation data from existing small-scale wastewater treatment and water reuse facilities have been gathered and synthesized.”
  - “Based on the results of this project, natural systems (ponds plus wetlands) are the best economic alternative for small communities if inexpensive land is available and effluent water quality can satisfy the local regulations. If high water quality is desired and budget is available, non-membrane systems can be used. Membrane-based systems can be used if even higher water quality is needed and if budget allows.”



Full report is available for purchase at the WaterReuse Foundation [website](#) .





# D Brackish Surface Water

4

- Surface water may become brackish during a drought due to a combination of evaporative losses, reduced inflow of fresh water, and discharge of waste water.
- Increased nutrient levels can result in algal blooms.
- Some algae produce toxic compounds that are difficult to remove in conventional treatment systems.
- Ultrafiltration is an excellent method for removing suspended solids, turbidity and micro-organisms.
- Do not chlorinate or otherwise disinfect before ultrafiltration of brackish surface water, or seawater, to prevent breaking algal cell membrane and releasing toxin.



For more information and studies on brackish water desalination

see <http://www.usbr.gov/research/AWT/brackish.html>







# D Seawater

5

- Seawater desalination is widely used around the world. Reverse osmosis (RO) is the more economical method due to higher recovery of fresh water and hydraulic energy recovery devices that save energy cost.

@ See the Reclamation Advanced Water Treatment Web site for studies concerning seawater desalination:

<http://www.usbr.gov/research/AWT/seawater.html>



# D Hauling water

6

- Often the quickest way to provide an emergency water supply is to transport water in tankers from a nearby source and store the water in tanks and reservoirs.
  - @ [30 TAC § 290.44\(i\)](#) provides instructions on how water hauling distribution must be accomplished.
  - @ TCEQ approved [licensed water haulers](#)
- It is important to note that hauling water is often the most expensive alternative, but may be more expeditious for a moderate supply volume.

# **E** Ancillary Equipment for New Sources

- Review potential equipment that may be needed for new sources of water:



1

Intakes



2

Pumps



3

Power

**Number Buttons take you to the Subsection.**



# Ancillary Equipment for New Sources (continued)

- **Intakes**



Surface sources will need a screened intake.

- Surface water intake screen suppliers in Texas:



- [Delta Intake Screens](#) – Houston
- [AMISTO CO Separation Products, Inc.](#) - Alvin
- [Headworks, Inc](#) – Houston
- [Gravity Flow Systems Southwest, Inc.](#) – Dripping Springs



[Seawater Intakes](#) – white paper from WaterReuse Assoc.



Also applies to subfloor surface water intakes





# E Ancillary Equipment for New Sources (continued)

- Pumps

- It is best to work with a local pump supplier. Here are a few Texas companies compliments of Google:

@ [Aqua Pump & Well Service, Inc](#) – Austin area

@ [A&A Pump House Supply](#) – Houston Area

@ [Southwest Texas Solar](#) – El Dorado

@ [Abel Water Systems](#) – San Angelo (wind systems)

@ [Jurgensen Pump](#) – Valley Mills

@ [Gicon Pumps & Equipment](#) – Amarillo, Lubbock, Odessa, & Ft. Worth





# E Ancillary Equipment for New Sources (continued)

- Power

- Power outages during a drought can be planned for. Some of the well pump suppliers provide solar or wind powered pumps, but generators are also a good idea for when there is a power failure.

@ [Generators of Texas](#) – Austin, Corpus Christi, Dallas, Houston, & San Antonio

@ [Generator Supercenter](#) – Tomball

@ [Kentech Power](#) – Austin, San Antonio, Houston, & Dallas

@ [Wholesale Solar](#) – Mt. Shasta, CA

@ [USP&E](#) – Celina





# F Treatment Needs

- **@** The minimum treatment required is driven by [TCEQ Drinking Water Standards](#) designed to protect human health. The document lists maximum contaminant levels for inorganic and organic compounds and describes treatment required to meet regulations.
- Secondary water quality standards are set for aesthetic reasons. TCEQ may grant temporary exemptions to systems that do not meet secondary standards with provisions (see p. 168 of above link).



# F Treatment Needs (continued)

@ You will need a water analysis of a new source. The EPA [Response Protocol Toolbox](#), Chapter 3 describes the EPA water source characterization protocol.

@ [Water Treatment Primer for Communities in Need](#)

- Summarizes drinking water regulations, conventional and advanced treatment processes and treatment for specific contaminants.











# G Distribution & Storage

- Review distribution and storage options:

- 1 Distribution Options
- 2 Blending and Remineralization
- 3 Temporary Water Storage
-  4 Disinfection of Tanks
-  5 Disinfection of Containers

Number Buttons take you to the Subsection.

  Note this section has two symbols. This indicates that information could be applicable to all water alternatives but required for water hauling alternative.





# G Distribution Options

1

- Use the current distribution system in whole or in part
  - Can the size of the existing distribution system be reduced to only supply water to prioritized zones?
  - @ Does a neighboring utility have excess water supply that can be shared through a temporary emergency interconnection?
- Supply key facilities through using the building plumbing
  - Schools
  - Hospitals
  - Major business centers





# G Distribution Options (continued)

1

- Public water dispensary

@ [World Health Organization's Environmental Health in Emergencies and Disasters: a Practical Guide](#) provides information on using water tankers, temporary water distribution stands, water containers, and facilities for personal hygiene.



# G Blending & Remineralization

2

- When introducing a new water quality to the distribution system it is important to stabilize the water to prevent piping corrosion.
- @ The World Health Organization's [Safe Drinking-Water from Desalination](#), Chapter 6, provides information on blending source water with desalinated water (in order to protect storage and distribution plumbing) and re-mineralization (to increase the concentration of important nutritional minerals).



# G Temporary Water Storage

3

- Temporary storage bladder tanks provide easily transportable water storage in a wide variety of sizes:



- [Interstate Products, Inc.](#)
- [Aero Tec Laboratories](#)
- [Basic Concepts, Inc.](#)
- [Tank Depot](#)



# G Disinfection of Tanks

4

## @ World Health Organization information on [cleaning and disinfecting water storage tanks and tankers](#)

- Considerations for converting tanks from another purpose to hauling or storing water
- Instructions for disinfecting the tank
- Chlorine testing to ensure disinfectant is sufficiently rinsed out.
- Considerations for disposal of waste liquids.



# G Disinfection of Containers

5

## @ Centers for Disease Control and Prevention information on the [cleaning and storage of water containers](#)

- Instructions for cleaning and sanitizing water containers
- Properties of acceptable water containers
- Proper labeling and storage of water containers
- This site also contains instructions for disinfecting water at home by filtering, boiling, and using household disinfectants



# H Waste Management

- Review how to manage waste including:



- 1 Domestic Waste Management
- 2 Concentrate Management
- 3 Solid Waste Management

Number Buttons take you to the Subsection.







# H Domestic Waste Management

1

- The site below describes how TCEQ regulates disposal of wastewater into or adjacent to water in the state or by land application for irrigation, evaporation, or subsurface application. Work closely with your TCEQ wastewater representative to determine the best solution for waste management from temporary treatment systems.

@ [Domestic Wastewater Permits](#)





# H Concentrate Management

2

- An engineering firm can help determine the best concentrate management solution for each situation.
- This subsection will discuss the various types of concentrate and disposal options.
- Types of Concentrate:
  - 2.1 Seawater Concentrate
  - 2.2 Brackish Concentrate
- Concentrate Disposal Options:
  - 2.3 Land Application
  - 2.4 Discharge to Surface Water
  - 2.5 Discharge to Wastewater Treatment Plant
  - 2.6 Deep Well Injection

Number Buttons take you to the Subsection.



# Concentrate Management (continued)



- This subsection also discusses optimization of concentrate production based on water treatment method. Optimization of concentrate can mean minimizing concentrate Total Dissolved Solids (TDS) or minimizing concentrate volume.
  - In Texas cases where concentrate water quality is a concern for beneficial uses, concentrate TDS is minimized. Beneficial uses include land application and surface water discharge.
  - In Texas cases where concentrate water quality is not a concern, the economic cost of disposal is minimized with concentrate volume. These disposal options include discharge to wastewater treatment plants and deep well injection.





# H Concentrate Management (continued)

2

- All desalination processes generate a concentrated waste stream.
  - The volume of concentrate =  $(1 - \text{Recovery}) * \text{capacity}$ .
  - Concentration =  $\text{Feedwater Concentration} * \text{Rejection} / (1 - \text{Recovery})$
  - Brackish water nanofiltration and reverse osmosis recovery rates range from 50 to 85% depending on the water composition and system design.
  - Anti-scalant and acidification can extend recovery beyond the saturation point for slightly soluble salts.
  - Seawater recovery from reverse osmosis is usually 40 – 50%.
  - Thermal distillation processes have a low recovery rate of 5 – 15%.
  - Under the sink reverse osmosis systems have a low recovery rate of 5 - 7%.

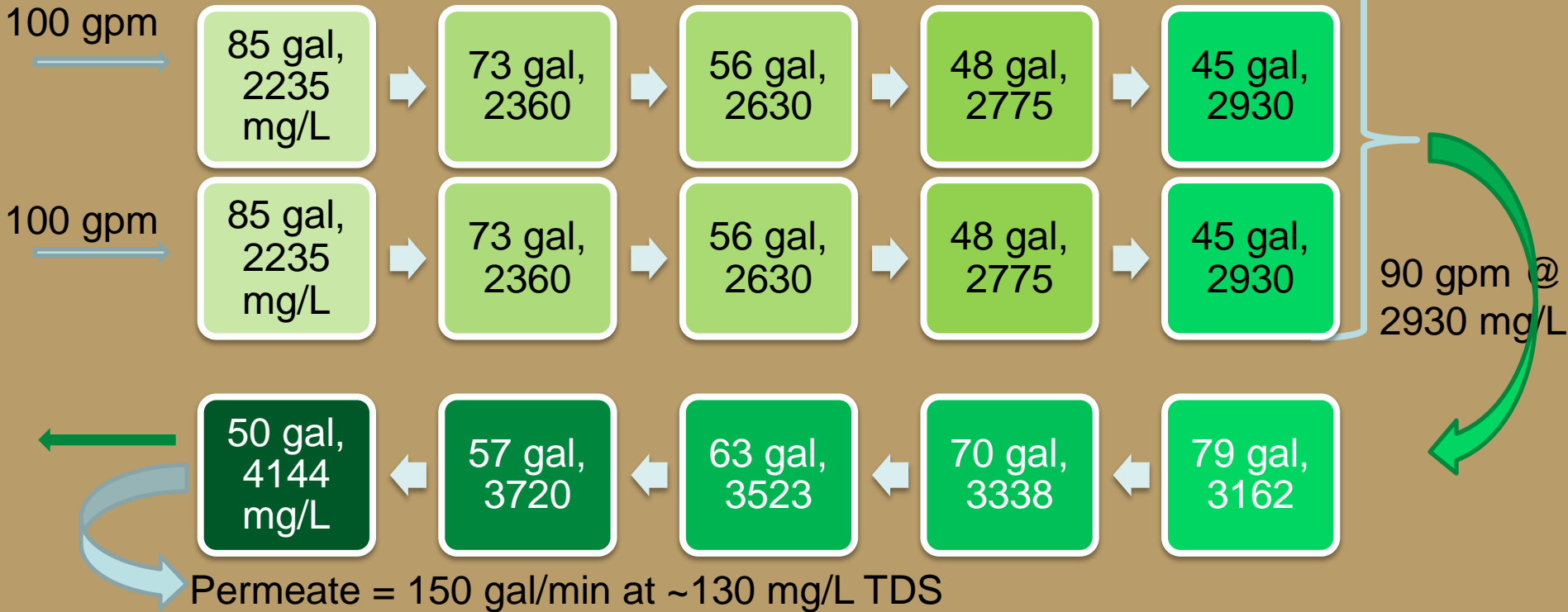




# H Concentrate Management (continued)

2

- Example concentrate volume and composition through a 2-stage RO system
  - With 200 gal/min (gpm) feed flow and 2000 mg/L TDS.
  - Over all recovery of 75%, Salt rejection of 95%





# H Seawater Concentrate

2.1

- It is best to return seawater concentrate to the ocean. It must be dispersed over a wide area away from the intake to a desalination plant. To minimize hyper saline plume development, the seawater concentrate can be blended with wastewater discharge. (TPDES Permit is required)

@ For more information see WaterReuse Association [“Seawater Concentrate Management”](#)





# H Brackish Water Concentrate

2.2

- Concentrate Management Summaries

- [@ Brackish Groundwater Concentrate Management](#)

- Documents the state of the science.

- [@ Existing & Emerging Concentrate Minimization & Disposal Practices for Membrane Systems](#) (Sethi et al. 2006 Florida Water Resources Journal)

- Description of methods

- [@ Bureau of Reclamation Concentrate Management Research](#)

- Download Federally funded reports on concentrate issues and management processes





# H Land Application

2.3

- @ Requires a Texas Land Application Permit ([TLAP](#))
  - Consult a soil scientist and estimate the Sodium Absorption Ratio (SAR) to determine suitability for plants.
  - Total Dissolved Solids (TDS) concentration in the RO wastewater is a main concern when irrigation is the proposed method for disposal.
- @ California DWPR [Report #154](#) (Water Reuse Study for Big Bear) compares RO and NF concentrate quality to secondary municipal wastewater for irrigation water potential. Report includes analysis of SAR, conductivity, and fitness for irrigation.
  - Evaporation ponds are regulated through the same permits as land application.







# H Discharge to Surface Water

2.4

- Discharge to surface water is rarely allowed. However, emergency discharge to a dry river bed, may be allowed during a drought emergency.
- If concentrate is re-blended with treated wastewater, the combined discharge would be equivalent to the source water.
- TCEQ Contact (512)-239-4671

@ [TCEQ Industrial Wastewater Permit Application Process](#) for discharge by or in waters of the State.





# H Discharge to Wastewater Treatment Plant

## 2.5

- Discharge to a wastewater treatment facility may be an option depending on the composition of the concentrate and other flows into the system. Discuss this option with your engineer and Publicly Owned Treatment Works (POTW).
- A new or modified Domestic Wastewater Permit will be required if the wastewater composition is changed or a new discharge point is used.

@ [Tips for Completing Water Quality Permit Applications](#)

@ [Domestic Wastewater Permit Process](#)





# H Deep Well Injection

2.6

- Waste disposal by deep well injection may be accomplished through an existing Class 1 UIC well that has been permitted to accept commercial waste stream.
- Several injection control wells have been permitted to accept hazardous or non-hazardous waste generated by other facilities.
- Alternatively, a well may be permitted and constructed for disposal. However, application preparation, permitting, and well installation may require more time that is available in an emergency situation.

@ [TCEQ Permit Application to Dispose of Waste in a Class I Injection Well](#)

- TCEQ UIC Permit Team 512-239-6466





# H Deep Well Injection (continued)

2.6

- El Paso Deep Well Injection Study

@ [Southwest Hydrology \(March/April 2008\)](#)


@ [Using Oil Fields for the Disposal of Concentrate](#)

- Texas Water Development Board, 2005, DWPR Report #112



**H****3**

# Solid Waste management

- Solid Waste disposal beyond that generated by the existing wastewater treatment plant might be needed in an emergency for media contaminated by treatment of hazardous water sources, or by precipitating solids from groundwater to get a higher water recovery.
-  Solid waste disposal is regulated through [30 TAC 330](#)
  - Contact the Waste Permit Office for assistance in navigating the solid waste permit process at 512-239-6619.
  - Guidance in Municipal Solid Waste (MSW) Regulation.



# I Rules and Regulations for Public Water Systems

## @ [Rules and Regulations for Public Water Systems](#) in Texas

- This link to the TCEQ web site provides links to rules and regulations for public water systems.
- Contact your TCEQ representative to discuss plans for supplementary or emergency water supplies. They can best help you to navigate the regulatory process with the least time and expense.
  - TCEQ Office of Water (512)-239-6696



# I Regulations

- Review of regulations you will encounter:

**1 Rules And Regulations For Public Water Systems**

**1.1 Subsequent Material Changes, Improvements, Additions, or Alterations to a Public Water System**

**1.2 Requirements and Exceptions to a Public Water System**

**2 Emergency & Temporary Orders & Permits**

**3 Reclaimed Water Authorization**

**4 Indirect Potable Water Reuse Authorization**

**5 Groundwater Well Approval**

**6 Public Water Distribution Approval**

**7 Water Rights**

**Number Buttons take you to the Subsection.**

# I 1 Rules and Regulations for Public Water Systems

- TCEQ is evolving regulations and guidance to respond to the water supply challenges caused by drought.

## @ [Texas Drought Information](#)

- On this page are links to:
  - current drought conditions,
  - announcements,
  - emergency planning workshops,
  - weather reports, and other news.

@ All public water systems that are restricting water use according to their Drought Contingency Plan should notify TCEQ through the [PWS Drought Reporting](#) form on this web site.

- Drought information hotline during business hours to answer questions from the public: 800-447-2827.



# I 1.1 Subsequent Material Changes, Improvements, and Additions, or Alternatives

- @ Any time there is a change in the PWS system, TCEQ must be notified as directed by [30 TAC § 290.39\(j\)](#)
- @ [30 TAC § 290.39\(d\)](#) describes the plans that must be submitted in support of the change.

# I Requirements and Exceptions to a Public Water System

1.2

- @ Texas law describes the design parameters of water treatment processes in [30 TAC § 290.42\(a\)-\(f\)](#).
- @ Processes that are not described in the above are covered under [30 TAC § 290.42\(g\)](#) and require an exception.
  - Treatment processes for high turbidity surface water and brackish groundwater or seawater require exceptions.
- @ Exceptions and Pilot Studies:
  - TCEQ Pilot Test Requirements for Alternative Treatment Technologies are under development at this time. Be sure to contact your TCEQ representative for current policy.
- @ Supporting Documentation: [EPA Environmental Technology Validation Reports for Mobile Treatment Systems for Reduction of Microbiological and Chemical Agents](#).

# 1 Emergency & Temporary Orders & 2 Permits

@ [30 TAC Chapter 35](#) Covers emergency and temporary orders and permits; temporary suspension of amendment of permit conditions.

@ [Subchapter D § 35.101](#) Emergency Suspension of Permit Conditions Relating to, and Emergency Authority to Make Available Water Set Aside for, Beneficial Inflows to Affected Bays and Estuaries and In-stream Uses.

- When drought threatens public health safety, and welfare, state water reserved for beneficial flows can be released for the applicant.

@ [Subchapter E § 35.202](#) Authorizes emergency rate increases when necessary to ensure provision of continuous and adequate services to utility's customers.

# I Reclaimed Water Authorization

3

## @ 30 TAC § 210 covers Use of Reclaimed Water

- Wastewater must be treated in accordance with the producer's wastewater permit. The code allows for beneficial use after treatment with criteria intended to allow the safe utilization of reclaimed water for conservation of surface and groundwater; to ensure the protection of public health; to protect surface and groundwaters; and to help ensure an adequate supply of water resources for present and future needs. (RULE § 210.2)

@ Reclaimed water needs to be distributed in a purple pipe system separate from drinking water distribution according to [30TAC § 210.25 Special Design Criteria for Reclaimed Water Systems](#).

@ Irrigation of areas where the public might be present during irrigation (Type I), treatment is required to meet water quality dictated in [30 TAC § 210.33\(1\)](#) in a 30-day average.



# I Reclaimed Water Authorization

3  
(continued)

@ 30 TAC § 210 Subchapter D concerns approval of alternative reclaimed water systems.

- File request in writing to the executive director to include information necessary or useful in assisting the executive director in acting on the request for approval of the alternate reclaimed water proposal. (RULE § 210.42)
- Executive director has 60 days to request additional information or act on the request.

# I Indirect Potable Water Reuse 4 Authorization

- Treated wastewater is stored in an environmental buffer (a natural water body) that physically separates the effluent from a water recycling facility from the intake to a drinking water plant.
- Treated wastewater that is not reused but rather discharged to a watercourse is return flow. Water reuse can ultimately reduce the amount of flow in the watercourse that is available to other water rights holders and the environment.
  - While significant quantities of reclaimed water have been permitted in recent years, the success of obtaining these permits has been largely due to coordination and collaboration between various water rights stakeholders potentially impacted by the issuance of the permits.



# I Indirect Potable Water Reuse

## 4 Authorization (continued)

- @ Indirect water reuse applications in surface water bodies are regulated through Texas procedures implementing requirements of the [EPA's Clean Water Act](#). These include:
  - @ TCEQ - Texas Pollutant Discharge Elimination System ([TDPES](#)) permitting procedures
  - @ TCEQ - Texas Surface Water Quality Standards [30TAC § 307.7](#)
  - @ If reclaimed water enters waters of the state then a discharge permit is required under [30TAC § 305 Consolidated Permits](#) is required.



# Groundwater Well Approval

 **30 TAC § 290.41** concerns Rules and Regulations for Public Water Systems – Water Sources.

- Groundwater sources shall be located so that there will be no danger of pollution from flooding or from unsanitary surroundings.
- The premises, materials, tools, and drilling equipment shall be maintained so as to minimize contamination of the groundwater during drilling operation.
- Construction, disinfection, protection, and testing of a well to be used as a public water supply source.


 **Guidance on well construction and operation**

- TCEQ guidance for conversion wells is under review, please contact the Public Drinking Water Section by phone at (512) 239-4691 or by email at [pdws@tceq.texas.gov](mailto:pdws@tceq.texas.gov) with the subject line: “Staff Guidance Review” for information.





# Public Water Distribution Approval

 **30 TAC 290.44** concerns rules and regulations towards public water system's water distribution.

- All potable water distribution systems shall be designed, installed, and constructed in accordance with current American Water Works Association (AWWA) standards.
- Pipes with 8.0% lead or solders and flux that contains more than 0.2% lead is prohibited.
- System must be designed to maintain a minimum pressure of 35 psi, in an emergency a minimum pressure of 20 psi is allowed.
- New potable water distribution lines construction shall be installed no closer than nine feet in all directions to wastewater collection facilities.



# I Water rights

7

@ The use of surface water in the state of Texas requires a [water right permit](#) *unless* they are using the water for one of several “exempt uses” in the Texas Water Code. These exempt uses allow anyone to use surface water without getting permission:

- Domestic and livestock use
- Wildlife management

@ Emergency use ([30TAC § 36 Suspension Or Adjustment Of Water Rights During Drought Or Emergency Water Shortage](#))

@ More information on [Rights to Surface Water in Texas](#)





# J Commercial Treatment System Resources

- Review Commercial Systems<sup>1</sup> available:

- 1 Mobile/Containerized Treatment

- 1.1 Smaller Mobile Units

- 1.2 Larger Mobile Units

- 1.3 Custom Containerized Treatment

- 2 Commercial System Sources



- 3 Air Stripping Equipment<sup>2</sup>

Number Buttons take you to the Subsection.

<sup>1</sup>This is a list of systems developed through an exhaustive review of companies that sell or rent mobile treatment equipment in Texas.



<sup>2</sup> Air stripping technology could be used for any source of water that contains VOCs but is more commonly seen in Groundwater.



# Mobile/Containerized Treatment

- Water treatment systems designed and built by the private industry have the capabilities to treat broad variations of source water quality.
  - Brackish Surface Water
  - Produced Water
  - Secondary Wastewater
  - Seawater
  - Groundwater
- **Certain mobile and containerized systems are highlighted based on their ability to treat the potential alternative water resources.**



Commercial and Industrial RO Systems, Applied Membranes, Inc.



# Mobile/Containerized Treatment

## (continued)

System Types	Advantages and Disadvantages
Smaller Mobile Units (< 100,000 gpd)	<ul style="list-style-type: none"> <li>Highly mobile light weight truck or double axle trailer mounted units easy to transport</li> <li>Smaller capacity systems</li> </ul>
Larger Mobile Units (up to 500,000 gpd)	<ul style="list-style-type: none"> <li>Process configuration is inclusive of multiple process options allowing for the treatment of a variety of source waters</li> <li>Set design configurations and processes equipped on all systems regardless of source water application</li> </ul>
Custom Containerized Systems	<ul style="list-style-type: none"> <li>Highly customizable to water source, eliminates extraneous processes</li> <li>Specific design for a set water chemistry</li> <li>Mounted in 20 to 40 ft containers, requires crane and commercial transport to move containers to new locations</li> </ul>



# J Smaller Mobile Units

1.1

## @ Outpost A – Aqua Sun International

- Multi-powered (solar, grid or portable generator).
- Water purification system capable of producing potable water from non-saline water sources.
- Production: 17,280 gpd at a rate of up to 720 gph or 12 gpm.
- Treatment process train includes filtration and UV disinfection.
- Filter can be substituted for lead, mercury, arsenic, and fluoride reduction filters to target specific contaminants.
- With a replacement parts kit the system is 58" x 42" x 46" and 330 lbs.
- All water contact components carry a NSF Approval Rating and the ultraviolet light carries a Certificate of Analysis.
- Price quoted at \$7,400 and availability will depend on the number of units ordered.



# J Smaller Mobile Units (continued)

1.1

## @ Complete Reverse Osmosis RO System Series J- 11,500 – 28,800 gallons per day

- Designed to produce low dissolved solids water from tap or well water.
- Heavy duty powder coated frame.
- SS High pressure components, SS Pump.
- Microprocessor Controlled Operation.
- Conservatively engineered for reliable long term performance.

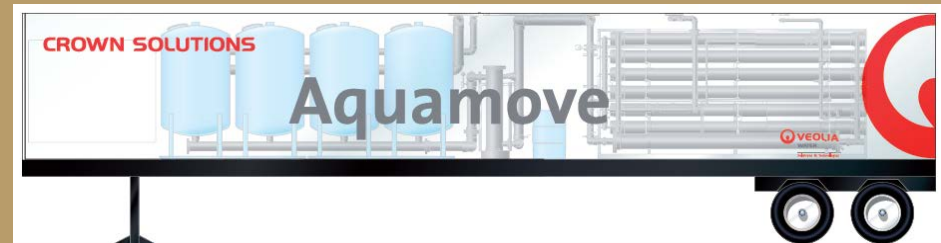


# J Larger Mobile Units

1.2

## @ Aquamove™ Mobile RO Trailer – Veolia Water Solutions and Technologies

- The Aquamove™ Mobile RO Trailer is capable of treating a variety of source waters.
- The 300 gpm (432,000 gpd) system can be configured as a 100-135 gpm two pass unit.
- Treatment process includes: multimedia, carbon, iron removal or softening pretreatment depending on source water followed by RO membrane filtration.



Trailers are available on a first come first serve basis. Trailers can be prepared and transported to a field site in 48 to 72 hours.



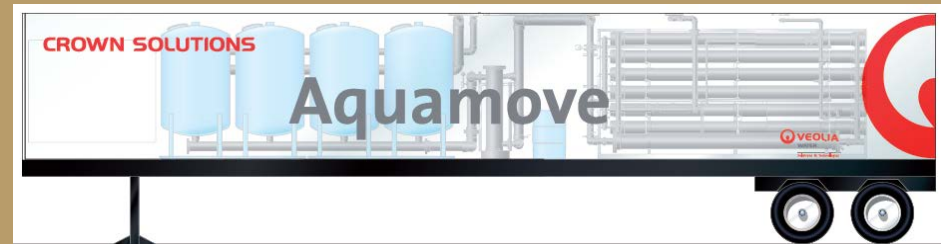


# J Larger Mobile Units (continued)

1.2

## @ Aquamove™ Mobile RO Trailer – Veolia Water Solutions and Technologies

- Trailer dimensions are 53' x 8.5' x 13.5' and weigh 55,000/75,000 lbs (shipping/operating) and requires three phase power 460V/3Ph/60Hz at 60-100 amps.
- Aquamove™ trailers are only available for lease:
  - RO Trailer Lease Rate: \$20,000 to \$40,000/month.
  - Mobilization/Demobilization One-Time Fee: \$35,000 includes set up and tear down, training, and commissioning.
  - Abbreviated Operations: \$1,200 per day/per man + expenses
  - Extended Operations: Negotiated rate



Trailers are available on a first come first serve basis. Trailers can be prepared and transported to a field site in 48 to 72 hours.



# J Custom Containerized Units

1.3

## @ Pure Aqua, Inc. ® Containerized Water Treatment Plants

- Pure Aqua, Inc. ® offers the design and construction of containerized water treatment plants customizable with various configurations for any source water application.
- Capacities range from 30,000 gpd to 900,000 gpd.
- Pure Aqua, Inc. ® produces treatment systems that are generally mounted in 20 ft containers .
- Containers require 460V/3Ph/60Hz power supply.
- The cost of these systems will be dictated by the source water.
- Lead time to manufacture is 8-10 weeks from receipt of order.



# Commercial System Sources

Several examples of mobile systems are listed below:

@ [Applied Membranes](#)

@ [Aqua Sun](#)

@ [Environmental Improvements Inc.](#)

@ [First Water](#)

@ [Forever Pure](#)

@ [GE Water](#)

@ [Lifestream Water Purification Equipment](#)

@ [Noah Water](#)

@ [Pall Corporation](#)

@ [Pure Aqua](#)

@ [RODI Systems](#)

@ [Veolia](#)

@ [Water Control Inc](#)



# Air Stripping equipment

- Air Stripping is primary used for removing volatile organics chemicals (VOCs), oxidizing contaminants. It is the process of removing contaminants from the liquid to gas phase.



**Example: Carbon Air's STAT 180 Air Stripper Skid ®**

- Can be provided as a stand-alone treatment or part of a fully integrated treatment system.
- Flow rate up to 200 gpm.
- Transfer pump mounted on skid.
- Skid mounted with controls.





# K Federal Treatment System Resources

- Federal Emergency Management Agency (FEMA) - the Governor must request the President to declare a state of emergency before Federal resources can be called into service:
  - Department of Homeland Security
    - @ [SECURE](#) (System Efficacy through Commercialization, Utilization, Relevance, and Evaluation) Program to certify [commercial mobile potable water treatment systems](#) that can be leased by FEMA.
  - Department of Defense Reserves and National Guard
    - @ Access to military expeditionary [water treatment equipment](#) with capacities ranging from 5 gal/min to 100 kgal/day.
    - @ Brochures on military models: [LWP](#), [TWPS](#), [ROWPU](#), and [EUWP](#).





# L Water Treatment Operator Requirements

## @ Texas Water Treatment Specialist Licensing

- Operators of fixed or mobile water treatment Systems must be licensed Water Treatment Specialists in the state of Texas.

## @ Texas Water Quality Association Licensing Information.




# L Water Treatment Operator Requirements (continued)

- Training for Water Treatment Operators

 Texas Water Quality Association (TWQA) offers [training](#) required for Class II and Class III Water Treatment Specialist.

 [David H. Paul, Inc](#) offers training specialized onsite and online training in membrane processes in addition to a calendar of traveling seminars.

 [South Central Membrane Association](#) can provide site specific training. Call (512)617-9490 or email: [info@scmembrane.org](mailto:info@scmembrane.org).





# **M** Potential Funding Sources

- 1 State of Texas Funding Sources
- 2 Federal Funding Sources

**Number Buttons take you to the Subsection.**

L Operator



N Public

**RECLAMATION**



# State of Texas Funding Sources

- TCEQ has a list of funding programs for Water and Wastewater Utilities

 Resources for Texas Water and Wastewater Utilities [Regulatory Guide-220](#)

 The [Texas Water Infrastructure Coordination Committee \(TWICC\)](#)

- *“TWICC will collaborate to identify water and wastewater infrastructure and compliance issues and to seek affordable, sustainable and innovative funding strategies for the protection of public health and the efficient use of government resources in Texas.”*



# State of Texas Funding Sources

(continued)

- Texas Department of Agriculture Grants

- @ Texas Capital Fund - Infrastructure Development

- \$50k to \$1,500k for public/private infrastructure
    - Applications due on the 20<sup>th</sup> of each month

- @ Community Development Block Grant Program

- @ Community Development Fund

- \$75k to \$800k for rural cities and counties for basic infrastructure such as water/wastewater facilities.
      - Applications accepted biennially

- @ Small Towns Environment Program Fund

- Up to \$350k
      - Requires community volunteers
      - Apply by invitation only

- @ Disaster Relief Fund

- \$50k to \$350k
      - Requires official disaster status declaration

# Federal Funding Sources

- @ Bureau of Reclamation [WaterSMART Program](#)
- @ Bureau of Reclamation [Title XVI Program](#)
- @ Department of Housing and Urban Development [Community Development Block Grant Program](#)
- @ U.S. Department of Agriculture [Water and Environmental Programs](#)
- @ U.S. Economic Development Administration (EDA) [Public Works and Development](#)
- @ U.S. Environmental Protection Agency (EPA) [Drinking Water State Revolving Fund](#)

# N Public Communications & Involvement

- AWWA – Drought Preparedness and Response Report M60 has examples of successful conservation publicity plans, rate structuring to promote conservation, and considerations for limiting water deliveries.

 [Drought Preparedness and Response Report M60 Table of Contents and Introduction](#)

- Use your emergency communication system to alert residents of the water situation, where they can get drinkable water, and how to handle tap water and grey water.



# **N** Public Communications & Involvement (continued)

## **@** TCEQ Water Conservation Programs

- Required Water Conservation and Drought Contingency Plan instructions

## **@** Texas Water Matters

- Meeting Needs through Conservation
- Conservation Potential for Cities, Agriculture and Industry
- What you can do
- Additional Resources

## **@** Save Water Texas – Outreach, Conservations and Education

### **@** Don't be a Texas Water Hog

- Water Conservation Program for Kids
- Facts, Water Audit
- Puzzles and Games
- Program Materials for educators and parents



# N Public Communications & Involvement (continued)

## @ Water IQ

- Resources for developing a Water Conservation Public Awareness Program
- Brochures and educational materials
- Educational events throughout the year
- Sign up for the program with Texas Water Development Board.
- Examples of successful water conservation programs in action



- [El Paso, Texas](#)
- [Round Rock, Texas](#)
- [San Marcos, Texas](#)
- [San Antonio, Texas](#)



**Please contact one of the following agency representatives with questions or suggestions to improve this tool:**

**Bureau of Reclamation**

**Oklahoma-Texas Area Office**

**Collins Balcombe**

**512-899-4162**

**[cbalcombe@usbr.gov](mailto:cbalcombe@usbr.gov)**

**Technical Service Center**

**Michelle Chapman**

**303-445-2264**

**[mchapman@usbr.gov](mailto:mchapman@usbr.gov)**

**Texas Water Development Board**

**Sanjeev Kalaswad**

**512-936-0838**

**[sanjeev.kalaswad@twdb.texas.gov](mailto:sanjeev.kalaswad@twdb.texas.gov)**

**Texas Department of Emergency Management**

**512-424-2208**

