

Review of Water Conservation BMP Guides

A TWDB staff committee reviewed the TX BMP Guide(2004) along with other notable bmp manuals and websites.

Objectives:

- Develop a vision for a future BMP Guide
- Identify new bmps that could potentially be added to the guide
- Identify current bmps that need to be revised
- Identify key components that would add to or enhance TX BMP Guide

The objectives for reviewing and evaluating the guides were for the purpose of producing and offering suggestions, recommendations, and guidance to the Council on how they can focus their efforts as they proceed with updates to the TX BMP guide.

The following guides, manuals and websites were reviewed:

TEXAS

Water Conservation Best Management Practices Guide

<http://www.twdb.state.tx.us/assistance/conservation/TaskForceDocs/WCITFBMPGuide.pdf>

COLORADO

Metro Mayors Caucus & Colorado WaterWise Council

Best Management Practices for Water Conservation and Stewardship

<http://www.metromayors.org/Downloads/BMP%20Final%20for%20MMC%204-28.pdf>

Guidebook of Best Practices for Municipal Water Conservation in Colorado

<http://cwcbweblink.state.co.us/WebLink/ElectronicFile.aspx?docid=146033&searchid=e37b0a05-4e5a-45f7-a4c6-260ddc8da4ac&dbid=0>

CALIFORNIA

CUWCC(California Urban Water Conservation Council) BMPs

<http://www.cuwcc.org/bmps-archive.aspx>

GEORGIA

Georgia Water Conservation Implementation Plan

[Note: Georgia's 80 BMPs are incorporated into the States Water Conservation Implementation Plan; there is not a separate BMP Guide]

<http://www.conservewatergeorgia.net/resources/WCIPMarch2010FINAL.pdf>

Georgia Soil and Water Conservation

Best Management Practices for Georgia Agriculture

http://www.gaswcc.org/docs/ag_bmp_Manual.pdf

FLORIDA

Florida Agricultural Water Conservation BMPs Manual

http://www.floridaagwaterpolicy.com/PDF/Bmps/Bmp_AgWaterConservation2006.pdf

Florida Office of Agricultural Water Policy

BMP Rules, Manuals, and Other documents

<http://www.floridaagwaterpolicy.com/BestManagementPractices.html>

ARIZONA

Arizona Department of Water Resources

http://www.azwater.gov/azdwr/StatewidePlanning/Conservation2/Agriculture/AG_BMPS.htm

Format Enhancements

Defining Water User Groups

The following broad water user categories should be clearly defined within this guide the main chapters. If there are already widely accepted definitions that are being used then those definitions need to be restated and cited at the beginning of the chapters in the BMP guide.

- Agricultural Water User
- Municipal Water User
- Industrial Water User
- Institutional & Commercial Water User

Organization of Guide

It is suggested that the current list of BMPs be categorized into target categories that group similarly related BMPs. Refer to Proposed Table of Contents

Visually Enhance the BMP

It is suggested that more graphs, tables, and images be added to each BMP to serve as informational resources for an entity to consider as they evaluate the overall BMP. This will enhance the presentation of the information found in the BMP description.

BMP Suite Packages for Municipal Water Providers

This guide attempts to emphasize that the use of BMPs will be uniquely tailored for each water provider as they identify their own specific set of conservation priorities and circumstances based upon their customer base, water supply, and growth potential. Water conservation programs are tailored to meet the needs of each individual utility and there really is no "one size fits all" approach. However, there are many water providers who will be referring to the BMP Guide as a menu of options to either begin or enhance their conservation programs.

When developing a water conservation program to meet the needs of their community, it is anticipated that a utility will start with the foundational best practices and select additional relevant best practices as their conservation programs and goals grow.

To assist water utilities in selecting best practices, three "suites" of best practices can be developed. These suites of best practices are organized to meet different budgetary and demand reduction objectives.

- Foundational Suite - is the most basic and could be considered a "minimum" package of utility-side conservation best practices. Utilities just starting to integrate water conservation into overall water resources planning and those with limited budgets should start with this suite which includes utility-side best practices that are considered fundamental and foundational for the establishment of an effective and low cost water conservation program.
- Enhanced Suite - builds on the practices included in the Foundational Suite and includes low and moderate cost best practices with maximum impact. Utilities seeking to implement a low to moderate level program with utility and customer-side measures should consider this suite.
- Comprehensive Suite - offers a complete package of best practices described in this guide. Those seeking maximum cost effective water savings should consider this suite. This suite includes all best practices from the first 2 suites and include additional customer-side best practices. While other conservation program measures beyond these best practices exist, most of the available water savings will be captured and accelerated through the implementation of these best practices.

These suites are just suggested groupings of best practices. Each provider must decide which best practices make the most sense for their specific situation and conservation goals. This list of suite packages can be offered as an appendix in the guide.

Changes to Elements

Currently there are 9 elements to each BMP in the guide. Each element is described below and **proposed changes are indicated in orange**.

A. Applicability

The specific type of water user group that could potentially benefit from the BMP is described, as are the general goals for water efficiency that the BMP addresses.

B. Description

This section provides an explanation of the specifics of the conservation measure(s) included in the BMP. The best available technology that is proven and cost effective is recommended. Often a best available technology may not yet be cost effective to be implemented by all water users. Highly efficient water conservation measures that will produce cost-effective results are mentioned.

C. Implementation

The basic steps to accomplish the BMP are described. If the description section includes more than one measure to complete the BMP, the implementation section will suggest necessary steps for achieving the water savings.

D. Scope & Schedule: This element should combine both the scope and schedule. Scope and schedule seem very similar in nature and although one gives a broad picture and the other gives a more defined picture it would be less confusing if the information was combined together into one element.

In BMPs which have multiple implementation steps, a recommended schedule for implementation is included. In general, planning, data gathering and evaluation steps should be accomplished within 12 months of adoption of a specific BMP. For simpler BMPs, the scope is complete when the steps described in the implementation section have been achieved. For more complicated BMPs, the scope indicates the level of implementation necessary to consider the BMP complete. Where different levels of implementation or constraints are present, these are described.

E. Scope

~~For simpler BMPs, the scope is complete when the steps described in the implementation section have been achieved. For more complicated BMPs, the scope indicates the level of implementation necessary to consider the BMP complete. Where different levels of implementation or constraints are present, these are described.~~

F. Documentation Measuring Implementation: This element should be expanded in terms of descriptive content to provide some guidance on how an entity can both document and measure implementation. Right now this element guides a user on what type of data, information and reports to collect. However, there should also be additional guidance on how a user can quantitatively or qualitatively measure or track progress in implementation.

To track the progress of a BMP, the water user should collect certain data to document progress implementing the BMP and evaluating actual water savings. This section identifies the recommended data.

G. Determination of Water Savings

This section specifies information necessary to calculate water savings from implementation of the BMP and may include statistical or mathematical formulas when appropriate.

H. Determination of the Impact on Other Resources

This is a new element that serves to identify other resources that are either required or saved by the implementation of this BMP. Specifically, related energy savings might easily result from a reduced water demand as well as lower infrastructure capital costs and annual maintenance and equipment.

I. Cost-Effectiveness Considerations

Basic costs of implementing the specific BMP are explained. Due to the wide variety in actual costs based upon size of program and location, ranges of costs are given where appropriate. In many cases, costs and expenses can be reduced or spread out when multiple BMPs are implemented by an entity. This section primarily serves to remind the users of costs to consider when performing a cost effectiveness analysis.

J. References for Additional Information

The BMP concludes with a listing of resources that can assist a water user in implementing the BMP.

Website Supplements

Case Studies

The Council has indicated that one of their goals is to encourage information sharing about the use of these types on BMPs in Texas. Components for information sharing could include the following:

- Water savings attributable to BMP Implementation
- Types of documentation and evaluation involved with implementing the BMP
- Implementation mechanisms and how the BMP was tailored to community circumstances
- Costs incurred in implementation of BMPs
- Benefits of implementation that may not be suited to quantitative analysis
- Barriers or challenges to implementation of the BMP

The above components of information sharing would best be used as the framework for collecting case studies. People like to have their programs highlighted as case studies and may be more likely to voluntarily share information for this purpose.

Case studies can serve as excellent examples and references for entities. It is suggested that case studies be made available on the BMP website rather than adding them to the individual BMPs in the guide. Essentially they would be an online only supplement to the BMP guide. Websites are highly accessible and are frequented often as resources. Because there are a number of case studies that could potentially be added, it will be a better use of space to put case study information on a website rather than a text document. This will make the process much easier to add case studies overtime.

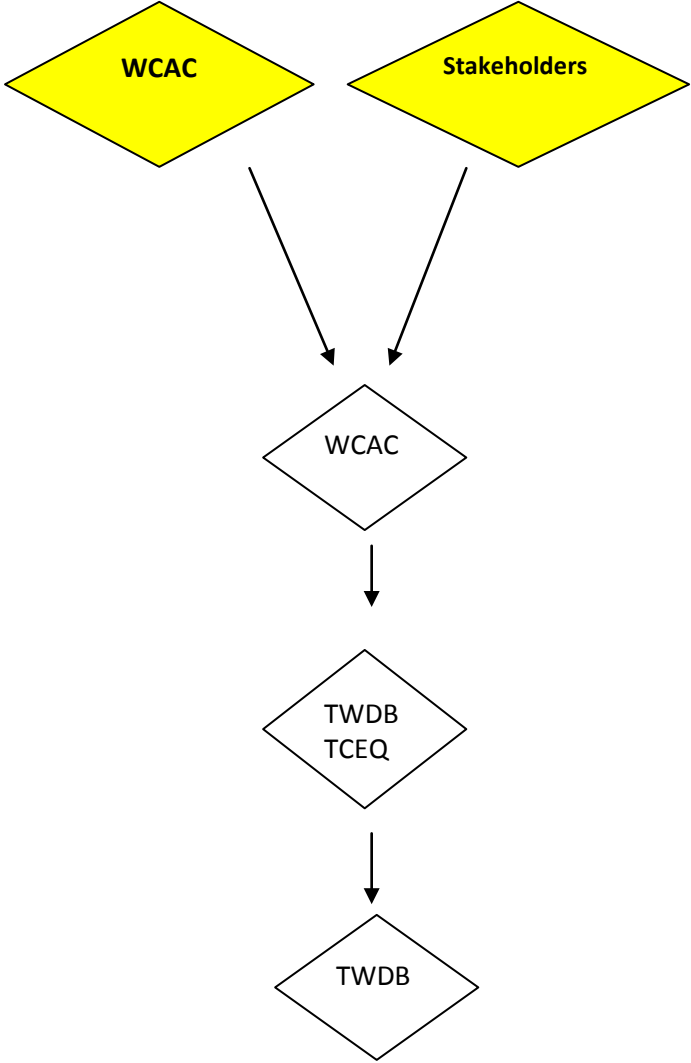
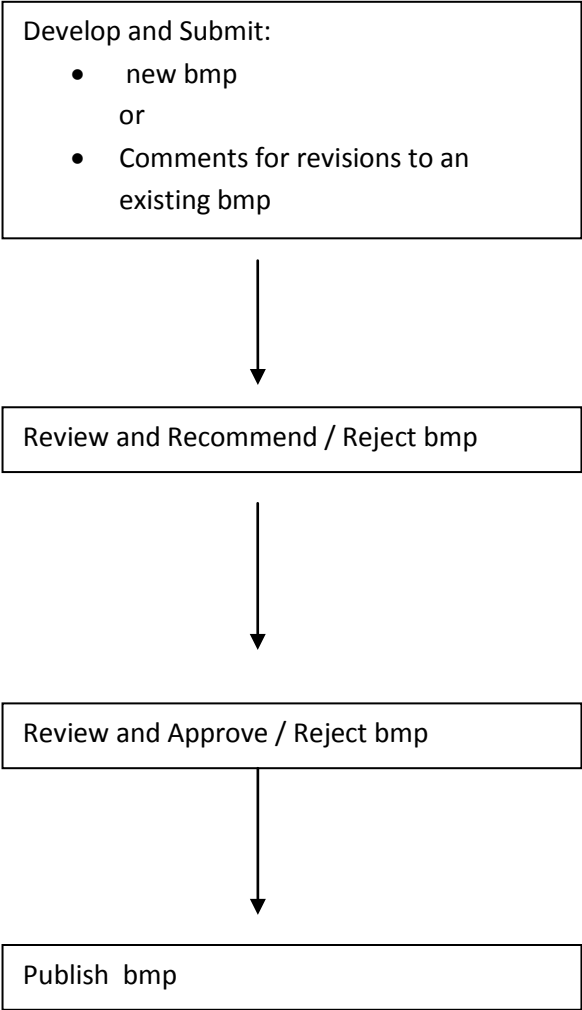
Research and Experimental Projects

This would be an online only supplement to the BMP guide. In addition to case studies the website could house some information on research and experimental projects that are in progress and being conducted by Texas academic institutions or resource institutes. Even though this section may not provide data results, it lets the reader know of on-going efforts in Texas that they might have already questioned. The academic sector is testing many new technologies and conducting studies relating to BMPs and water conservation, and it would be helpful to inform readers about the current research within the academic arena.

Model Plan

To increase the use and visibility of the BMP Guide by municipal water users the TWDB should consider using this BMP guide as part of a "model" water conservation plan (WCP). Although BMPs are not part of the required guidelines for a WCP, most utilities in Texas are required to submit a water conservation plan. A model WCP that incorporates BMPs would serve as a reference document that can assist a water provider in creating a new or revised WCP. The provisions of the model WCP are strictly voluntary. It would be beneficial for the TWDB and TCEQ to work together to develop a model WCP that depicts the incorporation of BMPs into a plan. Again this model is just that, a model to serve as a resource and it goes beyond the current checklist. This model plan could then be available online through the TCEQ, TWDB and WCAC websites.

Process for BMP Submissions



Current Outline of BMP Guide (2004)

- I. Introduction
- II. Municipal
- III. Industrial
- IV. Agricultural
 - i. Agricultural Irrigation Water Use Management*
 - ii. Land Management Systems*
 - iii. On-Farm Water Delivery Systems*
 - iv. Water District Delivery Systems*
 - v. Miscellaneous Systems*

Proposed Outline for BMP Guide (Future)

Introduction

Background
Development and Purpose of the Guide
Synopsis of State of water in Texas
What is a BMP?
Elements of a BMP
Getting the Most out of the Guide

BLACK indicates currently existing sub heading/ subsection
GREEN indicates new sub heading/subsection in the outline

I. Municipal BMPs

- i. Introduction to Municipal BMPS
- ii. Conservation Analysis & Planning
- iii. Financial
- iv. System Operations
- v. Landscaping
- vi. Education & Public Awareness
- vii. Rebate, Retrofit, and Incentive Programs
- viii. Conservation Technology
- ix. Regulatory & Enforcement

II. Industrial BMPs

- i. Introduction to Industrial BMPS
- ii. Conservation Analysis and Planning
- iii. Educational Practices
- iv. System Operations
- v. Cooling Systems Management
- vi. Landscaping
- vii. Sector Specific Practices
 - a) *Power Generation*
 - b) *Mining*
 - c) *Refining*
 - d) *Chemical Manufacturing*

III. Agricultural BMPs

- i. Introduction to Agricultural BMPS
- ii. Information Gathering and Education Practices
- iii. ~~Agricultural Irrigation Water Use Management~~ Cropping and Management Practices
- iv. Scheduling Practices
- v. Land Management Systems
- vi. On-Farm Water Delivery Systems
- vii. Water District Delivery Systems
- viii. Miscellaneous Systems

IV. Institutional and Commercial BMPs

- i. Introduction to Agricultural BMPS
- ii. Institutional
 - a) *State Facilities*
 - b) *Universities*
 - c) *School Districts*
 - d) *Military*
 - e) *Hospitals*
- iii. Commercial-Within Municipal Communities
 - a) *Hotels*
 - b) *Restaurants*
 - a) *Retail Stores*
 - b) *Office Buildings*
 - c) *Golf Courses*

Appendix:

Acronyms List
Definitions List
Organizations, Agencies, Associations List
Table & Figure List
Summary Table
BMP Suite Packages for Municipal Water Providers

MUNICIPAL BMPs

Introduction to Municipal BMPs

- ~~BMPs for Municipal Water Users~~ About Municipal BMPs

BLACK indicates currently existing BMP .

ORANGE indicates existing BMP that needs revision.

GREEN indicates new category or new BMP

Conservation Analysis & Planning

- Conservation Coordinator
- ~~Water Survey for Single Family and Multi Family Customers~~ Residential Water Surveys
- Non Residential Water Surveys
- Crisis Response Planning
- Development of a Water Conservation Plan
- Customer Categorization and Billing Systems
- Calculating Residential gpcd
- Cost Effective Analysis

Financial

- Wholesale Agency Assistance Programs
- ~~Water Conservation Pricing~~ Conservation Rate Structures

System Operations

- System Water Audit and Water Loss Control
- Metering of All New Connections and Retrofit of Existing Connections

Landscaping

- ~~Landscape Irrigation Conservation and Incentives~~ Landscape Water Budget
- Irrigation Efficiency Evaluations
- Certification of Landscape Professionals
- Water Efficient Landscape Design
- Athletic Fields Conservation
- Golf Course Conservation
- Park Conservation

Education & Public Awareness

- School Education
- ~~Public Information~~ Development of Public Awareness Program
- Public Awareness Program: Water IQ
- Informative Water Billing Statements
- Water Conservation Citizen Councils

Rebate, Retrofit, and Incentive Programs

- Conservation Programs for ICI Accounts
- Residential Clothes Washer Incentive Program
- ~~Water Wise Landscape Design and Conversion Programs~~ Landscape Design Incentive Program
- Low Income Plumbing Upgrade Program
- Showerhead, Aerator, and Toilet Flapper Retrofit
- Residential Toilet Replacement Programs
- Irrigation System Rebates

Conservation Technology

- Water Reuse
- Rainwater Harvesting and Condensate Reuse
- New Construction Graywater

Regulatory & Enforcement

- ~~Prohibition on Wasting Water~~ Water Waste Prohibitions and Enforcement
- Watering Schedules
- Adoption and Enforcement of Landscape Irrigation Standards.
- Rules for New Construction

INDUSTRIAL BMPs

Introduction to Industrial BMPs

- ~~BMPs for Industrial Water Users~~ About Industrial BMPs

BLACK indicates currently existing BMP .

ORANGE indicates existing BMP that needs revision.

GREEN indicates new category or new BMP

Conservation analysis and planning

- Industrial Water Audits
- Water Use Measurement Verification Program
- Water Use Efficiency Metrics
- Industrial Site Specific Conservation
- Water Management Plans
- Energy Management Plans
- Cost Effective Analysis

Educational Practices

- Management and Employee Programs

System Operations

- Industrial Water Waste Reduction
- Industrial Submetering
- Rinsing/Cleaning
- Water Treatment
- Boiler and Steam Systems
- Refrigeration (including Chilled Water)
- Recycle and Reuse Water
- Dry methods for cleaning and dust control
- Leak Detection and Repair
- Discontinuing discretionary use of water.
- Increasing the efficiency of cooling towers and boilers using performance-based contracting.
- Industrial Alternative Sources and Reuse of Process Water
- Piloting Innovative Technologies

Cooling systems management

- Once-Through Cooling
- Cooling Towers
- Cooling Systems (other than Cooling Towers)
- Increasing the efficiency of cooling towers and boilers using performance-based contracting.

Landscaping

- Industrial Landscaping
- Irrigation Efficiency Evaluations
- Water Efficient Landscape Design
- Water Reuse
- Rainwater Harvesting and Condensate Reuse

Sector Specific Practices

Electric Generation Utilities

- Integrated energy and water planning
- Integrated Educational Programs: Saving energy through water conservation
- Maximize efficiency of flue gas scrubbing
- Minimize evaporative losses
- Alternative water sources
- Pilot projects for new technology practices

Mining

-

Refining

-

Chemical Manufacturing

-

AGRICULTURAL BMPS

Introduction to Agricultural BMPS

- ~~BMPs for Agricultural Water Users~~—About Agricultural BMPS

BLACK indicates currently existing BMP .

ORANGE indicates existing BMP that needs revision.

GREEN indicates new category or new BMP

Information Gathering and Education Practices

- On-Farm Irrigation Audit
- Self Data Collection on cropping and water conservation practices
- Irrigation Workshops
- Cost Effective Analysis

Agricultural Irrigation Water Use Management-Cropping and Management Practices

- Irrigation Scheduling
- Volumetric Measurement of Irrigation Water Use
- Crop Residue Management and Conservation Tillage
- Variable Rate Irrigation (VRI) controls on center pivots
- Enhanced Center Pivot Control Panels
- Using Water demands to determine cropping and management practices

Scheduling Practices

- Night Time Irrigation
- Eliminating set schedule irrigation controls
- Rainfall shut off devices
- Using In-field Soil moisture sensors, ET sensors to time cycles
- Using real time weather and soil data or other models to aid in scheduling decisions

Land Management Systems

- Furrow Dikes
- Land Leveling
- Contour Farming
- Conversion of Supplemental Irrigated Farmland to Dry-Land Farmland
- Brush Control/Management

On-Farm Water Delivery Systems

- Inspecting On Farm Delivery Systems
- Lining of On-Farm Irrigation Ditches
- Replacement of On-Farm Irrigation Ditches with Pipelines
- Low Pressure Center Pivot Sprinkler Irrigation Systems
- Drip/Micro-Irrigation System
- Gated and Flexible Pipe for Field Water Distribution Systems
- Surge Flow Irrigation for Field Water Distribution Systems
- Linear Move Sprinkler Irrigation Systems

Water District Delivery Systems

- Inspecting Water District Delivery Systems
- Automated gates and delivery systems
- Lining of District Irrigation Canals
- Replacement of Irrigation District Canals and Lateral Canals with Pipelines

Miscellaneous Systems

- Tailwater Recovery and Reuse System
- Nursery Production Systems

INSTITUTIONAL & COMMERCIAL BMPs

Introduction to Institutional and Commercial BMPs

Institutional BMPs

Introduction to Institutional and Commercial BMPs

State Facilities

- Facility Inventory
- Water Audits
- Leak detection and repair
- Metering and Measurement
- Cost Effective Analysis
- Water Conservation Plans
- Employee Training
- Efficiency Standards

Universities

-
-

School Districts

-
-

Military

-
-

Hospitals

-
-

Commercial BMPs - Within Municipal Communities

Hotels

-
-

Restaurants

-
-

Retail Stores

-
-

Office Buildings

-
-

Golf Course

-
-

BLACK indicates currently existing BMP .

ORANGE indicates existing BMP that needs revision.

GREEN indicates new category or new BMP