

4.1.4 ON-FARM IRRIGATION AUDIT

A. Applicability

This BMP is applicable to agricultural producers that currently use on-farm irrigation and should be thought of as the initial BMP for agricultural water users to increase water efficiency in irrigation. Under this BMP the water user will collect information about water that is used to irrigate farm crops.

Once an agricultural water user decides to adopt this BMP, the water user should follow the BMP process in order to achieve the maximum benefit from this BMP.

B. Description

Water audits are an effective method of accounting for all water usage for on-farm irrigation and to identify opportunities to improve water use efficiency. Benefits from implementation of this BMP may also include energy savings and reduced chemical costs.

On-farm irrigation audits include measurement of water entering the farm or withdrawn from an aquifer, the inventory and calculation of on-farm water uses, calculation of water-related costs, and identification of potential water efficiency measures. The information from the on-farm irrigation audit forms the basis for implementing measures to increase efficiency of current farming practices and the basis for deciding which additional BMPs to implement. The conservation program may consist of one or more projects in different areas of the agricultural operation.

The audit will consist of gathering information on the following (source: NRCS):

- Field size(s) and shape, obstructions, topography, flood vulnerability, water table, and access for operation and maintenance;
- Type of pump equipment and energy source and pumping efficiency, if any;
- Type of irrigation equipment, age and general state of repair;
- Records of previous and current crops and water use; and
- Human assets - Available technical ability and language skills of laborers. Time and skill level of management personnel.

C. Implementation

The agricultural water user should conduct an on-farm irrigation audit that generally follows the guidelines as outlined in this section. NRCS procedures for an on-farm irrigation audit will result in the same or similar results. References that provide more detailed audit procedures are listed in Section I below.

- 1) Preparation and information gathering
The material collected to implement this BMP will be useful for other BMPs as well. Information that should be collected before beginning the audit includes

maps of the agricultural operation with field sizes and locations of main water supply, meters or measuring points, inventories of irrigation equipment, and irrigation schedules. Also, information about crop types, field slope, soil types and textures, and infiltration rates should be collected. Water use data for the past year should be collected. Additionally, any prior water use audits should be obtained and reviewed since these reports may include useful and relevant information to determine the most appropriate water saving measures to implement.

- 2) Conduct on-farm irrigation audit
The on-site physical examination and water use audit should identify and verify all equipment that uses water. Water usage for each major water use area should be determined. If possible during the audit, the performance of the irrigation equipment should be evaluated while it is being used to irrigate farmland.
- 3) Prepare a cost-effectiveness analysis
The cost-effectiveness analysis should determine the water efficiency opportunities that are cost-effective to implement. The analysis may also identify water efficiency opportunities that should be implemented even if not cost effective due to high visibility, ease of implementation, or general goodwill. After confirming the cost-effectiveness of the BMP, the action plan should then be prepared.
- 4) Prepare an action plan
The action plan should identify the conservation goals and recommend specific technology or actions that must be implemented by the agricultural producer to meet such goals. The plan should include estimates of the time required to implement the proposed technology or actions and list any governmental or non-governmental programs or services needed to implement the plan.
- 5) Preparation of an on-farm irrigation audit report
The data gathering and the on-site audit should be incorporated into an audit report that includes an updated set of field diagrams and water flow charts broken down by water use areas, a current list of all water using equipment including actual and manufacturer recommended flow rates, a current schedule of irrigation for all areas and equipment, an analysis of water costs by each field and for the entire farm, and calculations of the difference between water coming into the agricultural operation and a list of identified water uses throughout the operation. (Note: This is the amount of water that is potentially being lost by leaks and other losses.) The on-farm irrigation audit report should contain a proposed timetable to implement selected water efficiency measures.

D. Schedule

- 1) The audit will be completed in a timely manner.
- 2) The recommendations should be implemented within the first normal budget cycle following the conclusion of the audit. For most farms, this should be a reasonable time period to implement the recommendations. Major projects may take additional time for implementation.
- 3) If determined to be necessary for very large or complex agricultural operations or for more comprehensive conservation plans, the schedule can be extended. BMPs will be initiated in the second year and continued until the targeted efficiency is reached.

E. Scope

To accomplish this BMP:

- 1) Agricultural water users with one farm, or several farms with the same or very similar irrigation practices, should conduct a water audit following the schedule outlined in Section D above.
- 2) For agricultural water users with multiple farms sites, or multiple types of agricultural operations, a progressive implementation schedule should be followed, implementing the BMP at successive farms until all farms have been audited and conservation measures implemented.

F. Documentation

To track the progress of this BMP, the agricultural water user should gather and have available the following documentation:

- 1) The audit report;
- 2) Cost-effectiveness analysis;
- 3) The action plan;
- 4) Schedule for implementing the action plan;
- 5) Documentation of actual implementation of water efficiency measures contained in the action plan; and
- 6) Estimated water savings and actual water savings for each item implemented.

G. Determination of Water Savings

This BMP in and of itself does not save any water but helps identify other agricultural water conservation BMPs that may be implemented by the agricultural water user to save water.

H. Cost-Effectiveness Considerations

The cost of a farm audit varies from minimal to significant with the extent of the audit and if the audit is done internally, by a consultant, or using assistance from a governmental entity. The Texas State Soil and Water Conservation Board (“TSSWCB”) prepares Water Quality Management Plans which often address water conservation measures for agricultural land, and the NRCS can assist agricultural water user in implementing conservation plans.

I. References for Additional Information

- 1) Edwards Aquifer Authority, Groundwater Conservation Plan, September 2000, Rev. January 2004, *Appendix F- Water Savings Assumptions*.
- 2) Texas State Soil and Water Conservation Board, *Water Quality Management Plans*, <http://www.tsswcb.state.tx.us/programs/wqmp.html>
- 3) Natural Resources Conservation Service, September 1997, *Irrigation - Handbooks and Manuals - National Engineering Handbook Part 652 - Irrigation Guide, Estimated Efficiency Improvements Expected from Irrigation System Improvements*,
<http://www.wcc.nrcs.usda.gov/nrcsirrig/irrig-handbooks-part652.html>
- 4) Natural Resources Conservation Service, March 1999, *Irrigation Management, National Conservation Practices Standards, Code 449*, 2 p.