

2.2 On-Farm Irrigation Audit

Applicability

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

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

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 practice may also include energy savings and reduced chemical costs.

On-farm irrigation audits include measurement of water entering the farm from surface water or groundwater, 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 best management practices 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: U.S. Department of Agriculture-Natural Resources Conservation Service):

- Field size(s) and shapes, obstructions, topography, flood vulnerability, depth to water, and access for operation and maintenance;
- Type of pump equipment and energy source and pumping efficiency;
- Type of irrigation equipment, age and general state of repair;
- Records of previous and current crops and water use; and
- Technical ability and skills of laborers; time and skill level of management personnel.

Implementation

The agricultural water user should conduct an on-farm irrigation audit that generally follows the guidelines as outlined in this section. U.S. Department of Agriculture-Natural Resources Conservation Service 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 1 below.

- 1) Preparation and information gathering
The material collected to implement this practice will be useful for other best management practices 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) 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 recommendations.
- 4) Prepare a cost-effectiveness analysis
The cost-effectiveness analysis should determine the water efficiency recommendations 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 best management practice, the action plan should then be prepared.
- 5) Prepare an action plan
The action plan should identify the conservation recommendations and include 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.

Scope and Schedule

To accomplish this best management practice:

- 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 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 practice at successive farms until all farms have been audited and conservation measures implemented.

To schedule this practice:

- 1) The audit should be completed in a timely manner during normal crop irrigation practices.
- 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.
- 3) If determined to be necessary for very large or complex agricultural operations or for more comprehensive conservation plans, the schedule can be extended. Best management practices will be initiated in the second year and continued until the targeted efficiency is reached.

Measuring Implementation and Determining Water Savings

To track the progress of this practice, 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.

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

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 prepares waterquality management plans which often address water conservation measures for agricultural land, and the Natural Resources Conservation Service can assist agricultural water user in implementing conservation plans.

Determination of the Impact on Other Resources

Because this practice does not directly conserve water, it does not have a direct impact on other resources. But used as a management tool that can result in water savings; energy used from pumping water is also impacted.

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.texas.gov/programs/wqmp.html>
- 3) Natural Resources Conservation Service, September 1997, *Irrigation - Handbooks and Manuals - National Engineering Handbook Part 652 - Irrigation Guide*.

- 4) *Conservation Practice Standard for Irrigation Water Management (Acre), Code 449*, Natural Resources Conservation Service, October 2011

Acknowledgments-None