

**NONPOINT SOURCE SUMMARY PAGE**

**FY 01 CWA 319(h)  
FY01-18**

- 1. TITLE OF PROJECT:** Seymour Aquifer Supplemental Water Quality Improvement Project
- 2. PROJECT GOALS/OBJECTIVES:** The main goal of this project is to demonstrate management practices that mitigate nitrate movement in the soil within the Seymour Aquifer region. This project will generate and extend new knowledge to enhance Best Management Practices (BMPs) for nutrient and irrigation management within the Seymour Aquifer through establishment of a subsurface drip irrigation system at the Chillicothe Research Station. This project will also provide additional resources for quantifying and verifying the effectiveness of BMP implementation in reducing nitrate levels within the aquifer.
- 3. PROJECT TASKS:** (1) Install On-Site Teaching Tool for Demonstration of BMPs to Reduce Nitrate Infiltration. (2) Continuation of Evaluation of BMP Effectiveness in Conjunction with TSSWCB 04-9.
- 4. MEASURES OF SUCCESS:** (1) Demonstrate benefits of conversion to drip irrigation through implementation of drip irrigation demonstration site at Chillicothe Research Station. (2) Conduct education program for local irrigators at the Chillicothe Research Station to increase producer awareness and use of irrigation and nutrient BMPs. (3) Better estimate of reductions in nitrate concentrations in the Seymour Aquifer and analysis of additional measures needed to achieve water quality standards as reported in the TSSWCB Project 04-9 Final Report as a result of the longer monitoring period provided by this project.
- 5. PROJECT TYPE:** Statewide ( ) Watershed ( ) Demonstration (X) Other (X)
- 6. WATERBODY TYPE:** River ( ) Lake ( ) Wetland ( ) Ground Water (X) Other ( )
- 7. PROJECT LOCATION:** Seymour Aquifer – Haskell, Knox, Jones, Wilbarger, Hardeman and other surrounding counties
- 8. NPS MANAGEMENT PROGRAM REFERENCE:** State of Texas Agricultural/Silvicultural Nonpoint Source Management Program – Approved February 15, 2000.
- 9. NPS ASSESSMENT REPORT STATUS:** Impaired ( ) Impacted (X) Threatened ( )
- 10. KEY PROJECT ACTIVITIES:** Hire Staff (X) Monitoring (X) Technical Assistance (X) Education (X) BMP Implementation (X) Demonstration Project (X) Other ( )
- 11. NPS MANAGEMENT PROGRAM ELEMENTS:** Implementing Milestones from the *1999 Texas Nonpoint Source Pollution Assessment Report and Management Program* including (1) providing financial assistance to Soil and Water Conservation Districts (SWCDs) for the implementation of Water Quality Management Plans in order to reduce NPS pollution, (2) coordinating with Federal, State, and Local Programs, and (3) technology transfer, technical support, administrative support and cooperation between agencies and programs for the prevention of NPS pollution.
- 12. PROJECT COSTS:** Federal: (\$83,254) Local Match: (\$55,507) Total Project: (\$138,760)
- 13. PROJECT MANAGEMENT:** Texas Water Resources Institute
- 14. PROJECT PERIOD:** One year from start date.

## **Seymour Aquifer Supplemental Water Quality Improvement Project**

FY01 CWA Section 319(h)  
FY01-18

### **WORKPLAN**

#### **Problem Need/Statement**

The Seymour Aquifer is a shallow aquifer in Northwest Central Texas. The aquifer underlies over 300,000 acres and furnishes drinking and domestic water for many rural families. In addition, over 3,000 wells furnish water for irrigation and livestock use. The State of Texas has identified elevated nitrate levels as a concern in the aquifer. In a vast majority of the wells tested, nitrate levels exceed the federal safe drinking water standard of 10 mg/L NO<sub>3</sub>-N. Nitrate levels have been documented in some wells as high as 35 mg/L NO<sub>3</sub>-N. To remove this threat, the Texas State Soil and Water Conservation Board (TSSWCB) will work cooperatively through the Texas Water Resources Institute with the Texas Cooperative Extension (TCE) and Texas Agricultural Experiment Station (TAES) to provide water quality education to irrigators on BMPs to reduce nitrate concentrations in the Seymour Aquifer.

#### **General Project Description**

This program will serve to expand the efforts of the ongoing “Seymour Aquifer Water Quality Improvement Project” (TSSWCB 04-9) to beyond the irrigated portions of Haskell, Knox, and Jones counties. This supplemental project will encourage the installation of Drip Irrigation Systems in Wilbarger, Hardeman and other surrounding Counties as a best management practice to improve water quality and increase water quantity throughout the Seymour Aquifer.

The installation of drip irrigation systems will have a direct impact on the area groundwater by:

- 1) Reducing the potential for return flow of irrigation water into the aquifer (Return irrigation water flow has the potential to transport nutrients and pesticides into groundwater).
- 2) Increasing irrigation efficiency over that of row and center pivot systems thereby improving management of limited ground water resources.

In summary, the following are actions that will be undertaken by this project to reduce the potential for nitrate infiltration into the Seymour Aquifer:

- Provide implementation of drip irrigation at the Chillicothe Research Station for demonstration and educational events for producers in Wilbarger, Hardeman, and other surrounding counties as a method for the reduction of nitrate infiltration.
- TAES will extend the demonstration and evaluation period of TSSWCB Project 04-9 in order to better assess the effectiveness of BMP implementation in reducing nitrate levels within the Seymour Aquifer.

## **Tasks, Objectives, Schedules, and Estimated Costs**

**Task 1:** Install On-Site Teaching Tool for Demonstration of BMPs to Reduce Nitrate Infiltration

**Costs:** \$ 49,011 (Federal), \$ 33,309 (State), \$ 82,320 (Total)

**Objective:** Generate and extend new knowledge to enhance BMPs for nutrient and irrigation management within the Seymour Aquifer through establishment of a subsurface drip irrigation system at the Chillicothe Research Station. This will provide demonstration and education of best management practices to reduce nitrate infiltration and promote protection and prudent use of limited groundwater resources in the Seymour Aquifer.

**Subtask 1.1:** Install a subsurface drip irrigation system on the 14-acre site at the Chillicothe Research Station (Month 1 through month 12).

**Subtask 1.2:** Establish 72 individually controlled plots, which will provide a substantial but flexible system, to evaluate various best management practices, cropping systems, and management techniques to educate producers on practices to protect the aquifer (Month 1 through month 12).

**Subtask 1.3:** Host on-site education events at Chillicothe in conjunction with Task 3, which will expand the geographical reach of education activities to include Wilbarger, Hardeman and other surrounding counties (Month 1 through month 12).

### **Deliverables:**

- Established subsurface drip irrigation system
- Quarterly Reports
- Conduct education events and provide schedules, agendas and attendance lists
- Educational materials generated

**Task 2:** Continuation of Evaluation of BMP Effectiveness in Conjunction with TSSWCB 04-9

**Costs:** \$ 34,243 (Federal), \$ 22,198 (State), \$ 56,440 (Total)

**Objective:** Extend monitoring period of TSSWCB Project 04-9 to better quantify and verify the effectiveness of BMP implementation in reducing nitrate movement within soils that overlie the Seymour Aquifer.

**Subtask 2.1:** In conjunction with TSSWCB Project 04-9, TAES, with assistance from the Haskell SWCD technician, will assess and compile existing data on the Seymour Aquifer and the effects of irrigation and other farming practices on aquifer water quality (Month 1 through month 12).

**Subtask 2.2:** In conjunction with TSSWCB Project 04-9, TAES will (1) assess impacts of conversion from furrow and/or pivot irrigation to drip irrigation on nitrate concentration and water quantity at field scale by continuing projects on established drip and furrow irrigation plots located in aquifer region, (2) validate current data by installing in-line flow meters and other water measuring devices to quantify water use in furrow and/or pivot irrigation systems, and (3) monitor nitrates in irrigation water and the soil profile on a seasonal basis (Month 1 through month 12).

**Subtask 2.3:** In conjunction with TSSWCB Project 04-9, TAES will assess impacts of conversion from furrow and/or pivot irrigation to drip irrigation on nitrate concentration and water quantity at project scale by synthesizing current plot-scaled data on water and nitrogen use efficiency (assuming implementation of BMPs) to field scale and by monitoring and modeling water and nitrate balance on fields being implemented with BMPs and cost-share drip irrigation (Month 1 through month 12).

**Subtask 2.4:** In conjunction with TSSWCB Project 04-9, TAES will assess impacts of conversion from furrow and/or pivot irrigation to drip irrigation on nitrate concentration and water quantity at aquifer scale by coordinating with the SWCDs, NRCS, area Groundwater Conservation Districts to verify assumptions made when scaling up data and modeling fields being implemented with BMPs and cost-share drip irrigation (Month 1 through month 12).

**Subtask 2.5:** In conjunction with TSSWCB Project 04-9, TAES will use a water transport model along with a field-scale nitrogen balance to forecast the amount of irrigation conversion necessary to meet water quality standards (if achievable), BMP system efficacy and economics (cost/ac-ft), and amount of potential water savings over the expected life of drip irrigation systems (Month 1 through month 12).

**Subtask 2.6:** TAES will follow DQOs and a QAPP approved by the TSSWCB and US Environmental Protection Agency through the FY04 CWA Section 319(h) project, TSSWCB Project 04-9 (Month 1 through month 12).

**Deliverables:**

- Quarterly Reports
- Additional year of data collection and evaluation for inclusion in Evaluation Report and TSSWCB Project 04-9 Final Report

### **Coordination, Roles and Responsibilities:**

Participating Agencies and Organizations along with their roles in this project include:

- Texas State Soil and Water Conservation Board (TSSWCB): Project management.
- Texas Agricultural Experiment Station (TAES): Assist with providing water quality education and evaluation of BMP effectiveness
- Texas Water Resources Institute (TWRI): Coordination of water quality education and monitoring activities.

### **Measures of Success:**

- Demonstrate benefits of conversion to drip irrigation through implementation of a drip irrigation demonstration site at Chillicothe Research Station.
- Conduct education programs for local irrigators at the Chillicothe Research Station to increase producer awareness and use of irrigation and nutrient BMPs.
- Better estimate of reductions in nitrate concentrations in the Seymour Aquifer and analysis of additional measures needed to achieve water quality standards as reported in the TSSWCB Project 04-9 Final Report as a result of the longer monitoring period provided by this project.

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**Itemized Budget**

<b>Category</b>	<b>Federal</b>	<b>Non-Federal Match</b>	<b>Total</b>
<b>1. Personnel</b>	\$17,045	\$21,136	<b>\$38,181</b>
<b>2. Fringe Benefits</b>	\$ 3,016	\$ 4,660	<b>\$ 7,676</b>
<b>3. Travel</b>	\$ 3,058	\$ 3,270	<b>\$ 6,328</b>
<b>4. Equipment</b>	\$ -	\$ -	<b>\$ -</b>
<b>5. Supplies</b>	\$ 5,414	\$ -	<b>\$ 5,414</b>
<b>6. Contractual</b>	\$ 33,500	\$ -	<b>\$ 33,500</b>
<b>7. Construction</b>	\$ -	\$ -	<b>\$ -</b>
<b>8. Other Direct Costs</b>	\$ 10,362	\$ -	<b>\$ 10,362</b>
<b>9. Total Direct Costs</b>	\$ 72,395	\$ 29,066	<b>\$ 101,461</b>
<b>10. Indirect costs</b>			
15% IDC	\$ 10,859	\$ 4,360	<b>\$ 15,219</b>
Unrecovered IDC		\$ 22,080	<b>\$ 22,080</b>
<b>11. Total</b>	\$ 83,254	\$ 55,506	<b>\$ 138,761</b>
	60%	40%	