

**User-friendly Software That Allows Farmers To Use Agricultural
Metering Data For Management Purposes**

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Prepared by*

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Abstract

House Bill 579 was adopted by the Georgia legislature in 2003. The Bill included the following language: “The State Soil and Water Conservation Commission shall have the duty of implementing a program of measuring farm uses of water to obtain clear and accurate information on the patterns and amounts of such use, which information is essential to proper management of water resources by the state and **useful to farmers for improving the efficiency and effectiveness of their use of water, ...**”¹ The Commission is required to read and report water use,² but farmers need a way to use their meters as measurement and conservation tools.

This paper provides a description of a computer program that was developed by the Coastal Rivers Water Planning and Policy Center in conjunction with the Georgia Soil and Water Conservation Commission. We also detail the reasoning of having such a program, why the program was developed, and the background behind the programming language for this disk and formulas used to create the output (calculations). A hypothetical situation is also provided to give the reader an understanding of how the program is used.

¹ Georgia Code 12-5-31(m.1)(1). * Emphasis added.

² Georgia Code 12-5-105 (b.1)(1).

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I. Introduction

In 2003 the Georgia legislature gave the Georgia Soil and Water Conservation Commission (hereafter GSWCC) the duty of implementing a program for measuring farm water use. This requirement allows GSWCC to provide farmers a way to improve efficiency and effectiveness of their water use.³

The purpose of this paper is to describe a program that has been developed that will enable farmers to easily use their irrigation metering devices as management tools. This paper will detail the language used to create the computer program and will provide real world scenarios to show how the program can be used.

II. The Computer Program

This software was created using Macromedia Flash MX 2004 Professional. This program allows easy interface for the end users (farmers), as well as a programming language to run calculations. The programming language associated with Flash is called Action Script. This language was used to perform all calculations and formatting of numbers in this program.

User interface begins with an Introduction screen (Figure 1). This page contains logos of the participating agencies associated with this program. Two buttons are also included on this page. The first button allows you to enter the Conversion System. The second button allows you to view Contact Information of those associated with the Agricultural Metering Program and this computer program.

³ H.B. 579, amending Georgia Code 2-6-27.

Figure 1.



The Conversion System (Figure 2) allows the user to enter the beginning and ending meter readings, as well as the total number of acres irrigated. Users will also select the units of measure for their water use: Acre-Feet, Acre-Inches, or Gallons. Once the beginning and ending values have been reported, the program will process the information and display how much water has been used. For any given beginning and ending reading the results will display in Acre-Feet Pumped, Acre-Inches Pumped, and Gallons Pumped. There is also a box that will display the number of Gross Inches Applied. Gross Inches Applied is the amount of irrigation water applied divided by the number of acres irrigated. Calculations associated with this program are included in Appendix 1.

The Contact Information Page (Figure 3) allows users easy access to those who are associated with this program and the entire Agricultural Water Metering Program. The list provides contact information for many GSWCC employees and their regional offices. This also includes information for the Hooks Hanner Environmental Resource

Figure 2.

The screenshot displays the 'Agriculture Water Metering Conversion System' interface. At the top left is the Georgia State Water Conservation Commission logo. At the top right is the Coastal Rivers Water Planning & Policy Center logo. The main title 'Agriculture Water Metering Conversion System' is centered at the top. Below the title are three navigation buttons: 'Contact Information', 'Main Menu', and 'Exit'. The central form area contains three input fields labeled 'Beginning Meter Reading', 'Ending Meter Reading', and 'Acres Irrigated'. Below these fields is a section titled 'Select Meter Type Totalizing in:' with three radio button options: 'Acre Feet' (selected), 'Acre Inches', and 'Gallons'. A 'Calculate' button is positioned below the radio buttons. The bottom section of the interface, highlighted in a light blue box, contains four output fields: 'Acre Feet Pumped', 'Acre Inches Pumped', 'Gallons Pumped', and 'Gross Inches Applied'.

Center in Dawson where the metering program is located. Contact information for the Coastal Rivers Water Planning and Policy Center, a partner in this program, is also listed on this page.

Additionally included on this CD is a Microsoft Excel spreadsheet (Figure 4) that will enable the farmer to maintain water use readings and reports. This spreadsheet includes the date, for which the meter was read, crop, the number of crop acres, the beginning reading, the ending reading and the output as a result of using the computer program. This spreadsheet will allow the farmer to compare results from previous irrigation periods.

Figure 3.

Agriculture Water Metering Conversion System

Conversion System Main Menu Exit

Contact Information

Georgia Soil & Water Conservation

David A. Eigenberg - Division Director
 Agriculture Water Metering
 Hooks - Hanner Environmental Resource Center
 4344 Albany Highway
 Dawson, GA 31742

Coastal Rivers Water Planning & Policy Center

Coastal Rivers Water
 Planning & Policy Center
 P.O. Box 8153-02, Suite 3355
 Statesboro, GA 30460-8153
 Ph: (912) 486-7979

A Program by Coastal Rivers Water Planning & Policy Center in conjunction with Georgia Soil & Water Conservation Commission

Figure 4.

<u>DATE</u>	<u>CROP</u>	<u>Acreage</u>	<u>BEGINNING READING</u>	<u>ENDING READING</u>	<u>GROSS INCHES APPLIED PER ACRE (FROM CD)</u>

III. Example of Program Use

Farmer John Brown farms 500 acres of peanuts in Bulloch County, Georgia. 125 acres are under a single pivot that is a ground water withdrawal. Mr. Brown has had an Agricultural Irrigation Meter installed by the Georgia Soil and Water Conservation Commission in accordance with H.B. 579. This year Mr. Brown has decided to plant peanuts under his irrigation system. He is aware of the Irrigation Meter and has the software program provided to assist in calculating the amount of water that has been used.

After planting his crop and several days without rain, Mr. Brown wants to make sure that his peanut crop gets some water. He runs his center pivot irrigation system and makes one complete circle around the field. The meter was new so the beginning reading was 0.000. When the system was cut off the meter now reads 117.965 acre-inches. Mr. Brown wants to see how his computer program works, so he enters the beginning, ending and acres irrigated. Mr. Brown is given the following report (Chart 1).

As you can see Mr. Brown has applied 0.94 Gross Inches of water to his peanut crop.

A few weeks go by and it has rained less than an inch. Mr. Brown decides that his peanut crop is in need for some supplemental irrigation again. Mr. Brown wants to apply more water than he did the first time, so he slows the system and allows it to walk again. When the system is finished he wants to determine his water use. His beginning reading was 117.965 and his ending reading is 500.362. He is given the following report (Chart 2).

Chart 1.

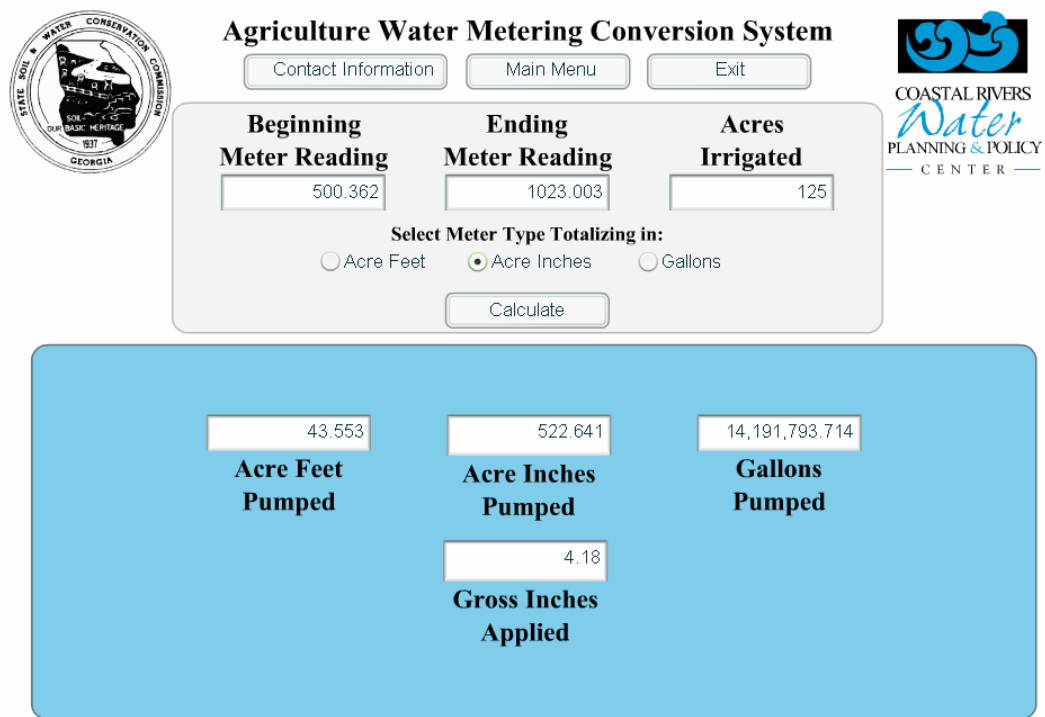


Chart 2.



As you can see Mr. Brown has applied 3.06 gross inches to his peanut crop. Bulloch County has finally received some much-needed rain and Mr. Brown does not have to irrigate for a while. Now it is time for possible the last irrigation cycle. Mr. Brown is ready to apply the water. His beginning reading is 500.362 and his ending reading is 1,023.003. He is given the following report (Chart 3). Mr. Brown has applied 4.18 gross inches of water to his peanuts.

Chart 3.



Agriculture Water Metering Conversion System

Contact Information Main Menu Exit

Beginning Meter Reading **Ending Meter Reading** **Acres Irrigated**

500.362 1023.003 125

Select Meter Type Totalizing in:

Acre Feet Acre Inches Gallons

Calculate

43.553 522.641 14,191,793.714


Acre Feet Pumped **Acre Inches Pumped** **Gallons Pumped**

4.18

Gross Inches Applied

Mr. Brown has harvested his crop and now he wants to see how much water he applied throughout the growing season. He likes the program and keeps the rainfall amounts each year, so he will now keep this amount of irrigation applied. His beginning reading is 0.000 and his ending reading is 1,023.003. Mr. Brown is given the following report (Chart 4).

Chart 4.



Agriculture Water Metering Conversion System

Contact Information Main Menu Exit

Beginning Meter Reading **Ending Meter Reading** **Acres Irrigated**

0 1023.003 125

Select Meter Type Totalizing in:

Acre Feet Acre Inches Gallons

Calculate

85.25 1,023.003 27,778,623.462

Acre Feet Pumped **Acre Inches Pumped** **Gallons Pumped**

8.18

Gross Inches Applied

For the year farmer John Brown has applied 8.18 gross inches to his 125 acres of peanuts. With the timely rainfall his farm also received Mr. Brown produced a bumper crop. He will use this program next year to track what he has done and see how he may need to change things to receive good results.

Table 1 below shows how the Microsoft Excel spreadsheet can work. The May 19 reading is the information that was collected in Chart 1. The June 6 record was collected from Chart 2. The July 4 record was collected from Chart 3. The total 2004 data was collected from Chart 4. Mr. Brown can now continue to add to this sheet in subsequent years.

Table 1.

<u>DATE</u>	<u>CROP</u>	<u>Acreage</u>	<u>BEGINNING READING</u>	<u>ENDING READING</u>	<u>GROSS INCHES APPLIED PER ACRE (FROM CD)</u>
19-May-04	Peanut	125	0.000	117.965	0.94
06-Jun-04	Peanut	125	117.965	500.362	3.06
04-July-04	Peanut	125	500.362	1023.003	4.18
Total 2004	Peanut	125	0.000	1023.003	8.18

IV. Closing Remarks

House Bill 579 was adopted by the Georgia legislature in 2003. In this bill it was stated that “The State Soil and Water Conservation Commission shall have the duty of implementing a program of measuring farm uses of water to obtain clear and accurate information on the patterns and amounts of such use, which information is essential to proper management of water resources by the state and **useful to farmers for improving the efficiency and effectiveness of their use of water, ...**”⁴ This paper describes a computer program that will allow farmers to accurately determine the amount of water they are applying to their crop.

This paper contains an example for how farmers may use this program to improve water use efficiency and conservation. We have also described the programming language behind the conversion CD. Formulas have also been included that describe when the calculations come from. We believe that this program will serve as a valuable resource for agricultural water users in the State of Georgia. Farmers who understand the amount of water use occurring during a growing may be enabled to reduce fuel or electricity expenses, reduce soil erosion, and conserve water.

⁴ Georgia Code 12-5-31(m.1)(1).

Appendix 1.

Calculations for Meters Totalizing in Acre-Feet

Acre-Feet = End Number – Beginning Number
Acre-Inches = Acre-Feet Pumped x 12
Gallons = Acre-Inches x 27,154
Gross Inches Applied = (Acre-Inches / Acres Irrigated)

Example for Meters Totalizing in Acre-Feet

Beginning Reading = 0.000
Ending Reading = 25.000
Acre-Feet Applied: $25.000 - 0.000 = 25.000$ *Acre-Feet Applied*
Acre-Inches Applied: $25.000 \times 12 = 300.000$ *Acre-Inches Applied*
Gallons Applied: $300.000 \times 27,154 = 8,146,200$ *Gallons Applied*
Gross Inches Applied: $300.000 / 200 = 1.5$ *Gross Inches Applied*

Calculations for Meters Totalizing in Acre-Inch

Acre-Inch = End Number – Beginning Number
Acre-Feet = Acre-Inch Pumped / 12
Gallons = Acre-Inches x 27,154
Gross Inches Applied = (Acre-Inches / Acres Irrigated)

Example for Meters Totalizing in Acre-Inch

Beginning Reading = 0.000
Ending Reading = 500.000
Acre-Inch Applied: $500.000 - 0.000 = 500.000$ *Acre-Inch Applied*
Acre-Feet Applied: $500.000 / 12 = 41.667$ *Acre-Feet Applied*
Gallons Applied: $500.000 \times 27,154 = 13,557,000$ *Gallons Applied*
Gross Inches Applied: $500.000 / 200 = 2.5$ *Gross Inches Applied*

Calculations for Meters Totalizing in Gallons

Gallons = End Number – Beginning Number
Acre-Inch = Gallons Pumped / 27,154
Acre-Feet = Acre-Inches / 12
Gross Inches Applied = (Acre-Inches / Acres Irrigated)

Example for Meters Totalizing in Gallons

Beginning Reading = 0.000
Ending Reading = 3,000,000.000
Gallons Applied: $3,000,000.000 - 0.000 = 3,000,000.000$ *Gallons Applied*
Acre-Inch Applied: $3,000,000.000 / 27,154 = 110.481$ *Acre-Inch Applied*
Acre-Feet Applied: $110.481 / 12 = 9.207$ *Acre-Feet Applied*
Gross Inches Applied: $110.481 / 200 = 0.55$ *Gross Inches Applied*