

Voluntary Reporting of Greenhouse Gases in Agriculture

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WNTSC
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1605(b) Program Background

- **Established by section 1605(b) of Energy Policy Act of 1992.**
- **Flexible implementing guidelines issued 1994.**
- **Over 200 regular reporters.**
- **Agriculture has had limited participation.**

Emissions Inventory – Potential Sources of Emission and Sequestration

- **Stationary Source Combustion**
- **Mobile Source Combustion**
- **Non-Fuel Use of Fossil Fuels**
- **Industrial Process Emissions**
- **Mining, Oil, and Gas Production Emissions**
- **Waste Treatment and Handling**
- **Indirect Emissions from Purchased Electricity, Steam, Hot and Chilled Water**
- **Other Indirect Emissions**
- **Forestry Sources and Sinks**
- **Agricultural Sources and Sinks**
- **Engineered Sequestration**

Revision Process –2005 and 2006

- **March 24, 2005: Interim Final General and Draft Technical Guidelines published in Federal Register for comment.**
- **April 26/27 and May 5: Public workshops.**
- **May 23: Comment period closes [extended to June 22].**
- **September 20: Guidelines become effective [unless extended].**
- **Fall 2005: EIA issues forms (after public review).**
- **First reports under revised guidelines: Summer 2006.**

Agriculture Activities Covered

- Crop Production**
- Grazing Livestock**
- Confinement Feeding**
- Residue Burning**

GHGs Sources and Sinks

N₂O sources:

- fertilizer applications
- nitrogen fixing plants
- crop residue
- livestock waste
- residue burning
- cultivation of organic soils

CO₂ sources:

- lime applications
- fossil fuel combustion
- cultivation of organic soils

CH₄ sources:

- enteric fermentation
- rice production
- livestock waste
- residue burning

CO₂ sinks:

- sequestration in soils
- sequestration in biomass

Summary of Improvements to the Reporting System for Agriculture

- **Includes all sources and sinks**
- **More thorough explanation of processes**
 - **Links to other references**
- **Expanded range & variety of estimation tools**
 - **Increased number of acceptable methods**
 - **Reliability ratings**
 - **Availability of default methods and guidance for direct sampling**

Why Report?

- **To demonstrate the results of your entity's commitment to reducing GHG emissions.**
- **To establish an official, government record of entity emissions and reductions.**
- **To initiate a comprehensive program of greenhouse gas emission monitoring and management.**
- **To document emission reductions that might be recognized by future government policies or programs.**

Voluntary Reporting of Greenhouse Gases CarbOn Management Evaluation Tool (COMET-VR)

Demonstration of a new web based USDA-Natural Resources Conservation Service tool that is part of the voluntary reporting system



Contributors

- ▷ USDA
- ▷ USDA GCPO
- ▷ NRCS
- ▷ ARS
- ▷ CSU NREL

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Welcome to the Voluntary Reporting Carbon Management Online Tool (Beta)

Introduction

The Voluntary Reporting of Greenhouse Gases-Carbon Management Evaluation Tool (COMET-VR) tool is a decision support tool for agricultural producers, land managers, soil scientists and other agricultural interests.

COMET-VR provides an interface to a database containing land use data from the Carbon Sequestration Rural Appraisal (CSRA) and calculates in real time the annual carbon flux using a dynamic Century model simulation.

Users of COMET-VR specify a history of agricultural management practices on one or more parcels of land. The results are presented as ten year averages of soil carbon sequestration or emissions with associated statistical uncertainty values. Estimates can be used to construct a soil carbon inventory for the 1605(b) program.

[Click Here!](#) to start the Voluntary Report COMET-VR or use the navigation link "COMET-VR Tool" at the top of the page.

About 1605 (b)

On February 14, 2002, the President charged DOE and other agencies with improving the current voluntary emission reduction registration program under [section 1605\(b\) of the 1992 Energy Policy Act](#) because of concerns with the growing threat of global climate change from increasing emissions of greenhouse gases.

DOE is currently leading an interagency process—with stakeholder involvement—to enhance the accuracy, reliability, and verifiability of emissions and emissions reductions data reported to DOE.

About NRCS

COMET-VR

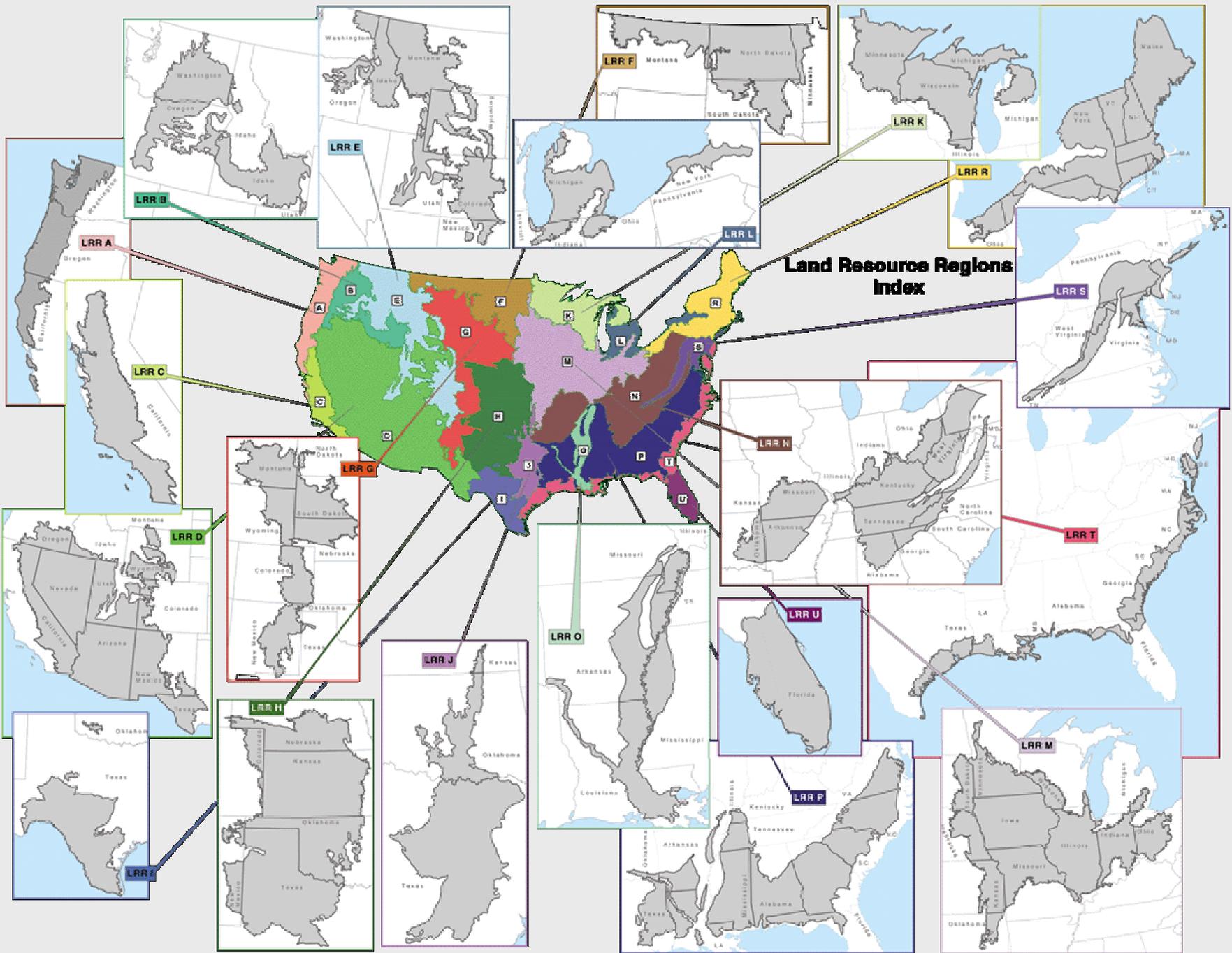
BACKGROUND

- **20 Land Resource Regions with subdivisions**
- **Century SOM Model with an uncertainty estimate**
- **Ave of 4.9 million records per LRR (98 mil total)**
 - Takes ~5 working days to recalculate entire dataset**
 - Difficult to manage such a large dataset**

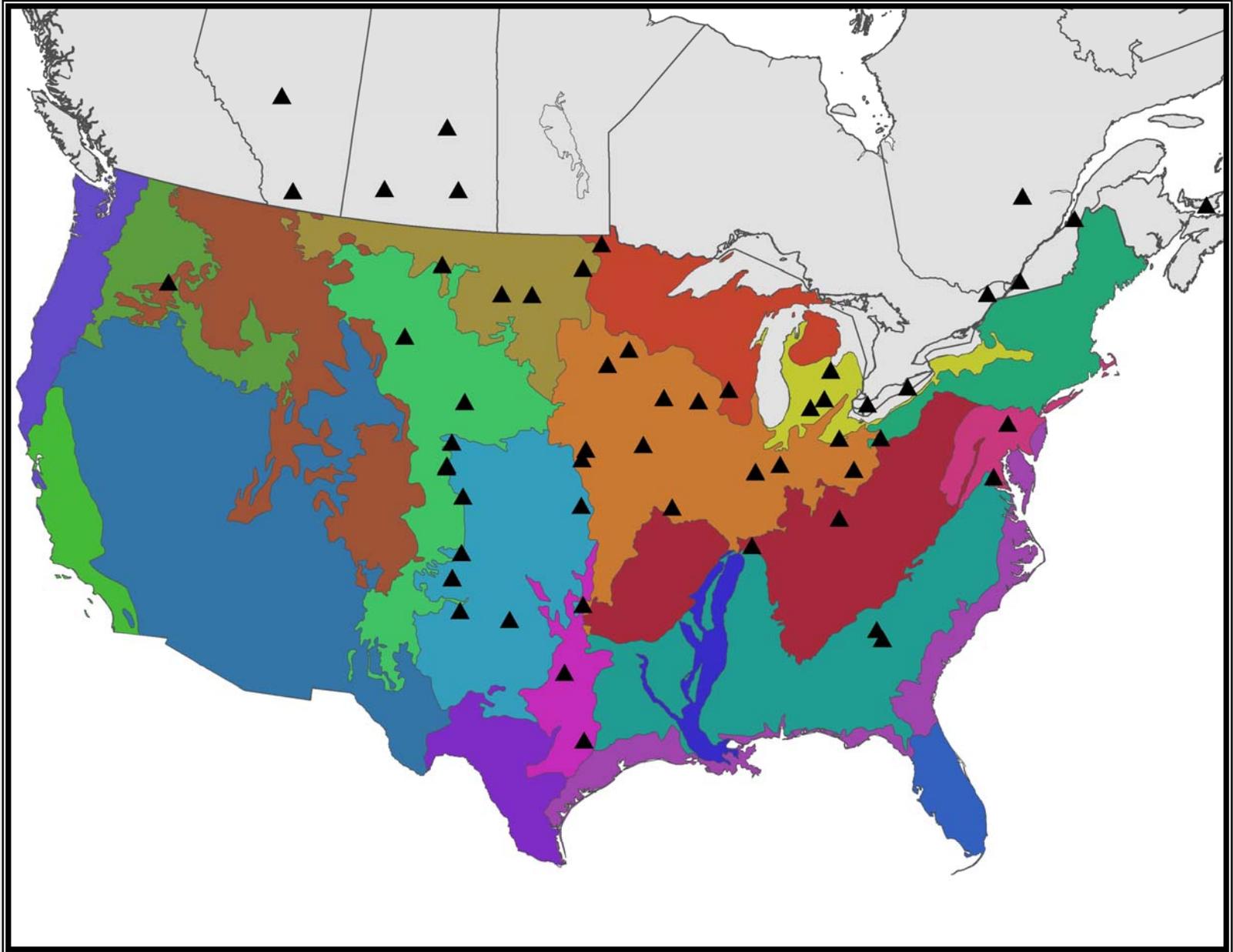
COMET-VR

APPLICATION

- **WEB based**
- **Crop production**
 - SOIL CARBON emissions and sequestration**
 - Fuel and energy use (estimate or user specified)**
- **Grazing livestock**
 - SOIL CARBON emissions and sequestration**



Agricultural Experiments



Methods

- **Use Century to model the management impacts on SOC storage based on field experiments**
 - 60 experiments with over 800 treatments
- **Statistically evaluate differences between the model results and field measurements for SOC storage**
 - linear-mixed effect model reflecting uncertainties in model and measurements
 - prediction error for the LRR carbon estimates

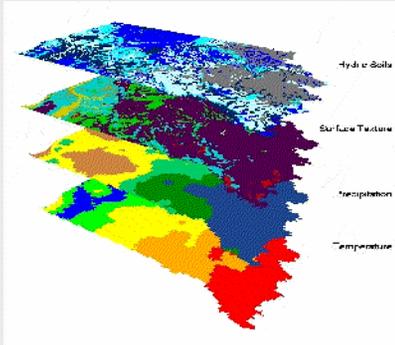
Required Responses to Utilize COMET-VR

- **Location**
 - State and County
- **Parcel Information**
- **Soils Information**
 - Soil Texture/Hydric Condition
- **Management History (crop rotations, tillage systems or grazing systems)**
 - Pre 1970's
 - 1970's-1990's
 - Base: 1990's-Current
 - Reporting Period: Current + 10 years

Modeling Procedure

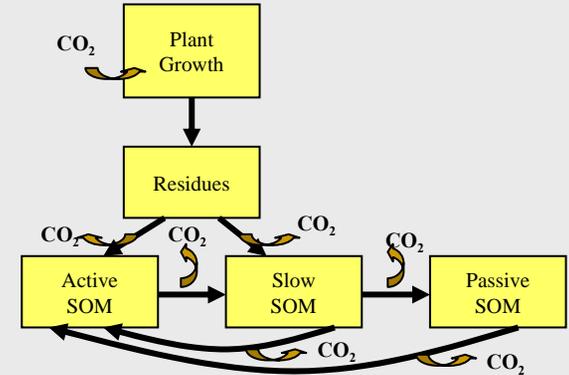
**Survey Data:
Land Use and Mgmt
Data (CSRA)**

**Spatial Data:
Soils and Climate**



**WEB
INTERFACE**

Century SOM Model

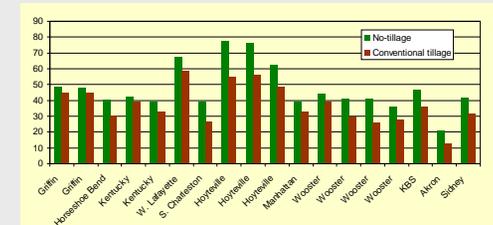


Results 1605b

**Response returned
in < 5 seconds**



Uncertainty Estimator



Experiments

On Line Demonstration Amarillo, TX

The screenshot shows the top portion of a website. At the top left is the USDA logo (United States Department of Agriculture). Below it is a navigation menu with the following items: Contributors, >USDA, >USDA GCPO, >NRCS, >ARS, >CSU NREL, and 'You are here: Home'. The main banner features the text 'Comet - VR' in a stylized font, with 'USDA Voluntary Reporting Carbon Management Tool' underneath. The banner is decorated with various agricultural images: a hand holding soil, a globe, a farmer, a field, a tree, a cow, and a corn cob. At the bottom is a navigation bar with links for 'Home', 'Help', 'Contact Us', and 'COMET-VR Tool'. There are also font size adjustment icons (A A A) and a 'Change text:' label.

USDA United States Department of Agriculture

Contributors

- >USDA
- >USDA GCPO
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www.cometvr.colostate.edu



Contributors

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About NRCS



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[Go to](#) | [Reset](#) | [State](#) |

Step 1. Enter the State Information: Select the State where the parcel is located from the list of State Names.

State Selection:

Select a State:



Selection

Location Information:

Parcel Information:

Soil Information:

Management History:



Contributors

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Voluntary Reporting Carbon Management Tool COMET-VR (Beta)

[Go to](#) | [Reset](#) | [State](#) | [County](#) |

Step 2. Enter the County Information: Select the County where the parcel is located from the list of County Names.

Texas County Selection:

Select a County:

Selection

Location Information:

State: Texas

Parcel Information:

Soil Information:

Management History:

Contributors

- ▶ USDA
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Voluntary Reporting Carbon Management Tool COMET-VR (Beta)

[Go to](#) | [Reset Parcel](#) |

Step 3. Specify your parcel's information: Enter the parcel name, parcel size, and measurement units.

[POTTER County, Parcel Selection:](#)

Enter the reporting date:

Enter a name (optional):

Measurement Units?: English Metric

Parcel Size?: Acres

Selection

Location Information:

- **County:** POTTER
- **MLRA:** 77E
- **LRR:** HS

Parcel Information:

Soil Information:

Management History:

Contributors

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Voluntary Reporting Carbon Management Tool COMET-VR (Beta)

[Go to](#) | [Reset](#) | [State](#) | [County](#) | [Parcel](#) | [Soil](#) |

Step 4. Enter the Soil Information: Select the dominant soil texture and hydric information for your parcel.

POTTER County, Texas Soil Selection

Select the
surface
soil
texture:

Clay Loam
Loam
Loamy Sand
Silty Clay Loam
Silt Loam
Sandy Loam



Is this a
hydric
soil?
Select No
or Yes:

No
 Yes



Selection

Location Information:

- **State:** Texas
- **County:** POTTER
- **MLRA:** 77E
- **LRR:** HS

Parcel Information:

- **Report Date:** 6/13/2005
- **Name:** NW Quarter
- **Size:** 160 Acres

Soil Information:

Management History:

Voluntary Reporting Carbon Management Tool COMET-VR (Beta)

Go to | [Reset](#) | [State](#) | [County](#) | [Parcel](#) | [Soil](#) | [Rotation](#) |

Step 5. Enter the land management information: Choose a rotation for the four time periods.

POTTER County, Texas Management History for NW Quarter:

Enter the management history for this parcel: ?

Management For this Time Period:

Choose Rotation:

Landscape position and historical management:

irrigation (pre 1970's)
livestock grazing (pre 1970's)
lowland non-irrigated (pre 1970's)
upland non-irrigated (pre 1970's)

1970's through mid-1990's:

dryland: continuous cotton
dryland: winter wheat-milo
Irrigated: continuous cotton
Irrigated: winter wheat-milo-corn
livestock grazing: rotational (<8 pastures), moderate grazing
livestock grazing: rotational (>8 pastures), moderate grazing

Enrollment in Conservation Reserve Program (CRP) during 1980's?

Select the CRP type:

None
100% grass
grass-legume mixture

Base (Current Mgmt.):

CRP, 100% grass
CRP, grass-legume mixture
dryland: continuous cotton
dryland: winter wheat-milo
Irrigated: continuous cotton
Irrigated: winter wheat-milo-corn

2005 Report Period:

CRP, 100% grass
CRP, grass-legume mixture
dryland: continuous cotton
dryland: winter wheat-milo
Irrigated: continuous cotton
Irrigated: winter wheat-milo-corn

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Selection

Location Information:

- State: Texas
- County: POTTER
- MLRA: 77E
- LRR: HS

Parcel Information:

- Report Date: 6/13/2005
- Name: NW Quarter
- Size: 160 Acres

Soil Information:

- Texture: Clay Loam
- Hydric: N

Management History:

See Also

- NREL Agroecosystems
- CASMGs Consortium for Agricultural Soils
- Mitigation of Greenhouse Gases
- ARS Research
- U.S. Agriculture & Forestry Greenhouse Gas Inventory
- Greenhouse Gas Reporting Guidelines
- Draft 1605b Technical Guidelines
- Voluntary Reporting Program

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Step 6. Enter the land management information: Choose a tillage for the three time periods.

POTTER County, Texas Tillage History for NW Quarter

Enter the management history for this parcel: ?

Tillage For this Time Period:

Choose Tillage:

1970's through mid-1990's:

Intensive Tillage
Reduced Tillage
No Till Tillage

Base (Current Mgmt.):

Intensive Tillage
Reduced Tillage
No Till Tillage

2005 Report Period:

Intensive Tillage
Reduced Tillage
No Till Tillage

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USDA COMET-VR Online Tool Version: 1.0b-062004

Selection

Location Information:

- **State:** Texas
- **County:** POTTER
- **MLRA:** 77E
- **LRR:** HS

Parcel Information:

- **Report Date:** 6/13/2005
- **Name:** NW Quarter
- **Size:** 160 Acres

Soil Information:

- **Texture:** Clay Loam
- **Hydric:** N

Management History:

- **Historic:** irrigation (pre 1970's)
- **70's - 90's:** dryland: winter wheat-milo,, CRP: None
- **Current:** dryland: winter wheat-milo,,
- **Report Period:** dryland: winter wheat-milo,,

Voluntary Reporting Carbon Management Tool COMET-VR (Beta)

Go to | [Reset](#) | [State](#) | [County](#) | [Parcel](#) | [Soil](#) | [Rotation](#) | [Tillage](#) | [Submit](#) |

Please Verify the information by reviewing the gray "SELECTION BOX" to the right before submitting.

[POTTER County, Texas COMET-VR Submit Information:](#)

Soil Carbon Calculation

If you find any problems with the information that you input, you can easily correct the problem by using the navigation links at the top of this form to jump back to the section needing correction. For example, If the acreage/hectare value for your parcel is incorrect, just click on the link "parcel". Then input the correct value and click on the next button. Review the Selection box to the right of the screen. The value should be corrected.

After correcting the information, click on the "Submit" link at the top of the page to return to the execution page.

When you click on the "Get Carbon" button you will be sending your information to the century program to compute the predicted change in Soil Carbon for the parcel NW Quarter, POTTER County, Texas.

This is a complex calculation and may take a few seconds, so Please be patient.

[Back](#)

[Reset](#)

[Get Carbon](#)

USDA COMET-VR Online Tool Version: 1.0b-062004

Selection

Location Information:

- **State:** Texas
- **County:** POTTER
- **MLRA:** 77E
- **LRR:** HS

Parcel Information:

- **Report Date:** 6/13/2005
- **Name:** NW Quarter
- **Size:** 160 Acres

Soil Information:

- **Texture:** Clay Loam
- **Hydric:** N

Management History:

- **Historic:** irrigation (pre 1970's)
- **70's - 90's:** dryland: winter wheat-milo, Intensive Tillage, CRP: None
- **Current:** dryland: winter wheat-milo, Intensive Tillage,
- **Report Period:** dryland: winter wheat-milo, No Till Tillage,

Voluntary Reporting Carbon Management Tool COMET-VR (Beta)

[Go to](#) | [Reset](#) | [State](#) | [County](#) | [Parcel](#) | [Soil](#) | [Rotation](#) | [Tillage](#) | [Summary](#) |

Values are valid for 2005 through 2015 assuming that no change in management occurs.

The default values, or your specified values for soil carbon, may be reported in the 1605(b) system. We recommend that you **print** this page and **save a copy of this report** to a file on your computer system. Use the button "Write File" on the **Next page** to save this report.

Getting data from the database

POTTER County, Texas Century's Dynamic Carbon Database COMET-VR Summary:

Carbon Storage Report

Report Year: 2005

Parcel Description		Parcel Management History	
Parcel Name:	NW Quarter	Historic:	irrigation (pre 1970's)
Parcel Size:	160 Acres	70's to 90's:	dryland: winter wheat-milo; Intensive Tillage
Location:	POTTER, Texas	Current:	dryland: winter wheat-milo; Intensive Tillage
Soil:	Non-hydric Clay Loam	Report Period:	dryland: winter wheat-milo; No Till Tillage

Predicted Change in Soil Carbon for the Parcel

Annual Change for 2005

	Change in Carbon	% Uncertainty 
Total Tons Carbon per year:	7	6.38
Total Tons CO2 Equivalent per year:	25	6.38

Values recorded in English units. One **ton** of carbon is equivalent to 3.664 **tons** of carbon dioxide.

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POTTER County, Texas Century's Dynamic Carbon Database COMET-VR Summary:

Dynamic Century Carbon ONLINE Tool - COMET-VR

Fuel and Fertilizer

Report Date: 2005
Parcel Description: NW Quarter, POTTER County, Texas

	1996 to 2005* Base (Current Management)	2006 to 2015* Reporting Period
No. 2 Diesel Use from Tillage	1,189 Total Gallons	272 Total Gallons
Nitrogen Fertilizer Use	0 Total Lbs	0 Total Lbs

* Values calculated from the Dynamic LRR database for 2005

Enter Actual changes in inputs for this parcel*

	Base	Reporting Period
No. 2 Diesel	<input type="text"/> Gallons	<input type="text"/> Gallons
Gasoline	<input type="text"/> Gallons	<input type="text"/> Gallons
Propane	<input type="text"/> Gallons	<input type="text"/> Gallons
Biodiesel	<input type="text"/> Gallons	<input type="text"/> Gallons
Natural Gas	<input type="text"/> MCF	<input type="text"/> MCF
Electricity	<input type="text"/> Kw-hr	<input type="text"/> Kw-hr
Nitrogen Fertilizer	<input type="text"/> Lbs	<input type="text"/> Lbs

* Enter only those applicable

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[POTTER County, Texas Century's Dynamic Carbon Database COMET-VR File Output:](#)

Your information has been saved to a file.

- Please **RIGHT click** on the link to **SAVE** this report to your computer. Then select "Save Target As" from the list and enter a file name in the appropriate box.
- Please **LEFT click** on the link to **READ** or **Print** this report using your browser.
- File your report using the **"Send Email"** button.

Saved File Link: [ASCII Report](#) 

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BACKGROUND INFORMATION

1. Parcel Description:

Name: NW Quarter, POTTER County Texas;
Size: 160 Acres;
LRR: HS;
MLRA: 77E;
Soil: Clay Loam;
Hydric: N;

2. Parcel Management History:

HISTORIC - irrigation (pre 1970's);

70's to 90's - dryland: winter wheat-milo; Tillage: Intensive;
CRP: None;

BASE (CURRENT Mgmt) - dryland: winter wheat-milo; Tillage: Intensive;

REPORT PERIOD - dryland: winter wheat-milo; Tillage: No Till;

CARBON STORAGE REPORT

1. Predicted Annual Change in Soil Carbon for the Parcel - NW Quarter
During the Reporting Period:

Total Tons Carbon per year: 7 Uncertainty: 6.38;
Total Tons CO2 Equivalent per year: 25 Uncertainty: 6.38;

FUEL AND FERTILIZER USE REPORT

1. Calculated from the Dynamic LRR database for:

Base No. 2 Diesel Use from Tillage: 1,189 Total Gallons
Report Period No. 2 Diesel Use from Tillage: 272 Total Gallons

Base Nitrogen Fertilizer Use: 0 Total Lbs
Report Period Nitrogen Fertilizer Use: 0 Total Lbs

2. Actual changes in inputs for this parcel:

NONE Reported;

This report was created using the Online Carbon Reporting Tool on 6/14/2005
Report id: _2606_2581_ct_2585_ct_2597_nt

Note: The Base is 1996 to 2005; and the Report Period is 2006 to 2015
(NA) denotes data not available.

Voluntary Reporting Carbon Management Tool COMET-VR (Beta)

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Properties

- Micro...

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Brenner pres...

Irr_H_image...

W

ca Mar...

Internet

Participants

- **Colorado State University - Natural Resource Ecology Laboratory**
 - **Keith Paustian, Kendrick Killian, Steve Ogle, Mark Easter, Steve Williams**
- **USDA**
 - **NRCS – John Brenner, Jill Schuler, Joel Brown and Maury Mausbach (retired)**
 - **ARS - Ron Follett, Steve Shafer and Mike Jawson**
 - **GCPO - Bill Hohenstein and Kathryn Bickel**

On Line Demonstration Amarillo, TX

The screenshot shows the top portion of a website. At the top left is the USDA logo (United States Department of Agriculture). Below it is a navigation menu titled "Contributors" with links to "USDA", "USDA GCPO", "NRCS", "ARS", and "CSU NREL". The main header features a collage of agricultural images (winds turbines, a hand holding soil, a farmer, corn, a cow) with the text "Comet - VR" and "USDA Voluntary Reporting Carbon Management Tool". At the bottom is a navigation bar with links for "Home", "Help", "Contact Us", and "COMET-VR Tool".

USDA United States Department of Agriculture

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