

Southeast Regional Carbon Sequestration Partnership (SECARB)

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| Principle Author(s): | Kathryn A. Baskin |
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Abstract

Work during the first six months of the project mainly concentrated on contracts execution and collection of data to characterize the region and input of that data into the geographical information system (GIS) system. Data was collected for source characterization, transportation options and terrestrial options. In addition, discussions were held to determine the extent of the geologic information that would be needed for the project. In addition, activities associated with the regulatory, permitting and safety issues were completed. Outreach activities are in the formative stages.

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List of Graphical Materials

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Figure 2. Top 50 CO₂ Producers in the Southeastern Region with Industrial producers included.

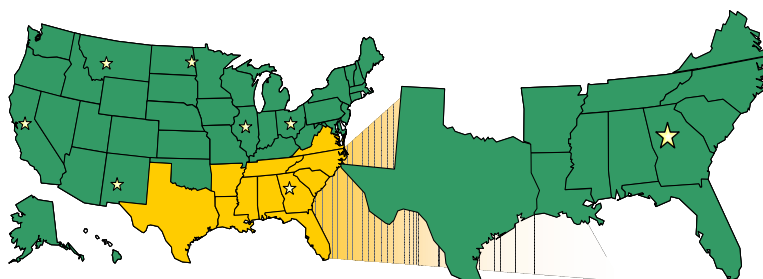
Figure 3. Top 50 Power Plant CO₂ Producers in the Southeastern region

Figure 4. Map of Top 50 Power Producers in Southeastern Region

Figure 5. Pipeline Map for a Portion of the Region.

Introduction

On November 21, 2002, Energy Secretary Spencer Abraham announced a new phase of the United State's Department of Energy (U.S. DOE) research program solely devoted to the development and deployment of viable carbon sequestration technologies. Less than one month later, the Department issued Phase I of a solicitation aimed at creating a nationwide network of Regional Carbon Sequestration Partnerships.



The SECARB region includes eleven states: Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas and Virginia.

Map courtesy of the U.S. DOE/NETL.

Given the Southern States Energy Board's (SSEB) existing carbon management initiative, the SSEB immediately began facilitating discussions with state and federal agencies, policy makers, industry representatives, research entities and other non-governmental organizations to determine a regional response to the solicitation. On August 16, 2003, the Department announced the winners of the Phase I solicitation. The result is a network of seven regional carbon sequestration partnerships, including the Southern States Energy Board's Southeast Regional Carbon Sequestration Partnership (SECARB).

SECARB is a collaboration covering eleven U.S. states under a United States Department of Energy initiative to develop regional approaches to carbon sequestration in support of President George W. Bush's Global Climate Change Initiative. The SECARB will evaluate options and potential opportunities for regional carbon sequestration, promote the development of a framework and infrastructure necessary for the validation and deployment of carbon sequestration technologies and produce implementation plans for pilot-scale projects to test and validate approaches and technologies. In addition, the SECARB will focus on engaging stakeholders from diverse constituencies in the planning and implementation of the SECARB activities to ensure that all constituencies are well represented in this collaboration.

Executive Summary

The Southeast region has a diverse partnership composition that encompasses state executive and legislative leadership; electric utilities and associations; sequestration and GIS research centers; energy producers and associations; and natural resource advocates. Also, the region has a diverse portfolio of CO₂ sources, potential CO₂ transport networks and sequestration options.

Work during the first six months of the project mainly concentrated on contracts execution and collection of data to characterize the region and input of that data into the GIS system. Data was collected for source characterization, transportation options and terrestrial options. In addition, discussions were held to determine the extent of the geologic information that would be needed for the project. As part of the *regional characterization activities*, SECARB is working on a CO₂ emissions inventory and verifying the accuracy of source data going into the inventory. Approximately 600 facilities have been identified in the 11-state Partnership region.

In the area of *source characterization*, significant limitations were identified in the initial data collected and significant efforts will be required to improve the quality of the data. The transport information efforts have just begun and the main information available to the project comes from an Electric Policy Research Institute (EPRI) project to characterize several power plants in the region.

Related to *geologic characterization activities*, SECARB is compiling geologic data on potential sinks for CO₂ including coal seams, gas and oil fields and deep saline formations. The work on *terrestrial characterization* is complete for several states within the region and is ongoing in Georgia. Agreement was reached with Virginia to use the same methodology being used in the other states.

For *regulatory, permitting and safety issues*, initial research and preliminary analysis has been completed for the SECARB region, as well as possible national and international models. *Outreach activities* are in the formative stages. SECARB technical team members are participating in the U.S. DOE/NETL Communications

SECARB Technical Team and Technology Coalition Members

Lead: Southern States Energy Board (SSEB)
Electric Power Research Institute (EPRI)
Mississippi State University (MSU) Diagnostic Instrumentation and Analysis Laboratory (DIAL)
Massachusetts Institute of Technology (MIT)
Winrock International
Augusta Systems, Inc.
AGL Resources
American Electric Power
Arkansas Oil and Gas Commission
BP America
Center for Energy and Economic Development
ChevronTexaco Corporation
Clean Energy Systems, Inc.
Dominion
Duke Power
Edison Electric Institute
Entergy Services
Florida Power & Light Company
Geological Survey of Alabama
Georgia Environmental Facilities Authority
Georgia Forestry Commission
Gulf Coast & Carbon Center, University of Texas at Austin
Interstate Oil and Gas Compact Commission
Louisiana Department of Environmental Quality
North American Coal Corporation, The North Carolina State Energy Office
Nuclear Energy Institute
Oak Ridge National Laboratory
Old Dominion Electric Cooperative
Progress Energy
SCANA Corporation
South Carolina Public Service Authority/Santee Cooper
Southern Company
Tampa Electric Company
Tennessee Valley Authority (TVA)
Virginia Center for Coal and Energy Research
Virginia Polytechnic Institute and State University

Workshop Series. In addition, the SECARB website is operating and is a work in progress. The web site address is www.secarbon.org.

Experimental

Due to the nature of the project, no experimental methods, materials or equipment are necessary.

Results and Discussion

The primary tasks in the Partnership's Phase I scope of work are: (1) Define the Geographic Boundaries; (2) Characterize the Region; (3) Identify and Address Issues for Technology Deployment; (4) Develop Public Involvement and Education Mechanisms; (5) Identify the Most Promising Capture, Sequestration and Transport Options; and (6) Prepare Action Plans for Implementation and Technology Validation Activity.

Task 1.0 Define Geographic Boundaries

The geographical boundaries task is completed and includes the states of Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas and Virginia.

Task 2.0 Characterize the Region

As part of the **Regional Characterization Activities**, SECARB is working on a CO₂ emissions inventory and verifying the accuracy of source data going into the inventory. Approximately 600 facilities have been identified in the 11-state Partnership region. The 50 largest facilities account for approximately 50 percent of the region's CO₂ emissions. Identifying power plant sites that the Partnership will concentrate on is an immediate priority. Work is ongoing to verify data on larger units in order to account for approximately 80 percent of the total CO₂ emission for the Southeast region. During the next few months, SECARB will take actions necessary to gather information on industrial sites (especially gas processing plants); complete the collection of transport option information; and finalize GIS costing methodologies.

SECARB is in the process of reviewing pre-combustion, post-combustion and oxygen-fired technologies for separating and capturing CO₂ emissions. Work is being done to determine pipeline purity requirements (moisture content, oxygen content, hydrogen sulfide levels, etc.) In addition, SECARB will determine purity requirements for enhanced oil recovery (EOR), coal bed methane (CBM) recovery and in deep saline formations. An immediate priority for capture and separation activities is internal communications and coordination on promising options relative to the various disciplines of investigation. During the next six months SECARB

needs to receive and analyze data from the EPRI Test Center Program (an industry short-list of approximately six candidate test centers).

The Massachusetts Institute of Technology (MIT) has begun collecting data on sources in the region and has found significant uncertainty especially about the industrial (non-utility) sources. Additionally, they are in the process of checking data locally. Source data on the MIT server has been linked to the U.S. DOE NATCARB (national database covering all regional carbon sequestration partnerships).

For power plants, this is the only data with a level of actual emissions measurement. However, there are also several gaps that will need to be covered. These include: gaps in the latitude/longitude information (many locations are approximations); site numbers but not unit breakdown; and no indication of other pollution control equipment or land availability for CO₂ control equipment installation. MIT is working with the Tennessee Valley Authority (TVA) to evaluate the quality of the information collected for their power plants to date.

For other sources—Gas processing, Refineries, Iron & Steel, Ammonia, Cement, Ethylene, Ethylene Oxide, Hydrogen—the information currently available does not contain actual CO₂ emissions, only assumed numbers. Also, for refineries, there are many potential streams for CO₂ emissions. For all of the industrial sources, the potential for the data to be confidential or proprietary may complicate data collection. Data collection for these other sources will require significant additional data collection efforts.

Shown in Figure 1 is a map of the sources within the Southeast region. Sources in the region are dominated by power sources.

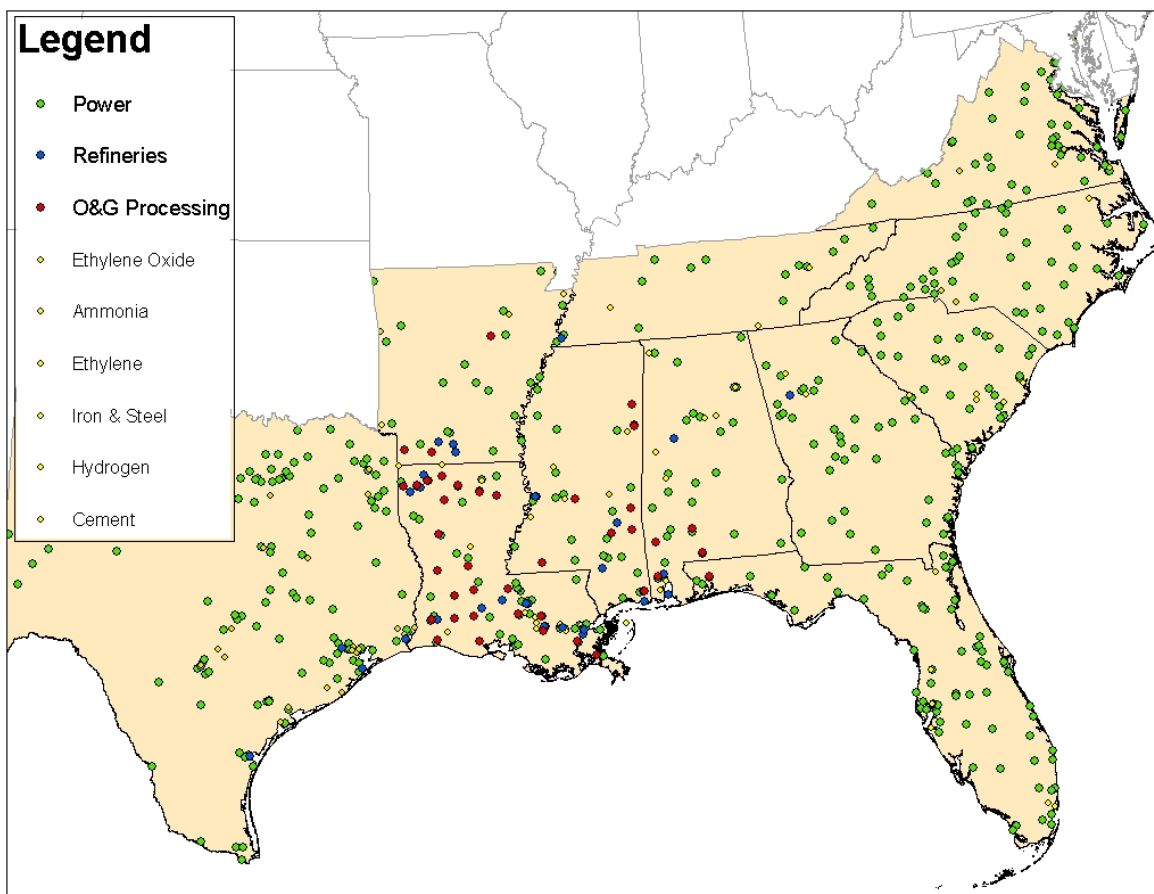


Figure 1. CO₂ Sources in the Southeast Region

Figure 2 is a bar chart that shows the top 50 sources within the region if the industrial installations are included. However, these sources are uncertain and Figure 3 is a bar chart of only the power plant sources. Figure 4 is a map of the locations of these sources.

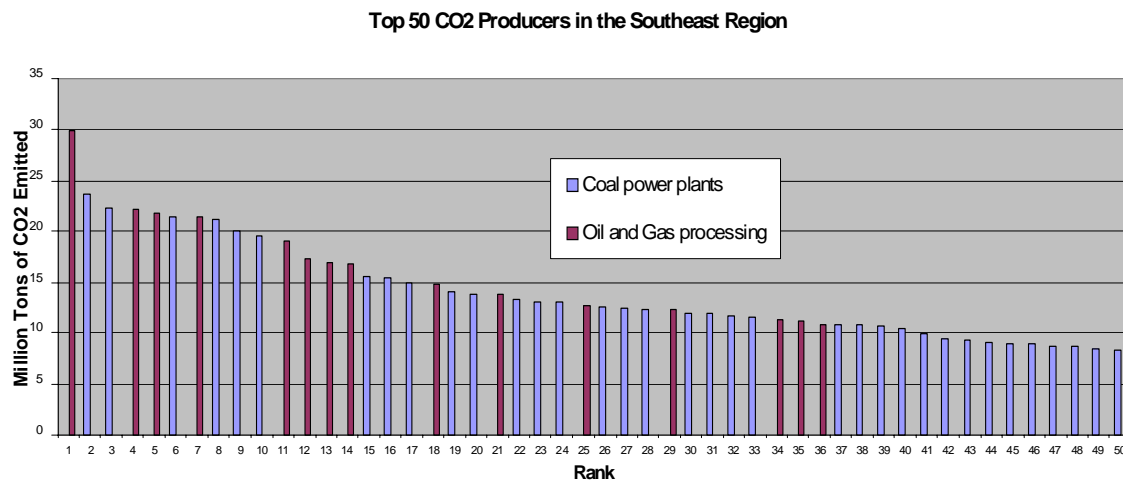


Figure 2. Top 50 CO₂ Producers in the Southeastern Region with Industrial producers included.

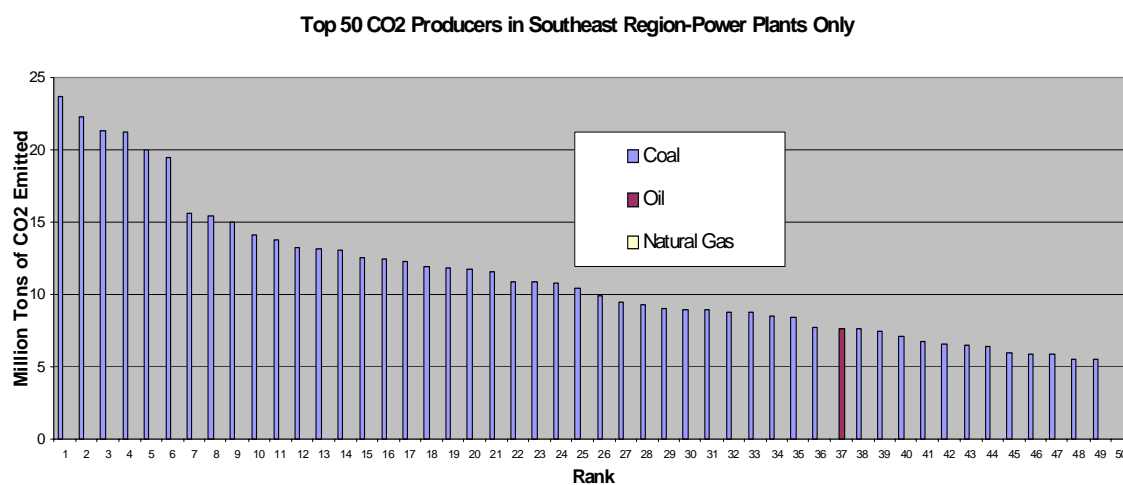


Figure 3. Top 50 Power Plant CO₂ Producers in the Southeastern region

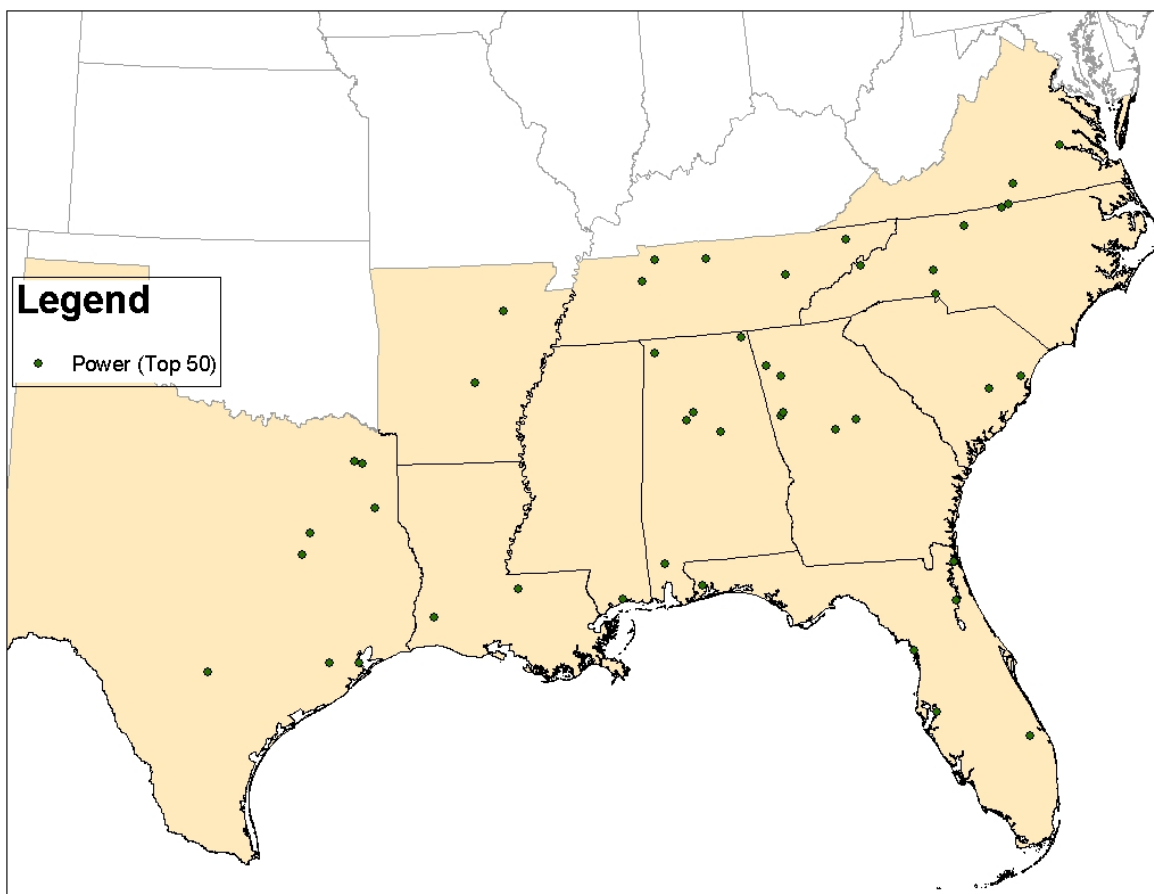


Figure 4. Map of Top 50 Power Producers in Southeastern Region

The main work on ***transport options*** is completed and is related to an EPRI project on CO₂ Test Centers where several power plants in the region have been characterized for transport options. Transport of CO₂ within the region is likely to be pipelines and this effort will be looking for data on transport issues such as lakes, parks and population centers. In addition, data will be collected on existing right-of-way paths (pipelines and power lines) as these may be the most effective path of transport. This information will be used in the regional evaluations but will not be included in the national database.

Shown in Figure 5 is a map of the pipelines for one of the power plants within the region. Shown in Figure 6 is a map showing the lakes and rivers surrounding one of the power plants within the region. Information like this will be collected for the entire region.

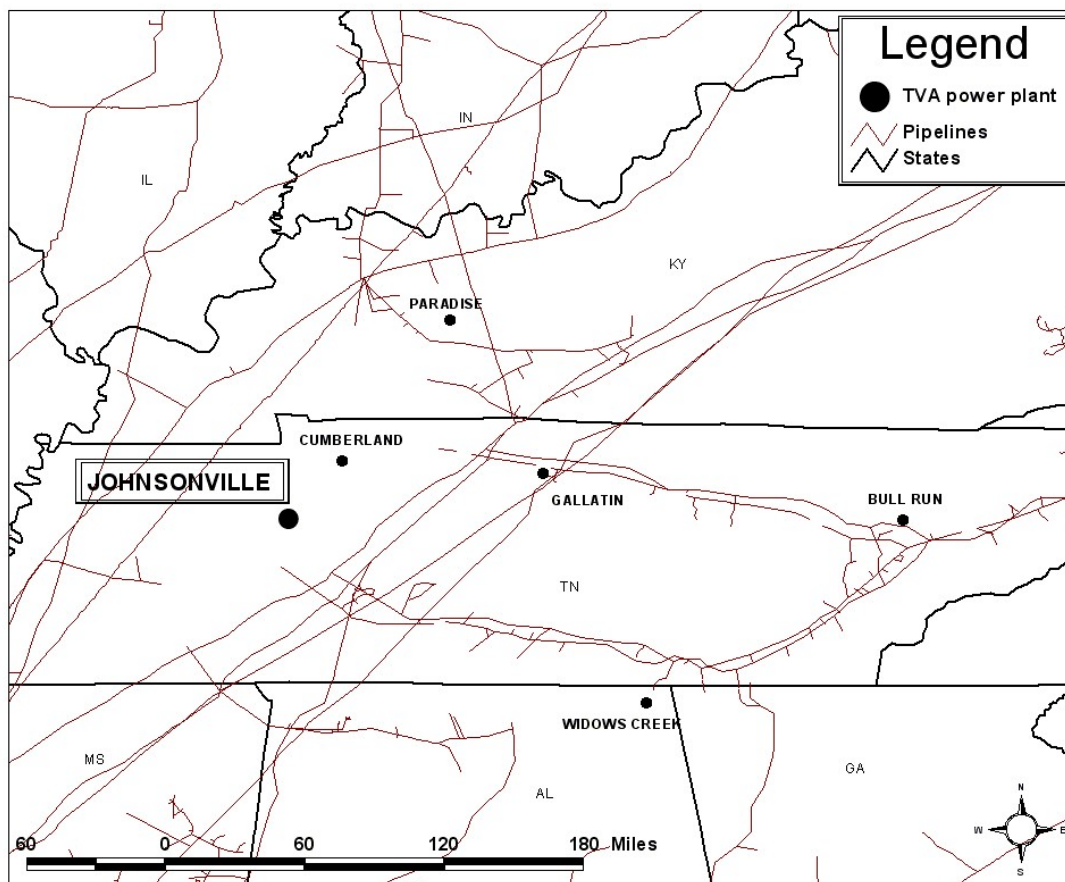


Figure 5. Pipeline Map for a Portion of the Region.

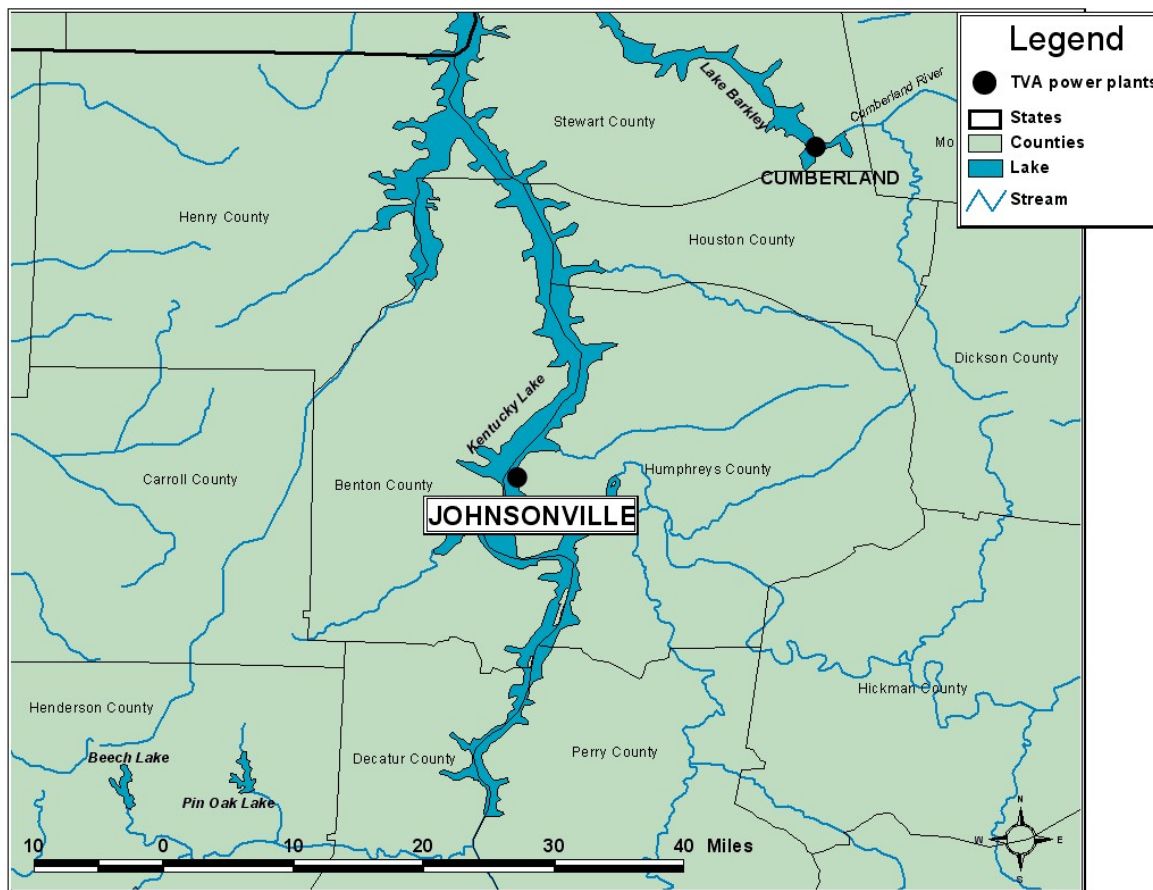


Figure 6. Lakes and Rivers Map for a Portion of the Region.

Related to **Geologic Characterization Activities**, SECARB is compiling geologic data on potential sinks for CO₂, including coal seams, gas and oil fields and deep saline formations. The process allows for an informed characterization of the region which then will allow the SECARB to identify the potential target areas that pose the optimum sequestration opportunities as well as define the most promising target areas for Phase II field work. Data criticality and data precision criteria are being developed and implemented.

The first step is a macro-level, geological characterization of the region. It was noted that the Southeast region has a diversity of geologic formations that may be suitable for value-added CO₂ utilization or long-term monitored storage of CO₂. There is much variability in data from one state to another and one geologic formation to another. Historically, data has not been collected or catalogued for purposes of evaluating CO₂ utilization and storage. SECARB is establishing screening criteria for optimizing field site selections. Overlay development is being coordinated with the MIT GIS project.

For ***Terrestrial Characterization Activities***, SECARB is mapping vegetative cover information for the 11-state region. Work is essentially complete on four states (as part of the cost share provided via EPRI) and work continues at Winrock International on five states that comprised the original nine-state region. Additional activity is being conducted in Virginia and Texas by university departments within their respective states. Overlay development for terrestrial systems is being coordinated with the MIT GIS project.

A great deal of land within the SECARB region is dedicated to managed forests or is grassland that is suitable for reforestation. Areas suitable for bottomland hardwood forest management are plentiful in the area and can account for some of the highest levels of carbon sequestration noted in terrestrial systems. In addition, the region has vast areas of farmland that are suitable for low-tillage farming practices and it has abandoned coal mine and phosphate mines that can be managed to increase the carbon content of the soil. Also, the region has many crops and crop residues that can be co-fired in boilers to reduce the intensity of CO₂ released from fossil fuels. Winrock International is developing systems to monitor, measure and verify carbon sequestration levels in terrestrial systems.

Task 3.0 Identify and Address Issues for Technology Deployment

For ***Regulatory, Permitting and Safety Issues***, initial research and preliminary analysis has been completed for the SECARB region, as well as possible national and international models. Leveraging this initial research, action plan outlines and, subsequently, action plans will be developed for the regulatory, permitting and safety frameworks. On a related front, initial research and preliminary analysis has been completed for the SECARB region for accounting frameworks and systems. In addition, efforts focused on studying national and international models, including the U.S. DOE 1605(b) voluntary reporting program, for purposes of obtaining analogous models. Action plans will also be developed for the accounting frameworks.

Outreach Activities are in the formative stages. SECARB Technical Team members are participating in the U.S. DOE National Energy Technology Laboratory (NETL) Communications Workshop Series. This has allowed for enhanced outreach activity planning efforts to move forward. In the coming quarter, RMS Strategies and The Phillips Group, with the assistance of Augusta Systems and the SSEB, will be conducting focus groups and developing outreach strategies. SECARB will leverage on SSEB's executive, legislative, regulatory and associate members linkages within the region. Outreach will be integrated as the slate of potential sites/opportunities is screened to approximately six options. At that point, it is anticipated that the approach will shift from general information dissemination to also include site/opportunity-specific outreach.

SSEB created and is operating a dedicated web site for the Southeast Carbon Sequestration Partnership. The web site is a work in progress and is intended to

play an integral role as a general outreach tool. The web site address is www.secarbon.org.

On November 3-4, 2003 SECARB technical team members participated in the NETL Regional Carbon Sequestration Partnership's kick-off meeting in Pittsburgh, Pennsylvania. Mr. Kenneth J. Nemeth, SSEB's executive director led technical team members in providing a presentation that highlighted the Southeastern Partnership's approach. In addition, SECARB technical team members participated in the various breakout sessions that addressed specific issues related to regulatory and compliance issues; public education and outreach; capture and separation technologies; geologic sink characterization and infrastructure requirements; and terrestrial sink characterization and infrastructure requirements. Working groups were established as a result of the breakout sessions and SECARB technical members participate with other regional partnership representatives on a regular basis to enhance communication.

On January 14-15, 2004, SECARB convened the first technical team and partners meeting. Over the two days, technical team members responsible for specific tasks and research updated attendees on their progress. In addition, the Partnership held discussions with industry representatives to solicit their input on regional strategies and activities already underway in the private sector. Dr. Karen Cohen, NETL Project Manager, provided an overview of the regional partnership working groups and the Carbon Sequestration Atlas.

During this reporting period, SECARB technical team members participated in several meetings to develop outreach efforts. On February 23, 2004, Dr. John Plodinec provided an overview of SECARB at the SSEB Associate Members Meeting in Washington, D.C.

On February 24, 2004, Governor Bob Wise of West Virginia, SSEB's chairman, announced at the Southern Governors' Association business meeting held during the National Governors' Association's Winter Meeting in Washington, D.C. that SSEB was awarded one of the U.S. DOE's seven Regional Carbon Sequestration Partnerships. He told the other governors attending the meeting that the Board would be leading the effort in the South with its Southeast Regional Carbon Sequestration Partnership.

On March 31, 2004, Mr. Richard Rudy, EPRI, represented SECARB at the American Chemical Society Annual Meeting in Anaheim, California. Mr. Rudy provided the participants with an overview of the Southeastern Regional Carbon Sequestration Partnership and its objectives.

An important outreach activity planned for the next quarter is the Chairman's Forum on Carbon Management. Under the chairmanship of Governor Bob Wise, West Virginia, SSEB will conduct a special regional forum on "Defining Priority Actions for Voluntary Carbon Management Activities in the South." The forum will be held on

May 20, 2004 in Washington, D.C. Governor Wise, in his role as SSEB's chairman, placed carbon management and its sub-field of carbon sequestration as the strategic area for leadership directing the Board's focus for this year. This initiative calls for the Board to take a leadership role between the public and private sectors based on each state's unique carbon management needs.

In addition, Augusta Systems is in the process of planning the Carbon Offset Opportunity Program that includes the participation of SECARB stakeholders. The objective of the U.S. DOE sponsored platform is to make potential investors and emissions reduction unit purchasers aware of carbon sequestration in the advancement of clean energy technologies and in the crafting of cooperative approaches and other related projects seeking investment or offering sale of emissions reduction units. This effort will be an active part of the SECARB public involvement and education mechanisms.

Tasks 4.0, 5.0 and 6.0

These tasks are dependent upon the work conducted under Tasks 1.0, 2.0 and 3.0. Therefore, no significant activities occurred during this reporting period.

Conclusion

Currently and on-going, SECARB is conducting a study and workshops for an eleven-state region. CO₂ sources, sinks and transport requirements will be described and entered into a GIS system. An outreach plan will be developed to engage stakeholders in the process of identifying and implementing regional opportunities for CO₂ sequestration. Literature searches, including exposure/dose response, will be utilized to assess environmental risk due to sequestration activities. Environmental efficacy will be confirmed through the development of measurement, monitoring and verification (MMV) protocols. The most promising capture and sequestration opportunities will be reviewed by permitting and regulatory agencies to determine adequacy of current regulations, existence of gaps and the need for proposed regulations. The evaluation of the life-cycle of storage options being considered will include environmental risk, MMV requirements, public acceptance, accounting frameworks (including Section 1605(b) of EPA Act) for aggregated amounts and value-added benefits.

References

None

List of Acronyms and Abbreviations

| | |
|-----------------|---|
| CBM | Coal Bed Methane |
| CO ₂ | Carbon Dioxide |
| Department | U.S. Department of Energy |
| EOR | Enhanced Oil Recovery |
| EPact | Energy Policy Act |
| EPRI | Electric Policy Research Institute |
| GIS | Geographical Information System |
| MIT | Massachusetts Institute of Technology |
| MMV | Monitoring, Measurement and Verification |
| NATCARB | National Carbon Database |
| NETL | National Energy Technology Laboratory |
| Partnership | Southeast Regional Carbon Sequestration Partnership |
| SECARB | Southeast Regional Carbon Sequestration Partnership |
| SSEB | Southern States Energy Board |
| TVA | Tennessee Valley Authority |
| U.S. DOE | U.S. Department of Energy |