TITLE: **Midcontinent Interactive Digital Carbon Atlas and Relational Database (MIDCARB)**

Cooperative Agreement No.:   DE-FC26-00NT40936

Contractor Name and Address: The University of Kansas Center for Research Inc.

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DOE Cost of Project: $ 835,392 (Budget Year 1)

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OBJECTIVES

Current federal energy policy assumes that hydrocarbons will continue to be the primary source of energy for the United States and the world well into the 21st century. However, there is concern about increasing atmospheric concentrations of carbon dioxide and its possible role in global climate change. For this reason, it may become necessary to manage anthropogenic CO_2. Sequestering CO_2 in geological reservoirs may be one way to safely sequester carbon over long periods of time, if the proper data and tools to analyze the geological feasibility as well as the associated costs can be developed.

The Midcontinent Interactive Digital Carbon Atlas and Relational DataBase (MIDCARB), a digital spatial database for five states (Indiana, Illinois, Kansas Kentucky and Ohio), will allow users to identify the amount of CO_2 available for sequestration in

relation to a source supply, the geologic security and safety of a sequestration site, the long-term effects on a reservoir, and the cost of compression and transport of CO2 between source and sequestration site. MIDCARB will organize and enhance the critical information about CO2 sources, and develop the technology needed to access, query, model, analyze, display, and distribute natural-resource data related to carbon management.

Large stationary sources of CO2 emissions will be identified, located, and characterized by volume, temperature, pressure, and gas mix. Potential CO2 sequestration targets, including producing and depleted oil and gas fields, unconventional oil and gas reservoirs, uneconomic coal seams, and saline aquifers, will be characterized to determine quality, size, and geologic integrity. All information will be available online through user query. Information will be provided through a single interface that will access servers in each state. The economic impact and possible value of the CO2 sequestration to hydrocarbon recovery from oil and gas fields, coal beds, and organic-rich shales will be considered.

PROJECT STATUS: A project meeting was held in Lawrence, KS on March 1-2 with multiple representatives from each member organization in attendance.

Project has just been initiated and an intial meeting was held. An organization and comunication network that crosses institutional and geographic barriers is being created. Inventories of digital information pertient to the MIDCARB project, and databases schemas at each participant are being assembled. Initial project web pages are being created and will be available at http://www.midcarb.org.

Scheduled Milestones:

Assessment of Potential CO_2 Sources	06/01
Identify Geological Sequestration Locations	08/01
Compile Database Characterizing CO2 Sources	09/01
Characterize Oil, Gas and Brine Reservoir Properties	11/01
Characterize Coal Bed Fluid and Rock Properties	02/02
Characterize Unconventional Reservoir Properties	03/02
Assess Critical Reservoir Properties	06/02
Develop Web- Enabled Relational Database and GIS (First Products 02/01)	Ongoing
Evaluate Potential of Economic Modeling	11/01
Technology Transfer (First Products by 11/00)	Ongoing

Significant Scheduled Events

Presentation: NETL Conference on Carbon Sequestration Washington, DC	05/01
Presentation: Geological Society of America Annual Meeting, Reno, NV	06/01
Eastern Section AAPG meeting, Kalamazoo, MI	09/01
Midwest/Great Lakes ArcInfo Users Group (MWFLAIUG) Conference 2001, Oak Brook, IL	09/01
Technology Transfer	Ongoing

SUMMARY OF TECHNICAL PROGRESS BUDGET PERIOD 1

Progress is reported for the period from 1 January 2001 to 31 March 2001.

In this second quarter, a successful meeting that included multiple representatives from each participating state took place in Lawrence, KS to address networking and computing aspects of the project. Papers for conferences in Washington DC, Oak Brook, IL, and Kalamazoo, MI are in the works. Initial data sets have been loaded and edited and methods to enable communications between the participant's computers and software were developed.

Administrative: The domain name, www.midcarb.org, has been secured and is active.

Task 1: Assessment of CO_2 Sources – *Identify the CO_2 sources across the region including CO_2 emission mass production rates from utility and non-utility power plants and the geographic distribution of these plants.*

The CO2 sources database continues to evolve and improve. Quarterly EPA emissions data and locations for the largest coal and gas-fired power plants are currently loaded for each state, though not all are accessible from the main web-site, as yet.

Compile Database Characterizing CO2 Sources – *Compile a database of CO_2 emission source characteristics, including concentration, pressure, temperature, trace gases, and output pattern (base, seasonal or peaking).*

Indiana: completed Visual Basic code for a working version of the "EPA Data Extractor", which is a data extraction utility created by the IGS to extract CO2 emissions data from raw text data files downloaded from the EPA web site. Delivered the extraction utility, corresponding sample database, and documentation to the appropriate staff at each of the cooperating state surveys. Also, Moved the IGS CO2 Sources database from Microsoft Access to Microsoft SQL server to facilitate database connectivity with co-operating state surveys. Database connection information for the IGS SQL server has been provided to the Kansas GS database administrator.

Ohio has utilized the IGS extraction utility to download emissions data from the EPA web site for the period 1997 to present. ARC SDE was purchased to better facilitate direct communication with other MIDCARB states. Means to directly communicate through the Ohio DNR firewalls have been established and connection information has been provided to the Kansas database administrator.

Characterize Oil, Gas and Brine Reservoir Properties – *Compile a representative database of oil, gas, and brine reservoir properties.*

Indiana: Initiated the digitization of Indiana oil and gas field boundaries. Field boundaries are being digitized as ArcInfo coverages and will eventually be linked to tabular data in the IGS Petroleum database. Began assessing the TORIS database elements for determination of which necessary datasets are readily available in the IGS records.

Ohio: Ohio has initiated the task of converting its oil and gas fields maps and data from a CAD-based system to ArcInfo coverages. The TORIS and Gas Atlas data schemas are being evaluated to develop a common dataset of reservoir properties for use in the MIDCARB GIS.

Characterize Coal Bed Fluid and Rock Properties – *Compile a representative database of coal bed fluid, rock properties, and enhanced coal-bed methane potential.*

Participating states have shared existing coal database schemas among the group. A common database schema is under development. Characterization is on-going.

Develop Web-Enabled Relational Database and GIS – *Develop an online relational database and web-enabled geographic information system (GIS) that can be queried to evaluate and determine options for sequestration. Queries would have spatial capabilities, and be based on critical parameters for CO_2 sequestration.*

The land-grid base-layers for all five states are being merged to form a continuous ArcInfo coverage and will be available on the web site soon. ESRI's ARC SDE product will be utilized as "middleware" to enable direct access to each individual state's graphical and tabular data.

Ken Nelson of Kansas will be giving a presentation entitled, "Using ArcSDE and ArcIMS to connect and map remote spatial databases" at the 2001 Midwest/Great Lakes ArcInfo Users Group conference in Oak Brook, IL on Sept. 24-26.

Technology Transfer – *The development of the MIDCARB atlas is in itself a technology transfer activity, and will be ongoing from project initiation.*

An initial project web site to facilitate communication amongst participating organizations has been developed and the domain name, www.midcarb.org, is now active. As products are developed they will be moved to this site. Several presentations and meetings are listed above.