Environment and Natural Resources Trust Fund
2009 Phase 1 Request for Proposals (RFP)

LCCMR ID: A02

Project Title: County Geologic Atlas Acceleration and Groundwater Monitoring Supplement

Total Project Budget: $2,695,200 [Part A (MGS): $820,200; Part B (DNR): $1,875,000)]

Proposed Project Time Period for the Funding Requested: July 2009 – June 2012 (3 years)

Other Non-State Funds: $120,000 [Part A (MGS)]

PART A

First Name: Dale **Last Name:** Setterholm

Sponsoring Organization: Minnesota Geological Survey

Address: 2642 University Ave. W.
St. Paul MN 55114-1057

Telephone Number: 612-627-5780 (x223)

Email: sette001@umn.edu

Fax: 612-627-4778

Web Address: http://www.geo.umn.edu/mgs

PART B

First Name: Jim **Last Name:** Berg

Sponsoring Organization: DNR

Address: 500 Lafayette Road
St. Paul MN 55115

Telephone Number: 651-259-5680

Email: jim.berg@dnr.state.mn.us

Fax: 651-296-0445

Web Address: http://www.dnr.state.mn.us/waters/index.html

Region:	County Name:	City / Township:
Northeast, Central, Metro, Southwest	Benton, Carlton, Carver, Chisago, Sherburne, Sibley	

PART A Summary:
Accelerate production of geologic portions of County Geologic Atlases, which describe aquifer location, size, boundaries, and vulnerability to support wise use and protection of groundwater and other resources.

PART B Summary:
To accelerate production of County Geologic Atlases and the installation and testing of Mt. Simon aquifer monitoring wells for groundwater protection and wise use.

	Part A	Part B
Main Proposal:	A02a - 0808-1-026-Main Proposal - Dale Setterholm.doc	A02b - 0808-1-008-Main Proposal - Jim Berg.doc
Project Budget:	A02a - 0808-1-026-Budget - Dale Setterholm.xls	A02b - 0808-1-008-Budget - Jim Berg.xls
Qualifications:	A02a - 0808-1-026-Qualifications - Dale Setterholm.doc	A02b - 0808-1-008-Qualifications - Jim Berg.doc
Map:	A02a - 0808-1-026-Map - Dale Setterholm.pdf	A02b - 0808-1-008-Map - Jim Berg.doc

PART A

Project Title: County Geologic Atlas Acceleration and Groundwater Monitoring Supplement (PART A)
Total Project Budget: $820,200
Proposed Project Time Period for the Funding Requested: July 2009 – June 2012
Other Non-State Funds: $120,000

Project Manager: First Name: Dale Last Name: Setterholm
Sponsoring Organization: Minnesota Geological Survey
Mailing Address: Street Address: 2642 University Ave. W.
City: St. Paul State: MN Zip: 55114-1057
Telephone Number: (612) 627-4780
Email: sette001@umn.edu
Fax: 612-627-4778
Web Address: http://www.geo.umn.edu/mgs
Location:
Region: Northeast, Central **County:** Benton, Chisago **City / Township:** _____

I. PROJECT SUMMARY AND RESULTS

Accelerate production of geologic portions of County Geologic Atlases, which describe aquifer location, size, boundaries, and vulnerability to support wise use and protection of groundwater and other resources.

PART A (MGS) MAIN PROPOSAL

PROJECT TITLE: County Geologic Atlas Acceleration & Groundwater Monitoring Supplement (Part A)

I. PROJECT STATEMENT

Geologic atlases provide information essential to sustainable management of ground water resources. They define aquifer boundaries, the connection of aquifers to the land surface, and the connection of aquifers to surface water resources. They facilitate and enhance the operations of natural resource management and regulation by state and local government units. A complete geologic atlas consists of Part A constructed by the Minnesota Geological Survey and focused on geology and the County Well Index, and Part B constructed by the DNR Division of Waters and focused on hydrology. Local participation is a primary factor in determining which counties are chosen for this project. Ground water sensitivity, demand, and the size of the population served are also considerations.

II. DESCRIPTION OF PROJECT RESULTS

PART A (MGS)

Result 1: Initiate 2 new county geologic atlas projects **Budget: $** 761,000

Deliverable **Completion Date** June 30, 2012

1. progress on maps of bedrock geology, surficial geology, subsurface Quaternary geology, bedrock topography, and thickness of glacial deposits.

2. database of well construction records to support the mapping, to document water use in specific aquifers, and to help resolve well problems

Result 2: production and printing of the Chisago and Benton atlases **Budget: $** 59,200

Deliverable **Completion Date** March 30, 2010

1. printed copies of the Benton and Chisago County Geologic Atlases, Part A and a DVD version of each with geographic information system files, databases files, pdfs, and additional digital products. These are the final products of work completed under a 2007 LCCMR project at MGS.

PART B (DNR)

Results 3 and 4 - See the Part B (DNR) main proposal

III. PROJECT STRATEGY AND TIMELINE

A. Project Partners

The Minnesota Geological Survey will require that the selected counties participate either with funding, or with in-kind services. Local participation enhances our understanding of local needs as

we design the products and also promotes involvement and use of the products. DNR Waters Division completes Part B, the hydrogeology section, of the atlases.

B. Project Impact

A geologic atlas provides counties and others with an assessment of ground water distribution and use, and the means to make decisions that protect and wisely use that resource. They are a basic and essential component of the information required for sustainable water management. The atlases increase the effectiveness and efficiency of regulatory programs and planning efforts. They are also used to support site-specific efforts such as well design, wellhead protection, and contaminant remediation. Within this project MGS will evaluate the impact of geologic settings on shallow geothermal energy installations and determine the feasibility of creating an atlas product that highlights those settings.

C. Time

This proposal builds on past LCCMR proposals and the 25 year CGA program history. This proposal is 3 years in length and should approach completion of atlases for 2 new counties. It will also fund printing and publication of 2 atlases constructed under a previous LCCMR grant.

D. Long-Term Strategy (if applicable)

MGS is the geologic mapping agency of the state and intends to provide comprehensive geologic mapping and associated databases at appropriate scales statewide as quickly as possible. The County Geologic Atlas program is the primary vehicle for completing this goal. Atlases are complete or under construction for 24 of the 87 counties in Minnesota. The program receives funding from DNR Waters, and is also leveraged with federal dollars from the National Cooperative Geologic Mapping Program of the United States Geological Survey. MGS competes for these cost share dollars annually and they cover half of the costs of each map product incurred in that one year window. This proposal would allow us to cost share at least two and possibly as many as 4 of the map products. The LCCMR funds bolster our ability to cost-share mapping projects. A graph of historical and projected funding to the program is included. This proposal includes equipment that is essential to the CGA program. A new soil probe will augment the program drilling capacity that currently relies on a nearly 20 year old unit. A borehole camera is proposed. This unit will allow us to see the borehole walls to identify fractures and other hydrologically significant features. It also allows us to inspect the borehole before more expensive geophysical tools are used, and avoid some of the risk of deploying those tools.

Project Budget: County Geologic Atlas Acceleration & Groundwater Monitoring Supplement (Part A)

IV. TOTAL PROJECT REQUEST BUDGET

BUDGET ITEM *(See list of Eligible & Non-Eligible Costs, p. 17)*	**AMOUNT**	**% FTE**
Personnel:	$ -	%
Between 5 and 15 MGS staff will be assigned to this work on a part time basis; the teams will be chosen based on the skill sets necessary for the geology of the selected counties	$ 569,200	%
Contracts:	$ -	
test hole drilling (awarded on a competitive bidding process)	$ 75,000	
printing of the Benton and Chisago Geologic Atlases (printer will be determined by plate size after production and design)	$ 22,000	
Equipment/Tools:	$ -	
truck-mounted Giddings soil probe and accessories	$ 62,000	
borehole video camera	$ 15,000	
repairs to borehole flowmeter (purchased on previous LCCMR grant)	$ 9,000	
supplies and equipment (photocopying well records, maps, augers and other expendable parts for soil probe, drill repairs, sample bags, lab supplies, lab services, scans, plotter supplies, mylar)	$ 13,000	
Other:	$ -	
travel, lodging, food, and vehicle rental costs	$ 55,000	
TOTAL PROJECT BUDGET REQUEST TO LCCMR	$ 820,200	

V. OTHER FUNDS

SOURCE OF FUNDS	**AMOUNT**	**Status**
Remaining $ From Previous Trust Fund Appropriation (if applicable): $196,311 from ML 2007, Chapter 30, Sec. 2, Subdivision 5j, County Geologic Atlas Program Acceleration; $700,000 from M.L. 2008, Chapter 367, Subdivision 4h, South-Central Minnesota Groundwater Monitoring and County Geologic Atlases	$ 896,311	*ongoing atlases in Chisago, Benton, Blue Earth, Nicollet, other counties*
Other Non-State $ Being Leveraged During Project Period: MGS will compete for federal cost share dollars annually. These federal funds cover half of the costs of each map product incurred within a one year window. We intend to try to cost share at least two and possibly as many as 4 of the map products associated with this proposal. Funding might be $80,000 to $160,000 over life of project.	$120,000	*pending*
In-kind Services During Project Period: Each of the participating counties will be asked to establish accurate lcoations for water wells with construction records in the county	approx. $50,000	*pending*
Past Spending: *List money spent or to be spent on this specific project, cash and/or in-kind, for 2-year timeframe prior to July 1, 2009*	$0	

County Geologic Atlas Program Acceleration

Project Manager: Dale R. Setterholm

Qualifications:

Education

MS in Management of Technology, Carlson School of Management
University of Minnesota, Minneapolis, MN, 1999

Capstone Project: *A Project Management System for the Minnesota Geological Survey*

BS in Geology, Institute of Technology, University of Minnesota,
Minneapolis, MN 1979

Professional Experience

Geologist, Minnesota Geological Survey, 1979-2008
Associate Director, Minnesota Geological Survey

Participate in strategic planning, budget development, program administration, project management, personnel administration, purchasing, facilities management, information systems planning, search and hiring procedures, contract development, grants administration, and client relations.

Associate Fellow, University of Minnesota Institute on the Environment

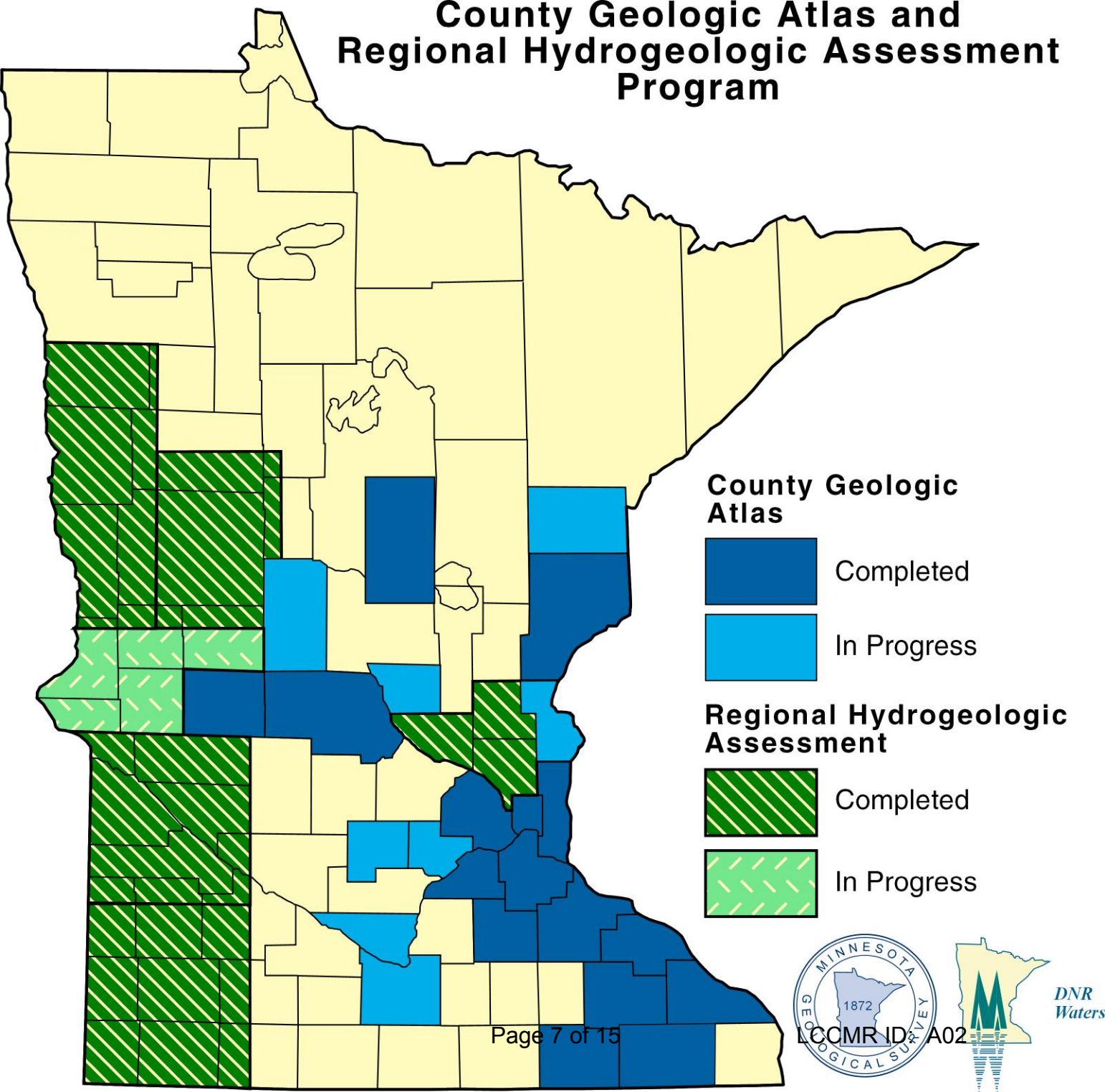
Geologic interests and experience include:

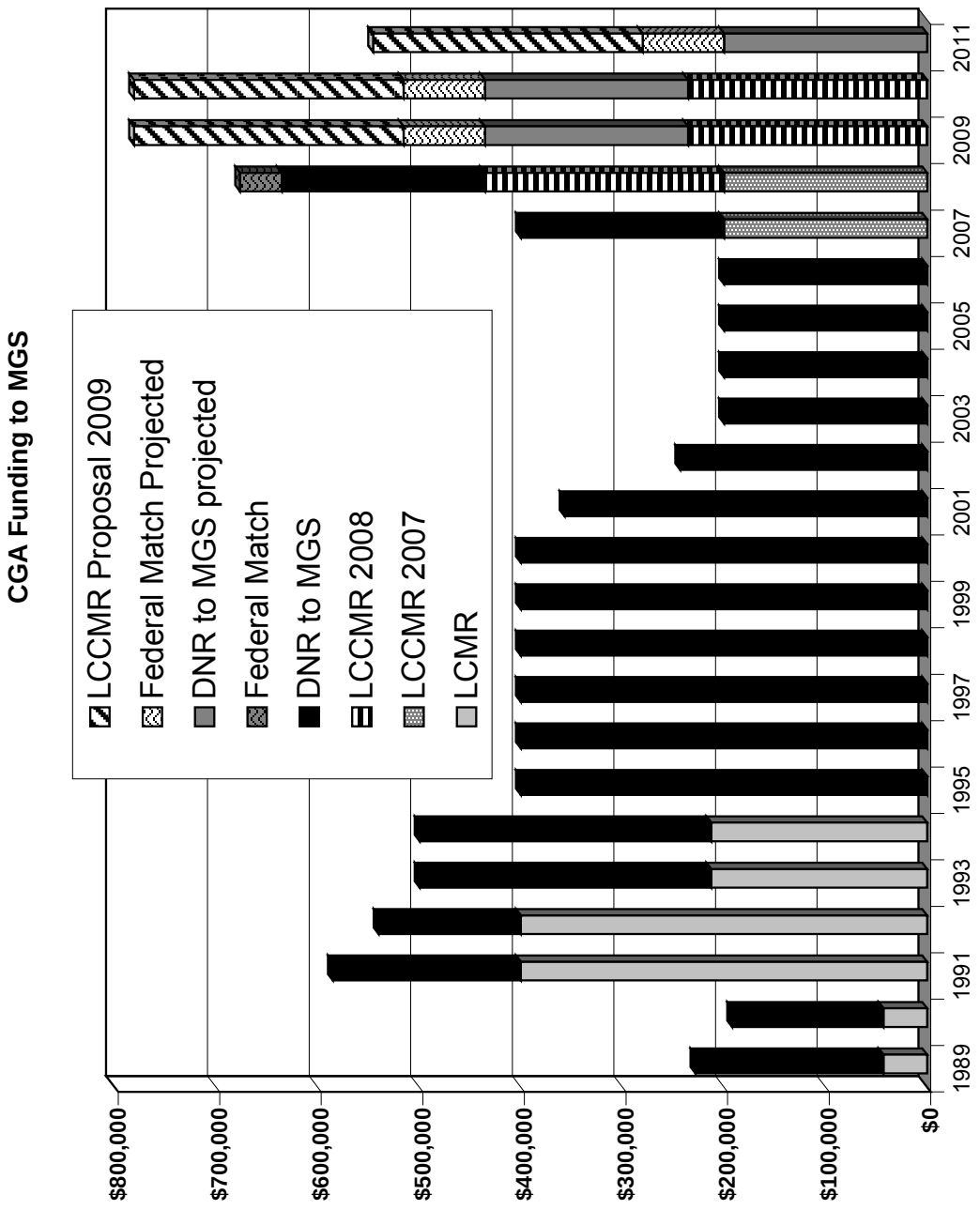
- building subsurface geologic databases and applying them to geologic mapping and water resource management.
- the relationship of geologic settings and ground water sensitivity.
- the influence of geologic settings on water levels and water quality in lake management.

Organization Description:

The Minnesota Geological Survey is the geologic mapping agency for the State of Minnesota, as directed by its enabling legislation. Its goal is to produce comprehensive geologic mapping and related databases statewide at a scale of 1:100,000 or more detailed. This mapping supports informed land use management and decision-making that protects and wisely allocates resources. The MGS is part of the N.H. Winchell School of Earth Sciences in the Institute of Technology at the University of Minnesota. It has existed since 1872 and has a current staff of approximately 25.

County Geologic Atlas and Regional Hydrogeologic Assessment Program




CGA Funding to MGS
LCCMR Proposal 2009
Federal Match Projected
DNR to MGS projected
Federal Match
DNR to MGS
LCCMR 2008
LCCMR 2007
LCMR
$800,000
$700,000
$600,000
$500,000
$400,000
$300,000
$200,000
$100,000
$0
1989
1991
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2007
2009
2011

PART B

Project Title: County Geologic Atlas Acceleration and Groundwater Monitoring Supplement (PART B)
Total Project Budget: $1,875,000
Proposed Project Time Period for the Funding Requested: July 2009 – June 2012
Other Non-State Funds: $0

Project Manager: First Name: Jim Last Name: Berg
Sponsoring Organization: Minnesota Department of Natural Resources (DNR)
Mailing Address: Street Address: 500 Lafayette Road
City: St. Paul State: MN Zip: 55115
Telephone Number: (651) 259-5680
Email: jim.berg@dnr.state.mn.us
Fax: 651-296-0445
Web Address: http://www.dnr.state.mn.us/waters/index.html
Location:

Region:	County Name:	City / Township:
Northeast, Central, Metro, Southwest	Benton, Carlton, Carver, Chisago, Sherburne, Sibley	

I. PROJECT SUMMARY AND RESULTS

To accelerate production of County Geologic Atlases and the installation and testing of Mt. Simon aquifer monitoring wells for groundwater protection and wise use.

PART B (DNR) MAIN PROPOSAL

PROJECT TITLE: County Geologic Atlas Acceleration & Groundwater Monitoring Supplement (Part B)

I. PROJECT STATEMENT

Geologic atlases (Part A – MGS, Part B – DNR, Figure 1) provide information essential to sustainable management of ground water resources. They define aquifer boundaries, the connection of aquifers to the land surface, and the connection of aquifers to surface water resources. They facilitate and enhance the operations of natural resource management and regulation by state and local government units.

The deepest bedrock aquifer of south central Minnesota and the metro area – the Mt. Simon aquifer, supplies all or some of the water needs of over one million Minnesotans (Figure 2). The few water level measurements available from this aquifer in the Mankato and Twin Cities metro area indicate declining water levels in some areas. Critical recharge areas for the Mt. Simon aquifer exist in the northwestern and western metro area and portions of south central Minnesota. The recharge and physical characteristics of the Mt. Simon aquifer along this zone are poorly understood. This recharge zone will be investigated and characterized through monitoring well installations, water level monitoring, groundwater chemical analysis, and aquifer capacity testing to help determine recharge pathways and sustainable limits for this aquifer. This project would be an expansion of the 2008 LCCMR funded project to investigate the Mt. Simon aquifer recharge zone in south central Minnesota (Figure 2)

II. DESCRIPTION OF PROJECT RESULTS

PART A (MGS)

Results 1 and 2 - See the Part A (MGS) main proposal

PART B (DNR)

Result 3: Complete three (3) and initiate two (2) county geologic atlas Part B projects **Budget:** $ 890,000

Deliverable **Completion Date** June 30, 2012

1. Progress on Part B atlas development including ground water sample collection and analysis; geophysics field data collection and analysis; aquifer mapping and technical analysis of ground water systems. Part B atlas report preparation.

2. Printed Carlton, McLeod, and Carver County Geologic Atlases, Part B; provide Part B materials to MGS for DVD version of each, along with geographic information system files, database files, pdfs, and additional digital products. Digital products will be posted on DNR webspace.

Result 4: Monitoring well installation, sampling, laboratory analysis, Aquifer capacity testing and water level measurement **Budget:** $985,000

Monitoring wells will be completed at approximately 10 locations in an expanded region north of the 2008 project area with contracted drilling services hired and coordinated by the DNR. Some funding will also be used to fund well installations in the 2008 project area that otherwise would have been eliminated due to rapidly rising drilling costs (caused by rapidly increasing steel and fuel costs). The additional monitoring wells from this 2009 supplement will be located along the western and northwestern edge of the Mt. Simon aquifer in Sibley, McLeod, Wright, and Sherburne counties. The wells will be

completed in the lowermost bedrock aquifer (Mt. Simon Formation) and shallower aquifers. The wells will be sampled by DNR staff for general chemistry, trace elements, tritium, and Carbon 14 to determine the residence time or age of the groundwater. In addition, DNR staff will instrument the wells with continuous water level recording equipment to track short and long term water level changes. The chemistry and water level information will help determine the sustainable limitations for future use of this aquifer.

Deliverable **Completion Date** June 30, 2011

1. Monitoring well nests (groups of closely spaced wells) at approximately 10 locations.
2. Interpretive report with recommendations, data, maps and other figures.

III. PROJECT STRATEGY AND TIMELINE

See also MGS Main Proposal

A. Project Partners
The Minnesota Geological Survey completes Part A of county geologic atlases (see MGS Main proposal for county atlas continuation). At the completion of the Part A work, DNR Waters Division completes Part B, the hydrogeology section, of the atlases. To initiate a project, the MGS will require that the counties participate either with funding, or with in-kind services. Local participation is a primary factor in determining which counties are chosen for this project. Ground water sensitivity, demand, and the size of the population served are also considerations.

B. Project Impact
A geologic atlas provides counties and others with an assessment of ground water distribution and use, and the means to make decisions that protect and wisely use that resource. The atlases also increase the effectiveness and efficiency of regulatory programs, contaminant remediation, and planning efforts.

C. Time
This proposal builds on past LCCMR proposals and the 25-year CGA program history. This proposal is 3 years in length and includes funding to complete 3 Part B atlases and start 2 additional Part B atlases. The MGS has initiated work on additional Part A atlases that will be completed in the future. Part B atlases will need to be completed for those project in the future.

D. Long-Term Strategy (if applicable)
MGS is the geologic mapping agency of the state and intends to provide comprehensive geologic mapping and associated databases at appropriate scales statewide as quickly as possible. The County Geologic Atlas program is the primary vehicle for completing this goal. Atlases are complete or under construction for 24 of the 87 counties in Minnesota. The MGS receives funding from DNR Waters, and is also leveraged with federal dollars from the National Cooperative Geologic Mapping Program of the United States Geological Survey. MGS competes for these cost share dollars annually and they cover half of the costs of each map product incurred in that one-year window. MGS intends to cost share at least two and possibly as many as 4 of the map products associated with this proposal. A graph of historical and projected funding to the program is included.

DNR Waters has been a cooperator and funding partner with the MGS since the early 1990's. For each Part A atlas completed by the MGS, DNR completes a Part B atlas. The Part B atlases are supported by state general fund appropriations to the DNR.

Project Budget: County Geologic Atlas Acceleration & Groundwater Monitoring Supplement (Part B)

IV. TOTAL PROJECT REQUEST BUDGET

BUDGET ITEM	AMOUNT	% FTE
Personnel		
Hydrogeologist (2 staff), new Part B start (result 3)	$ 446,000	100%
Information Tech. Spec. (GIS) (result 3)	$ 197,000	100%
Information Officer (result 3)	$ 91,000	50%
Contracts		
Printing (result 3)	$ 36,000	
Monitoring well drilling - competitive bid or state contract (result 4)	$ 900,000	
Equipment/Tools		
Water level data loggers and transducers (result 4)	$ 65,000	
Other		
Project staff travel and training (result 3)	$ 15,000	
Water sample analysis (result 3)	$ 105,000	
Water sample analysis (result 4)	$ 20,000	
TOTAL PROJECT BUDGET REQUEST TO LCCMR	$ 1,875,000	

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Remaining $ From Previous Trust Fund Appropriation M.L. 2008: Chapter 367, Subdivision 4h, South-Central Minnesota Groundwater Monitoring and County Geologic Atlases	$ 696,000	*unspent*
- 3 year project hydrogeologist salary	$ 198,000	*encumbered*
Other State $ Being Spent During Project Period: State general fund (result 3)	$ 1,980,000	*secured and pending*
2008 bonding funds	$ 171,450	
Past Spending: State general fund	$ 1,320,000	

Project Manager Qualifications and Organization Description
Project Manager: James A. Berg

Degrees and Professional Certificates:
M.S. Geology, University of Kansas, Lawrence, Kansas 1981
B.A. Geology, Carleton College, Northfield, Minnesota 1977
Minnesota Professional Geologist, License #30501

Qualifications:
1995 to present DNR Waters Hydrogeologist/Geophysicist

Currently managing 2008 LCCMR funded project to research recharge and physical characteristics of the Mt. Simon aquifer in south-central Minnesota through new monitoring well installations, water level monitoring, and ground water sample chemical analysis. Coordinating geologic sample collection and submittal to the Minnesota Geological Survey and other cooperators for stratigraphic, mineralogical, and geochemical interpretation.

Completed 13 regional, county, and area aquifer-mapping projects in Minnesota for water resource assessment and protection purposes. Various combinations of existing well and test hole data, new test hole data, geochemical/geophysical data have been used to complete these projects. The projects include the Southwestern Minnesota Ground Water Exploration Project 1996-1997, funded in part, by the 1995 Minnesota Legislature. This project combined new test hole data from 27 locations in a five county area of southwestern Minnesota to help find new ground water sources for municipalities and rural water systems. Other aquifer mapping projects in western/southwestern Minnesota includes: the Traverse-Grant, Otter Tail, and Upper Minnesota River Basin Regional Hydrogeologic Assessments, a preliminary assessment of Murray County shallow buried aquifers, Geologic Atlases of Pine and Pope Counties, an assessment of the Rock River alluvial aquifer in southwestern Minnesota, and a three-dimensional evaluation of buried sand and gravel aquifers in the Fargo-Moorhead region.

As a DNR geophysicist Jim Berg has acquired, processed and interpreted seismic data (refraction and reflection) for approximately 70 surveys in a variety of geologic settings across Minnesota. Data were used to evaluate bedrock topography, Quaternary stratigraphy, and depth to water table for ground water resource evaluations

Previous employment:
1987 to 1994 Project Manager/Hydrogeologist for various for Twin City environmental consulting firms
1981 to 1986 Exploration Geologist, Champlin Petroleum, Denver, CO

Other relevant qualifications include aquifer pumping test design, implementation, and interpretation; geophysical well log data acquisition and interpretation; geographic information systems (ARCVIEW and ARCGIS) proficiency, and computer modeling of ground water flow (MLAEM and MODFLOW)

Project Responsibilities:
The project manager will be responsible for: contracting drilling and other services, coordinating with project partners, determining test hole locations, coordinating drilling and logging services, coordinating Gopher One utility location requests, and log data interpretation and primary author of final report.

Organization Description:
Minnesota Department of Natural Resources, Division of Waters – state agency.

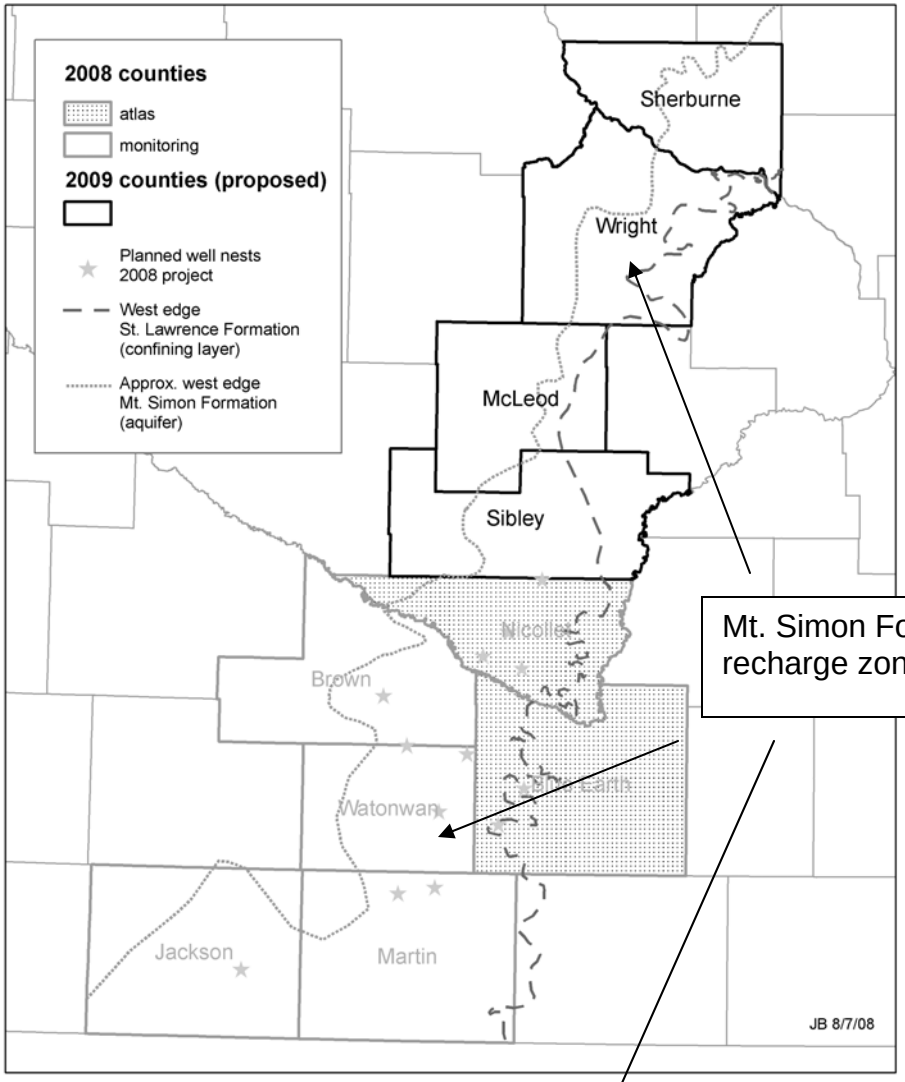
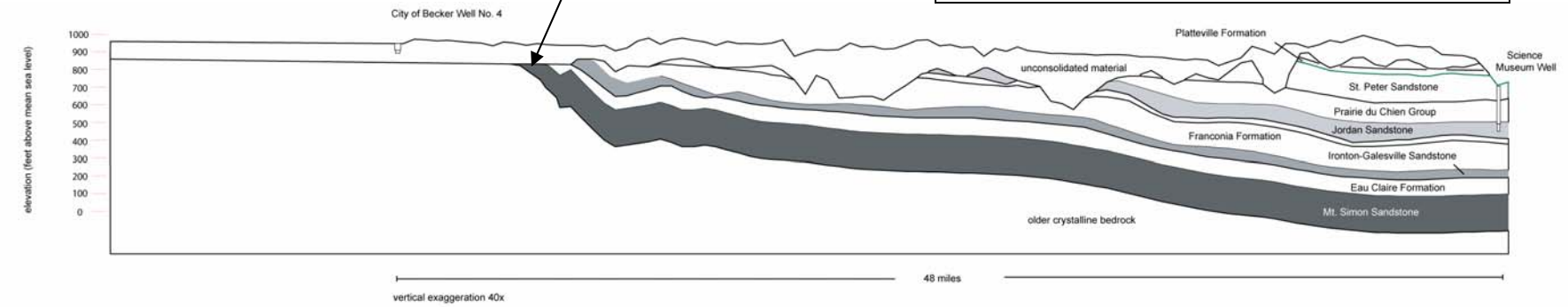


Figure 2

The southern portion of the Mt. Simon recharge area is being investigated with funding from the 2008 LCCMR project. This proposal is for a continuation of this project to the north.

Mt. Simon Formation recharge zone

West edge of Mt. Simon in northwestern metro area showing the truncation of the formation beneath overlying unconsolidated material (sand, gravel, clay or silt). (From Bob Tipping, Minnesota Geological Survey)



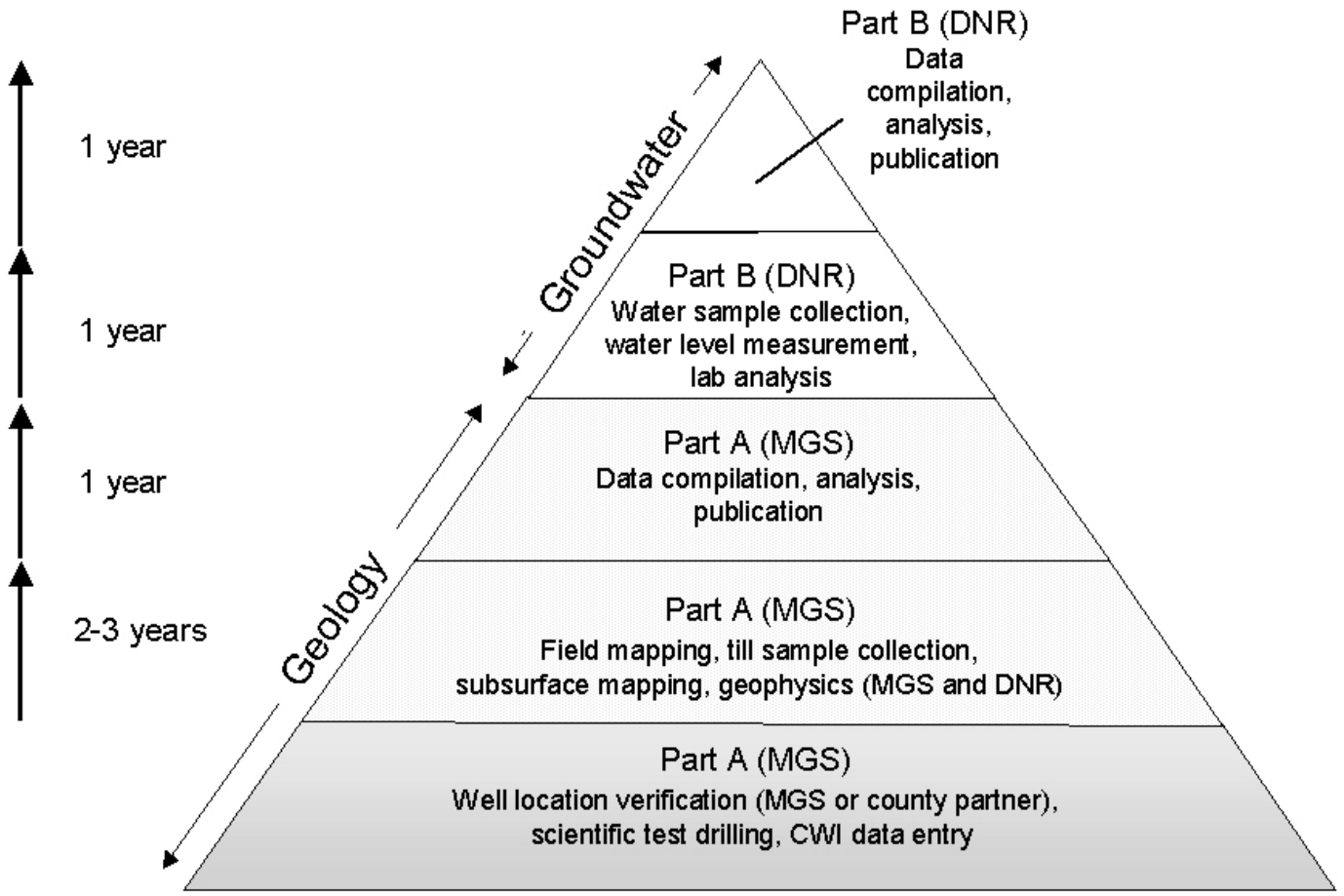


Figure 1

This diagram shows the typical tasks involved in completing both parts a geologic atlas. The tasks within each layer of this pyramid can only be started after the completion of tasks in the underlying layer.