July 1, 1993

LCMR Final Status Report

I. County Geologic Atlas and Groundwater Sensitivity Mapping

Program Managers:

MGS Component
Priscilla C. Grew, Director
Minnesota Geological Survey
2642 University Avenue
St. Paul, MN 55114
612-627-4780

DNR Component
Sarah Tufford, Administrator
Groundwater Unit, Waters Div.
MN Dept. of Natural Resources
500 Lafayette Road
St. Paul, MN 55155
612-297-2431

A. M.L.91 Ch.254 Art.1 Sec. 14 Subd: 4(f) Appropriation: $1,400,000
Balance: $ 00.00

$800,000 is from the Minnesota environment and natural resources trust fund to the University of Minnesota, Minnesota Geological Survey, to expand production of county geologic atlases and create a new atlas services office.

$600,000 is from the Minnesota environment and natural resources trust fund to the commissioner of natural resources for groundwater sensitivity mapping.

B. Compatible Data: During the biennium ending June 30, 1993, the data collected by projects funded under this section that have common value for natural resources planning and management must conform to information architecture as defined in guidelines and standards adopted by the Information Policy Office. In addition, the data must be provided to and integrated with the Minnesota Land Management Information Center's geographic data bases with the integration costs borne by the activity receiving funding under this section.

C. Match - N/A

II. Narrative

The Groundwater Bill of 1989 established the base level funding for the MGS county geologic atlas and associated shallow groundwater sensitivity assessment programs in the DNR-Waters budget base. These coupled programs provide maps at two levels of detail that meet the urgent need for detailed information in some counties and less-detailed, multi-county, mapping where extensive information, on little studied areas, will be needed in the near future. This LCMR appropriation accelerates the ongoing base activity in order to respond to state, regional, and local needs for geotechnical information essential to the wise use and protection of Minnesota's groundwater, pursuant to recommendations of the EQB Water Resources Committee.

The work program provides for acquisition, verification, interpretation, and transfer of geologic and hydrogeologic information at an appropriate scale for planners, resource managers, and educators. In this way, geotechnical information is made readily available so that relevant environmental factors and the sensitivity to pollution can be taken into account when decisions are made about land use and resource management.

County geologic atlases have been completed for 6 of Minnesota's 87 counties, and one regional hydrogeologic assessment is now underway. Vast areas of northern, northwestern, and southwestern Minnesota have a current need for resource assessment. This work program would accelerate the ongoing base activity.

III. Objectives

A. Expand production of county geologic atlases.

A.1. Narrative: The production rate for atlases will be accelerated to achieve full completion of two atlases and partial completion of three more during the biennium.

4f

A.2. Procedures: Staff size and support facilities at MGS will be enlarged to allow an effective doubling of the present atlas production activity. MGS will produce the basic atlas plates (database map, surficial geologic map, bedrock geologic map, bedrock topographic map, hydrogeologic maps, and special plates as appropriate to local needs); MGS and DNR will cooperate on the assessment of groundwater sensitivity.

DNR will provide services to the program that include contract drilling and geophysics, performing and interpreting aquifer tests, hydrogeologic monitoring, and collecting water level data. DNR may involve the USGS through its joint funding agreement in these activities.

We propose that the MGS develop the methodology to work with large, geologically complex counties in which subsurface control is limited or very uneven. Stearns County, a likely candidate for atlas work, is larger and geologically more complex than any county previously mapped. It provides an opportunity to develop research methodologies and compilation techniques appropriate to working in new, more complex areas of the state.

A.3. Budget:

	MGS	DNR
a. Amount budgeted	$340,000	$300,000
b. Balance	$00.00	$ 00.00
c. Amount redirected from Objective D: 6/1/92	+30,000	-0-

A.4. Timeline for Products/Tasks

July 91 Jan 92 July 92 Jan 93 July 93
----------a.b.----------
c.----------
----------d.e.----------

a. Complete Ramsey County Atlas (begun 1990);
b. Begin Sherburne County Atlas;

c. Begin Stearns County Atlas;
d. Complete Rice County Atlas (begun 1990);
e. Begin Fillmore County Atlas

A.5. MGS Status 6/30/93:

12/1/91 Approved revision: Since Atlas is county voluntary program, scheduling must be revised to accommodate county wishes. Rice County start delayed to 4/91. Fillmore County atlas started 7/91 instead of 12/92. Start of Stearns County delayed to 7/92. Preliminary interest from Wright and Mower Counties instead of Sherburne.

6/1/92 Approved revision: Funds redirected from Objective D will be used to meet needs for field verification, computerized data editing, and geological interpretation of expanded water well data bases in Rice, Fillmore and Stearns Counties.

6/30/93: Goodhue County has approved funding for an atlas and will be the next county if state funds permit.

The Ramsey County Geologic Atlas was completed 10/26/92 and delivered to Ramsey County officials. Plates published by MGS included water well database, surface geology, bedrock geology, depth to bedrock, hydrogeology, water well construction and sealing, and groundwater sensitivity to pollution. Geologic maps were presented at a scale of 1:48,000. GIS files for selected plates were also generated and delivered to the county. MGS and DNR began cooperative work on three additional CGAs (Fillmore, Rice, and Stearns Counties) which are in progress.

County interest in the County Geologic Atlas program has increased in the past two years. During the contract period we had expressions of interest in the CGA Program from eight counties; Fillmore, Goodhue, Houston, Mower, Rice, Stearns, Wabasha, and Wright. We are currently working on atlases for Fillmore, Rice, and Stearns. Goodhue County has allocated county cost-share funds for their atlas and wants to begin; Mower County staff have expressed serious interest in an atlas

Pursuant to county and state agency requests, we added to the originally proposed products a Geographical Information System (GIS) database with each CGA. Creating a project GIS involves development of the base layers (County borders, USGS Quadrangle boundaries, township-range-section, roads, and hydrology) and development of thematic layers (water well database, surface geology, bedrock geology, and depth to bedrock).

Fillmore CGA

We have completed two years of the three-year contract for the Fillmore CGA (7/1/91-6/30/94). The project database of water well information is essentially complete, and we have assembled about 70% of the GIS base layers. The information in the project database has been used to construct computerized stack maps that show the 3-D distribution of sand bodies. Preliminary versions of the surficial geology map, Quaternary stratigraphy, bedrock geology, and bedrock topography have been compiled. We completed the rotasonic test drilling in January, 1993, and have begun texture and lithologic analysis of the collected samples. Seven rotasonic and split-spoon test holes were drilled in the county to characterize glacial tills and alluvium. Additional soil probe holes have been drilled to help define the limits of map units.

We have created GIS base layers for the county borders, 7-1/2' USGS quadrangles boundaries, township-range-section, roads. Digitized thematic layers for the water-well locations are 80% complete and the preliminary surficial geology layer is finished.

Rock quarries have been inventoried for the Mineral Resources Plate. Previously unknown iron sulfide occurrences have been discovered and are being investigated. We have determined that these occurrences containing trace amounts of zinc and lead sulfides are an outlier of the Tri-State Pb/Zn mineral district.

Rice CGA

We have completed two years of the three-year contract for the Rice CGA (7/1/91-6/30/94). The project database of water well information is about 77%

assembled, and about 80% of the GIS base map layers have been completed. The information in the project database has been used to construct computer stack maps that show the 3-D distribution of sand bodies. We have created GIS/GRS base layers for county borders, 7-1/2' USGS quadrangles boundaries, township-range-section, and roads. Preliminary versions of the surficial geology, Quaternary stratigraphy, bedrock geology, and bedrock topography maps have been compiled. Existing soil map units have been classified, according to surficial materials, and compiled. A preliminary geomorphic map of the County has been drawn. It is based on the interpretation of topographic maps and aerial photography. Work on Quaternary stratigraphy included test drilling and sample analysis of existing cuttings. Three rotasonic boreholes have been drilled to bedrock to characterize the glacial sediment. The resulting core is being described and sampled.

Stearns CGA

Work on the Stearns CGA is one year into the three-year contract period. The water-well database is about 90% completed. Base-map layers for the GIS are about 70% completed. Preliminary work has begun on the surface geology and bedrock geology maps. Summer 1993 will be the first season for our field work on the geologic maps. Stearns County is a large, geologically complex county. Therefore, geologic maps will be presented at two scales; a detailed scale (1:100,000) in heavily populated areas and an intermediate scale (1:200,000) in rural areas.

A.5. DNR Status 6/30/93:

Both the CGA and RHA projects are fully staffed, including a GIS specialist. Laboratory contracts are in place for both general and isotope chemistry. Preliminary sensitivity evaluations are provided to counties on request using available data. Currently, 14 preliminary sensitivity evaluations are completed with 4 additional evaluations requested. Provided technical assistance to local governments for acquisition of GIS data, its use and interpretation and technical assistance and review of local pollution sensitivity mapping initiatives. Local cooperators participated in workshops reviewing project status and transfer of information. Tours of field sites were arranged by project

staff. An all-day information meeting was held for Stearns County staff at the start of the project.

Ramsey CGA

DNR staff digitized the surficial pollution sensitivity coverage for the Ramsey CGA; all thematic layers, in addition to the base layers, are now available digitally and can be viewed and analyzed using ARCVIEW.

Rice CGA

In second year of two year hydrogeologic study. Field data collection is 90% completed. Chemistry sampling is coordinated with Rice County and the Pollution Control Agency. Data analysis and development of GIS database and thematic display layers will be completed next fiscal year. Analysis models utilizing GIS will be applied and evaluated, in particular models for assessing pollution sensitivity. Composition, printing, and distribution of selected materials from the GIS database will be completed by the end of FY 94. Complete GIS digital data will be filed with LMIC for future distribution, maintenance and archiving.

Fillmore CGA

Also in second year of two year hydrogeologic study. Field data collection is 95% completed. Concurrent contract with University of Minnesota, Geology and Geophysics Department for extensive chemistry and isotope sampling, dye tracing for the purpose of identifying ground water basins, and analysis of sinkhole fields in the county. Data collection under this contract 75% complete and will be completed early FY 94. Significant previous dye tracing results and detailed sinkhole mapping efforts have been added to the hydrogeology database for the county. Preliminary hydrogeology data analysis is available with final analysis and modeling to be completed next fiscal year. Development of GIS database and thematic display layers will be completed next fiscal year. Analysis models utilizing GIS will be applied and evaluated, in particular models for assessing pollution sensitivity. Composition, printing, and distribution of selected materials from the GIS database will be completed

by the end of FY 94. Complete GIS digital data will be filed with LMIC for future distribution, maintenance and archiving.

Stearns CGA

Beginning first year of approximately two-year hydrogeologic study. Utilizing the well database assembled and verified by the MGS, DNR staff will collect ground water level and chemistry data throughout the county. During the second year, the GIS database will be developed and applied to analysis of flow systems, ground water chemistry and modeling of pollution sensitivity.

A.6. Benefits: Acceleration of the atlas program into new geologic areas will develop the methodology for handling large, complex counties. Geotechnical information will be readily accessible at the local level for planning and resource decision making. County staff will be trained in the acquisition and use of geotechnical data. The maps and interpretations become instructional aids for environmental and resource education.

B. Expand regional sensitivity mapping (multi-county, intermediate scale mapping).

B.1. Narrative: MGS will complete the Anoka Sand Plain regional hydrogeologic assessment begun in 1989, and complete two additional regional hydrogeologic assessments. Collaboration with the DNR will enhance regional analysis of hydrogeology and sensitivity mapping.

B.2. Procedure: MGS will complete the Anoka Sand Plain regional hydrogeologic assessment, develop a prioritized list of candidate areas for regional hydrogeologic assessment projects, and begin work on two candidate areas accorded highest priority.

Two possibilities are a southwestern regional hydrogeologic assessment (Rock, Nobles, Pipestone, Murray, Lincoln, Lyon Counties) ~~and a regional hydrogeologic assessment for the Iron Range (portions of Itasca and St. Louis Counties)~~ and Red River Valley Assessment (Clay, Wilkin, part of Traverse, Grant, Otter Tail, Becker, and Norman.

Regional hydrogeologic assessments cover areas equivalent to 3 to 6 southern Minnesota counties at a less detailed scale than county atlases. Typically the effort is directed toward rapid regional evaluation of the uppermost 150 feet of the geologic section. Such evaluation is made from surficial geologic mapping, water well logs, and supplemental shallow drilling where required.

B.3. Budget:

	MGS	DNR
a. Amount budgeted	$150,000	$300,000
b. Balance	$ 00.00	$ 00.00
c. Amount redirected from Objective D: 6/1/92	+30,000	-0-

B.4. Timeline for Products/Tasks

July 91 Jan 92 July 92 Jan 93 July 93
----------a.c.----------
b.----------b.

a. Complete Anoka Sand Plain Regional Hydrogeologic Assessment;
b. Complete Southwest Counties Regional Hydrogeologic Assessment;
~~c. Begin Iron Range Regional Assessment~~
c. Begin Red River Regional Hydrogeologic Assessment. Complete Southwest Assessment 6/94; complete Red River Hydrogeologic Assessment 6/94

B.5. MGS Status 6/30/93:

The Regional Hydrogeologic Assessment (RHA) for the Anoka Sand Plain was completed and work was started on two additional RHAs (Red River Valley and Southwest Minnesota) during the contract period (7/1/91-6/30/93).

Local, county, state, and federal interest in RHAs has increased in the past two years. RHAs provide geologic interpretations and maps of surface geology and glacial stratigraphy that are necessary to address problems involving

groundwater management. In sparsely populated parts of the state the RHAs can provide this information economically. In order to provide reliable geologic information the MGS and DNR have entered cooperative working relationships with the City of Moorhead and two USGS-water resources division projects in the Red River Valley. In southwestern Minnesota, findings from the RHA and the Southwest Greenstone Project (MGS) have interested the DNR and USGS-Water Resources Division in an aquifer evaluation project.

The RHAs also involve the creation of a GIS for the management and presentation of spacial data. The tasks involved in creating the GIS include development of base layers and thematic layers.

The Anoka Sand Plain Regional Hydrogeologic Assessment was completed and GIS files were delivered to DNR-Waters for presentation processing on September 3, 1992. The Anoka Sand Plain RHA includes Anoka, Chisago, Isanti, and Sherburne Counties. GIS base layers and GIS thematic layers for water well database, surface geology, surface hydrology, and groundwater sensitivity to pollution are included in the Anoka Sand Plain RHA.

Red River Valley Regional Hydrogeologic Assessment

We have completed two years (66%) of the three-year contract for the Red River Valley (7/1/91-6/30/94). Our base layers for the GIS are about 70% completed, and geologic maps are being field checked for final compilation. The information in the project database has been used to construct computer stack maps that show the 3-D distribution of sand bodies. We have created GIS base layers for county borders, 7-1/2' USGS quadrangles boundaries, and township-range-section. We are still working on base layers for roads and hydrology. The thematic layer for the water-well locations is complete. A surficial geologic map based on interpretations of aerial photography has been drawn and field checked. Existing soil maps have been classified according to surficial materials for the Lake Agassiz basin. Holocene/Pleistocene stratigraphy of Lake Agassiz sediment has been compiled from the penetration rates described in bridge borings. A map and cross sections showing an interpretation of the glacial stratigraphy have been drawn using pre-existing

and project generated sample data. A map of the bedrock surface has been drawn using CWI water well data and 1992 seismic data. Samples obtained from about 100 shallow test holes drilled in 1992 have been analyzed for texture and coarse-sand lithology. Three deep rotasonic test holes were drilled and logged during October, November, and December, 1992. The cores obtained were described and sampled during January, 1993, and the samples collected have been analyzed for texture and coarse-sand lithology. The results of all analyses have been entered into the project database and incorporated into the current stratigraphic interpretations.

Southwestern Regional Hydrogeologic Assessment

We have completed two years of the three-year contract for the Southwestern Minnesota RHA (7/1/91-6/30/94). We have completed the project database of water well information, and have assembled about 70% of the GIS. The information in the project database has been used to construct computer stack maps that show the 3-D distribution of sand bodies. We have created GIS base layers for county borders, 7-1/2' USGS quadrangles boundaries, and township-range-section. We are still working on base layers for roads and hydrology. The thematic layer for the water-well locations is complete. Field observation locations have been digitized and an attribute table of relevant data will be linked to each point. We have compiled preliminary versions of the surficial geology map and Quaternary stratigraphy plate. Three deep rotasonic test holes were drilled January 1993. Description and sampling of the recovered core are in progress. About 220 shallow stratigraphic test holes were drilled with the soil probe. These shallow borings will help refine map-unit boundaries on the surficial geologic map. Analyses of the collected samples will help refine Quaternary stratigraphy.

B.5 DNR Status 6/30/93:

Anoka Sand Plain Regional Hydrogeologic Assessment

Digital thematic and base layers were provided by the MGS. DNR staff have completed layout and printing of three plates incorporating four digital maps plus explanatory text. New production technology was successfully applied,

reducing printing setup costs significantly. Distribution of printed materials will be completed early FY 94. Digital files are provided to local governments and public agencies on request. In FY 94, the complete GIS database and related digital files will be placed with LMIC for future distribution, maintenance and archiving.

Red River Valley Regional Hydrogeologic Assessment

Completed first year of two year effort. Basic data collection is on schedule and 60% complete. Additional water levels and ground water chemistry samples will be collected the first half of FY 94. Local coordination and cooperation has been excellent, greatly enhancing DNR data collection ability. A voluntary contribution of $6,000 from local government in the project area will allow additional water chemistry analyses. Ground water flow system and chemical evolution analysis and modeling will be completed next fiscal year. The GIS database will be compiled and thematic layers developed. Selected materials from the database and thematic layers will be distributed in printed map format. The complete GIS database and related digital files will be provided to local governments and also placed with LMIC for future distribution, maintenance and archiving.

Southwest Regional Hydrogeologic Assessment

Start on this assessment was delayed by late filling of staff position. Currently in first year of field data gathering efforts with 20% complete. Additional ground water levels and the ground water chemistry sampling will be completed FY 94. Ground water flow, chemistry, and pollution sensitivity analysis and modeling will be completed late FY 94.

B.6. Benefits: Regional hydrogeologic assessments are designed to identify critical sensitivity areas quickly. The data then are available to local-level decision makers who may find them completely adequate for managing and planning, or who may wish to proceed with further studies at a more detailed scale. The products generated are a computerized subsurface database, a map of surficial geology, and an analysis of hydrogeology and geologic sensitivity. Regional hydrogeologic assessments provide the

foundation for future, more detailed, county atlases, if future atlas studies should eventually be needed.

C. Create new MGS Atlas Service Office.

C.1. Narrative: The office will provide technical advisory services to counties who are using completed atlases or assessments, and those planning future studies that would use geotechnical information and expertise available through the MGS. The office will also provide expertise and assistance in continuing to update and improve local groundwater databases.

C.2. Procedures: MGS will hire hydrogeologists, geologists, and student assistants who are familiar with computerized data use. The staff will provide assistance and interpretive services to counties and regional groups through telephone calls, on-site visits, demonstrations, support for digitized hydrogeologic databases, and workshops designed to aid in the use and up-dating of atlases. The office staff will monitor contact hours, the rate of public inquiry, and topics of inquiry to provide MGS with feedback for future improvement of atlas program.

C.3. Budget:

	MGS	DNR
a. Amount budgeted	$250,000	-0-
b. Balance	$00.00	-0-

C.4. Timeline for Products/Tasks

July 91 Jan 92 July 92 Jan 93 July 93

a.

b.----------

c.----------

a. ~~Hire personnel~~; Hiring delayed due to veto. 12/1/91
6/1/92 New positions posted at University personnel office.

b. Provide assistance to counties and regional groups.

c. On-site visits, demonstrations, and workshops.

C.5. Status 6/30/93:

The MGS/ASO has been instrumental in providing geologic and hydrogeologic information and interpretations to the public and to local and county governments. The office trains county personnel in the use of County Well Index, a computerized water well data base originally funded in the previous biennium as recommended by LCMR.

MGS/ASO has provided water related information to the public in response to 4,000 requests and has received 78 local water plans for counties.

MGS/ASO sponsored workshops at Winona State University, Mankato State University, Carleton College, and Southwest State University; training 68 county staff in the use of CWI and has distributed the CWI to county staff or the SWCDs in 55 counties.

MGS/ASO helped health services agencies from Rock and Nobles Counties to match located water wells with water quality, and assisted in relating groundwater quality to geologic factors.

MGS/ASO staff demonstrated the use of CWI in locating and documenting abandoned wells to 50 county staff at 3 regional workshops held by BWSR on water plan implementation.

MGS/ASO reviewed ratings assigned by DNR to soil types for Level 1 groundwater sensitivity assessments of 10 counties.

Carver County requested that MGS assist in the geological interpretation of water wells in the county because old geologic maps and information were inadequate for local water planning. MGS found that stratigraphic variability in Carver County requires a new geologic analysis. As an MGS/ASO project, MGS agreed to prepare a new bedrock geologic map for resolution of well interpretation problems faced by the county. Carver County will provide a $3,000 cost-share for this activity.

At the request of Mower County, MGS/ASO provided geologic interpretative services for 14 water wells.

C.6. Benefits: The Atlas Service Office will interpret hydrogeologic and geologic information for the public and provide counties and regional multi-county groups with technical assistance that will maximize use of published atlases. Services provided by the Atlas Service Office will permit

the atlas staff to concentration meeting mapping deadlines, and work with county personnel on atlases that are in progress.

D. Rent office space and laboratory space to house new MGS staff needed for objectives A. B. and C. 12/1/91 No space rented yet due to veto. 6/1/92 University assigned MGS additional space in University-owned building.

D.1. Narrative: Work space is not available in the Institute of Technology, so the University of Minnesota requires MGS to request funds to house the additional staff requested in this proposal.

D.2. Procedures: Work space will be rented during early ~~September 1991~~, July 1992, (12/1/91) and will be required for the duration of the program.

D.3. Budget:

		MGS	DNR
a. Amount budgeted		$60,000	-0-
b. Balance		$60,000	-0-
c. Amount redirected to Objectives A&B:	6/1/92	-60,000	-0-

D.4. Timeline for Products/Tasks

July 91	Jan 92	July 92	Jan 93	July 93
a.		|a.		|

a. Rent work space. 6/1/92 Redirect funds to Objectives A and B.

D.5. Status 6/30/93:

Associate VP for Academic Affairs has assigned additional space to MGS in University-owned building. Original budget allocation for Objective D transferred equally to Objectives A and B to meet priority needs in areas of GIS and water well data base.

D.6. Benefits: Provides office space not available in the Institute of Technology to house the additional staff required for the atlas program expansion.

6/1/92. Due to University layoffs in other units, additional University-owned space has been assigned by the University to MGS.

IV. Evaluation:

In the short term the program can be evaluated by its ability to reach the interim goals indicated on the timelines.
In the long term the program can be evaluated by how well geologic and hydrogeologic information is disseminated to, and used by resource planners and decision makers at the state, regional, and local levels.

V. Context

A. The first six atlases (Scott, Winona, Olmsted, Hennepin, Washington, and Dakota Counties) cover counties with 35 percent of the state's population, but only 4 percent of the state's land area. Addressing future land- and water-use questions will require sound geotechnical information in much of the remaining 96 percent of the state's land area.

B. The Groundwater Act of 1989 established the base level funding for the MGS county geologic atlas and associated shallow groundwater sensitivity assessment programs in the DNR-Waters budget base. The Environmental and Natural Resource Trust appropriation of $1,400,000 supplements this ongoing base activity, and allows MGS and DNR to respond to state, regional, county, and local needs for accelerated production of geologic and hydrogeologic information essential to the wise use of Minnesota's natural resources.

State environmental agencies and local water planning joint powers organizations also need geologic and hydrogeologic information. An advisory group will be established to develop a list of standard atlas components and candidate counties. This group will also determine the work schedule for regional hydrogeologic assessments.

MGS will continue to be the lead agency on geologic mapping (surficial glacial deposits and bedrock geology), database acquisition (MGS water well database), and other atlas products requested by counties (such as mineral resources maps). MGS will continue to produce the atlas plate for well construction recommendations in cooperation with the Department of Health. DNR will assume lead agency responsibility for hydrogeologic interpretation and mapping of sensitivity of groundwater to pollution, and will ensure that sensitivity mapping complies with state guidelines.

DNR will enhance the hydrogeologic component by added geophysics, contracted drilling, and involvement of the U.S. Geological Survey under an existing cooperative agreement.

C. LCMR funded the first county geologic atlas (Scott County, published in 1982). Since then five additional county geologic atlases have been completed. The last two counties were funded jointly by the 1989 Groundwater Bill (funds contracted from DNR to MGS) and the counties involved.

Historically, the atlas program has been county driven, and counties have determined their own research and data needs. This proposal assumes continuation of voluntary participation by the counties. The historical county cost share ($90,000 per county) is assumed, and these county contract funds will continue to go to MGS as in the base program.

D. Previous related Biennial Budget System program titles and amounts for FY 90-91 are funded through Department of Natural Resources, Waters Division:

M.L. 89 Ch 326, Sec.1, Subd.6, Art.10, Item a. and b.

a. Title: County Geologic Atlas Development
Contract Amount from DNR to MGS: $356,000

b. Title: Regional Groundwater Assessment
Contract Amount from DNR to MGS: $350,000

E. FY 92-93 Biennial Budget: Department of Natural Resources, Waters Division contracts to MGS:

a. Title: County Geologic Atlas Development
DNR Contract Amount to MGS: $342,000 (FY 91 was $171,000)

b. Title: Regional Groundwater Assessment
DNR Contract Amount to MGS: $300,000 (FY 91 was $150,000)

In this work program, we are assuming both the continuation of the DNR FY 91 base level funding (contracted each biennium from DNR to MGS), and the county, cost-shared contribution ($90,000 per atlas that is contracted, by the counties, to the MGS). If the base were to be reduced, a corresponding revised work plan would be necessary.

VI. Qualifications

1. Program Managers:

MGS Component
Dr. Priscilla C. Grew, Director
Minnesota Geological Survey
2642 University Avenue
St. Paul, MN 55114
612-627-4780

DNR Component
Ms. Sarah Tufford, Administrator
Groundwater Unit, Waters Div.
MN Dept. of Natural Resources
500 Lafayette Road
St. Paul, MN 55155
612-297-2431

2. Cooperators/other investigators:

A) Dr. Kenneth L. Harris, Geologist
County Geologic Atlas Program, Supervisor
Minnesota Geological Survey
2642 University Avenue
St. Paul, MN 55114
612-627-4780

M.S. Geology, University of North Dakota, 1973
Ph.D. Geology, University of North Dakota, 1975

Dr. Harris' graduate work involved mapping and developing a model of the stratigraphy of the Quaternary sediments of a large area in northwestern Minnesota. He worked for the North Dakota Geological Survey from 1977 to 1989 as a Pleistocene Geologist.

There his duties included developing and implementing an atlas mapping program which continues to be an active surficial mapping program in North Dakota.

B) Dr. Howard Hobbs, Geologist
County Geologic Atlas Program, Project Geologist
Minnesota Geological Survey
2642 University Avenue
St. Paul, MN 55114
612-627-4780

M.S. Geology, University of North Dakota, 1973
Ph.D. Geology, University of North Dakota, 1975

Dr. Hobbs' graduate work involved investigating the mineralogy of glacial sediment in northwestern Minnesota and developing a model of the Quaternary stratigraphy for a large area in northeastern North Dakota. He has worked for the Minnesota Geological Survey for the past twelve years as a Pleistocene Geologist. In that capacity he has mapped in all parts of the State at various map scales.

C) Mr. Gary Meyer, Geologist
County Geologic Atlas Program, Project Geologist
Regional Assessment Program, Project Geology
Minnesota Geological Survey
2642 University Avenue
St. Paul, MN 55114
612-627-4780

M.S. Geology, University of North Dakota, 1979

Mr. Meyer's graduate work involved environmental geology in west-central North Dakota. He has worked for the Minnesota Geological Survey for the past eleven years as a Pleistocene Geologist, where he has mapped in all parts of the State at various map scales.

D) Dr. John Mossler, Geologist
County Geologic Atlas Program, Geologist/Stratigrapher
Minnesota Geological Survey
2642 University Avenue
St. Paul, MN 55114
612-627-4780

M.S. Geology, University of Iowa, 1964
Ph.D. Geology, University of Iowa, 1970

Dr. Mossler's graduate work involved petrology and stratigraphy of Paleozoic bedrock units in Iowa. He has worked for the Minnesota Geological Survey for the past 15 years as a geologist/stratigrapher, where he has mapped the bedrock stratigraphy in all parts of the State at various map scales.

VI. Reporting Requirements

A unified status report on the entire atlas/sensitivity mapping program (including LCMR, base DNR, and county-funded components) will be produced by MGS and DNR and submitted to all funding agencies. Semiannual status reports will be submitted not later than Jan. 1, 1992; July 1, 1992; Jan. 1, 1993; and a final status report by June 30, 1993.

1991 RESEARCH PROJECT ABSTRACT
FOR THE PERIOD ENDING JUNE 30, 1993
This project was supported by the Environment and Natural Resources Trust Fund

TITLE: County Geologic Atlas and Ground Water Sensitivity Mapping

PROGRAM MANAGER:

MGS Component
Priscilla C. Grew, Director
Minnesota Geological Survey
2642 University Avenue
St. Paul, MN 55114
612-627-4780

DNR Component
Sarah Tufford, Administrator
Ground Water, Water Info. Systems & Climatology
Section, Waters Division
MN Department of Natural Resources
500 Lafayette Road
St. Paul, MN 55155
612-297-2431

LEGAL CITATION: M.L.91 Ch.254 Art.1 Sec. 14 Subd: 4(f)
APPROP. AMOUNT: $1,400,000

STATEMENT OF OBJECTIVES:

To accelerate production of County Geologic Atlases (CGA) and Regional Hydrogeologic Assessments (RHA). RHA's are multi-county, intermediate scale mapping projects that focus on the upper 150 feet in the subsurface; a major component is the sensitivity to pollution assessment. CGA's are single county studies in which the county participates financially. The results are geared to the needs of the county for geologic and interpretive information.

The MGS develops the well log database and compiles bedrock and surficial geologic maps. Water well construction and mineral resources maps may be included if requested by the participating county. The DNR collects water samples for analysis and measures water levels which, in combination with the geologic information from the MGS, enables the preparation of interpretive maps describing the hydrogeology and ground water sensitivity to pollution.

RESULTS

The Ramsey County CGA was published and delivered to county officials. Work is in progress on Rice, Fillmore, and Stearns CGA's. The Anoka Sand Plain RHA was completed covering Anoka, Chisago, Sherburne, and Isanti Counties. Work is in progress on the Red River and Southwestern RHA's.

PROJECT USE AND DISSEMINATION

Public presentations and workshops have been held in each project area. These are designed to inform interested parties and to solicit local input. The digital database of well logs is furnished to each county participating in a CGA and to all counties within a RHA. Assistance in using and maintaining the database is provided to county staff. As each project is completed the printed maps and geographic information system (GIS) database are furnished to each county involved. The printed reports are distributed to interested parties in the project area.

The products of these studies are used by local interests for siting facilities such as landfills or highways and for protecting areas of special concern such as community well fields.