Minnesota Geological Survey NEWSLETTER

VOLUME 2, NUMBER 1 SPRING 1986

MINNESOTA GEOLOGICAL SURVEY, UNIVERSITY OF MINNESOTA
2642 UNIVERSITY AVENUE, SAINT PAUL, MINNESOTA 55114-1057, (612) 373-3372

DIRECTOR'S FAREWELL

By law, professors at the University of Minnesota retire at the end of the academic year in which they attain the age of three score and ten. For me, this turning point is now. A new director will be in charge of the Minnesota Geological Survey on July 1, 1986. A search committee was appointed from both within and outside the University. The post was nationally advertised, a large number of applicants were screened, and a half dozen were interviewed. As I write this, the process is not quite complete.

If I had to say, in a single phrase, what the Survey has accomplished during the past 13 years, I would say that we have crossed the frontier into subsurface geology. Before I came here I was told that glacial drift was a serious obstacle to geologic investigations in Minnesota, and having worked in northern New York, New England, and Alaska, I felt I had the terms of reference with which to appreciate this problem. Frankly, I was shocked. The almost unbroken panoply of drift spread across Minnesota seemed overwhelming. Even the complex, multilayered glacial drift itself could be only partly known from surface investigations. I was filled with admiration for what my predecessors had been able to accomplish with the means available to them, and at the same time challenged to break this constraint on further progress in Minnesota geology.

Thirteen years ago the investigations of the Survey were primarily field mapping, constrained by available rock exposures. Our implements were chiefly the geologic hammer and the Brunton compass, and our missions as well as our funding were correspondingly limited. Reconnaissance-scale aeromagnetic and gravity maps, published in 1970, provided only a broad structural framework. Our holdings of drillers' logs and samples comprised a few hundred holes.

Since then we have collected and reviewed several hundred thousand drillers' logs and established a computerized data base with procedures for acquiring more logs as new holes are drilled. Our high-resolution aeromagnetic mapping program is adding immeasurably to knowledge of Minnesota geology, and as Dr. Robert W. Hamilton, Chief Geologist of the U.S. Geological Survey wrote me recently, it "... has set new standards for such regional surveys, and the spectacular products you have produced will help us greatly in our efforts to establish a new national airborne geophysical program."

We have begun to carry out our own geologic test drilling at critical locations. Already, having drilled less than a hundred shallow holes through the drift and into bedrock, we are re-drafting the geologic map of Minnesota with intriguing implications for the discovery and diversification of mineral resources.

The subsurface data base has enabled us to meet many practical needs, such as water resources, land use, and waste control, and we are frequently called on by state and local agencies. We work closely with the DNR in investigations of state lands and mineral resources. As we begin to peel back the drift that blankets the state, we are stimulating renewed interest in mineral exploration by private venture capital.

None of this would have been possible without an outstanding and dedicated staff, and also without generous support from state and federal agencies, above all the Legislative Commission on Minnesota Resources (LCMR). This remarkable arm of the Legislature is, to my knowledge, not matched in any other state. Bi-partisan and bi-cameral, it is charged with allocating and supervising many millions of dollars dedicated to the development and protection of state resources. It does so with wisdom and imagination. The water-well data base, the investigation of aquifers and karst drainage in southeastern Minnesota, the aeromagnetic survey, and the limited but critical drilling capability that we now have, all stem from LCMR. In the photograph is a bronze plaque given to me by LCMR as an expression of appreciation for our services. I was deeply moved, but it is the deeds of LCMR that Minnesota should inscribe in bronze.

To cross the frontier into 50 or 60 thousand square miles of unexplored geology is a great adventure, no less so if it is geology a few hundred feet below the familiar prairies and woodlands of Minnesota. Logging drill holes and number-crunching geophysical data may not be as exhilarating as paddling off into the wilderness with hammer and compass, but our shaded-relief images of variation in magnetic intensity are as challenging to the scientific imagination as the mountains of the moon, and the excitement of discovery is there as each input of new data falls into place and the story of the earth's crust in Minnesota unfolds. It has been a great privilege to have had a hand in the adventure, and even though I am about to quit paddling, I still intend to go along for the ride. I will retain an office in the Survey as Professor Emeritus, with hope that I can offer a useful perspective as the scene unfolds.

One such perspective, which I would like to offer in closing, is my concept of the mission of the Minnesota Geological Survey. First and above all, it is a scientific organization dedicated to investigating the geology of Minnesota. It also serves practical needs and demands, but to neglect its primary goal would in the long run destroy the power of the Survey to respond creatively to practical needs. The Survey's status as part of the School of Earth Sciences is basic to its mission. The Survey benefits from the scientific resources in the University, and the public benefits from having these resources applied to the needs of the state. Students and faculty benefit from participation in Survey-funded research and its practical applications.

The Survey should be spending about a million dollars a year on geophysics and drilling, more in the years ahead (about 70 percent of such funds simply pass through to drilling and geophysics contractors). As the aeromagnetic map nears completion, a shift in emphasis to other geophysical techniques and drilling will need to be phased in. How to fund the needs of modern subsurface geologic research is to me the most pressing problem that I leave to my successor. Its successful resolution is the key to our continued advance into the hidden geology and unexplored resources of Minnesota.

Bon voyage!

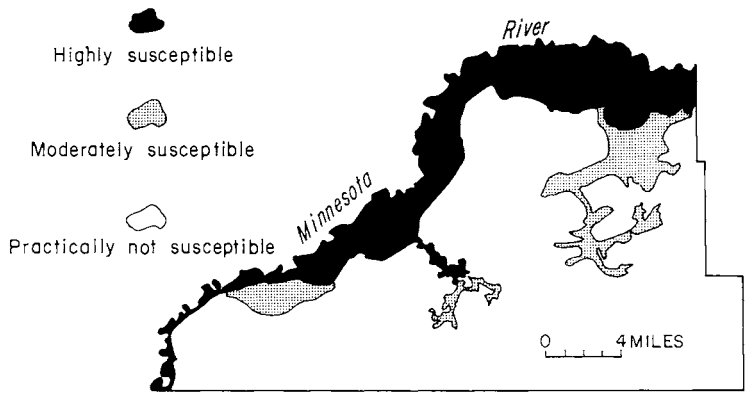
Matt Walton

COUNTY GEOLOGIC ATLASES

Many planning and management decisions affecting land and water resources are made at the county and township level. Issues such as ground-water availability, ground-water contamination, mineral resource potential, and waste-disposal siting require a sound understanding of local geologic and hydrologic conditions. However, local decision makers frequently do not have sufficient geologic and hydrologic information in understandable form to aid them. MGS has begun a county geologic atlas program to meet these data needs.

A geologic atlas consists of three basic parts: (1) county data bases of site-specific information which are easily accessed and interactive with state agency information systems; (2) county maps at 1:100,000 scale (1 inch equals about 1.5 miles) which describe basic geologic and ground-water conditions; and (3) interpretive maps which apply these basic conditions to local problems, such as aquifer susceptibility to contamination or an inventory of potential geologic resources. As new water and land management issues arise, additional interpretive maps or reports can be prepared with minimal or no additional geologic investigation because site-specific information and basic geologic mapping already will be available.

The diagram is an example of a map showing pollution-susceptibility of ground-water resources. It was prepared by combining information from maps of the glacial geology, depth to bedrock, bedrock geology, and the directions of ground-water movement. This map was published in a local newspaper, and residents responded by testing their well water for nitrate and bacterial contamination. The results of this testing confirmed the accuracy of the map, and it is now used as a planning document for well construction and land use. Geologic atlases are also very useful to state agency programs that manage natural resources. The basic geologic and hydrologic maps of a county will provide hydrologists with a level of understanding for ground-water resources that is not possible without the atlas and will enable regulatory programs to better manage water appropriations and to control contamination. Also, the basic geologic mapping contained in an atlas is critical for evaluating mineral and aggregate resource potential.



Susceptibility of bedrock aquifers in Scott County to pollution. Highly susceptible are areas where fractured bedrock is thinly covered by granular or largely permeable materials, and the water table is near the land surface. Moderately susceptible are areas where bedrock is covered by materials of varying permeability and the water table is 70 to 100 feet below the surface. Areas shown as having low susceptibility to short-term contamination are areas where the bedrock is covered by at least 100 feet of glacial till, which has low permeability, and the bedrock aquifers exhibit artesian conditions.

MGS has prepared geologic atlases for Scott and Winona Counties and is working on one for Olmsted County. Funding for an atlas is shared between the county and MGS. For additional information, contact Bruce Olsen 612-373-3372.

Bruce Olsen

PROJECT UPDATES

QUATERNARY GEOLOGY

H. Hobbs, R. Lively, and G. Meyer
Gary Meyer found from subsurface data obtained for the Pollution Control Agency's investigation of pollution near the Twin Cities Army Ammunition Plant that the large kame within the plant boundary was deposited by the Superior lobe, instead of the Grantsburg as previously thought. The kame and material that fills an adjacent buried valley are thought to have been formed by a subglacial stream.

Rich Lively's U-series disequilibrium dating laboratory is back in service after a 2-year hiatus. Samples of late Pleistocene calcite cave deposits are again being dated on a routine basis.

Howard Hobbs is continuing to map the surficial geology of Olmsted County.

STRATIGRAPHIC GEOLOGY

J. Mossler and D. Setterholm
The study of Cambrian rocks is continuing. Thin sections of the basal Mt. Simon Sandstone from the southwestern part of the Hollandale embayment contain an uncommon suite of detrital accessory minerals (rutile, diaspore, books of kaolinite, and felted, matted sericite aggregates). These minerals indicate derivation from the Sioux Quartzite, to the west and north. The presence of abundant abraded authigenic quartz overgrowths also supports this interpretation. In contrast, thin sections of Mt. Simon from farther east in the Hollandale embayment only rarely contain abraded quartz overgrowths and have accessory minerals (predominantly zircon, tourmaline and ilmenite-magnetite) similar to the western Wisconsin outcrop belt of the Mt. Simon. The presence of granular (>2 mm) quartz grains in well cuttings from the basal Mt. Simon along the western margin of the Hollandale embayment also supports the interpretation that some Mt. Simon was derived from the west.

As part of a project to determine whether favorable environments for sedimentary manganese deposits exist in southwestern Minnesota, two holes were drilled through more than 400 feet of Cretaceous strata. Dale Setterholm is studying the gamma and electric logs and the core obtained. The rock is quite variable, because this was an area of transition between the open Cretaceous sea and the shoreline to the east.

PRECAMBRIAN GEOLOGY

J. Green, M. Jirsa, G. Meyer, J. Miller, G. Morey, and D. Southwick
Geologic quadrangle mapping along the North Shore as part of the COGEOMAP project will be completed in the Silver Bay quadrangle by Jim Miller this summer. Mapping will also extend into adjacent Illgen City, Finland, and Doyle Lake quadrangles. John Green of the University of Minnesota-Duluth is preparing strip maps along the North Shore between Finland and Grand Marais quadrangles.

In our first joint project with the Natural Resources Research Institute at Duluth, Mark Jirsa spent several days in northeastern Itasca County with Steven Hauck of the NRRI. They collected samples from a Precambrian greenstone belt that Mark is mapping. The NRRI will arrange for chemical analyses of these and other samples that will be collected as mapping progresses.

The northeastern Itasca County area is no longer part of the CUSMAP project, because the U.S. Geological Survey has shortened the length of the project. No geologic or geochemical work will now be done south of Rainy Lake-Seine River fault, although the USGS will acquire the aeromagnetic and electromagnetic data for all of the original area.

In a cooperative project with the Minnesota Department of Natural Resources (DNR), Division of Minerals, Gary Meyer has investigated the use of glacial drift as a tool for locating ore bodies, particularly gold. The idea, which has proved successful in Canada and Scandinavia, is to find and trace anomalous geochemical and heavy mineral values "up-ice" to the ore body in Precambrian bedrock. Local Quaternary stratigraphy and ice flow directions must be worked out in some detail to employ the technique. The entire drift section was cored to bedrock by DNR using a sonic drill in two study areas in Koochiching and St. Louis Counties, where Rainy lobe deposits form the base of the glacial drift. The Rainy till should be useful for prospecting, because it contains abundant clasts of local bedrock, and the direction of ice movement can be determined from moraines and glacial striations.

GEOPHYSICS

V. Chandler, P. McSwiggen, G. Morey, and graduate student R. Ferderer
An opportunity arose to acquire additional gravity data in less accessible parts of the International Falls sheet in conjunction with a DNR project. Publication of this map has therefore been postponed until later this year.

Seismic profiles across the Midcontinent rift were given to MGS by a commercial contractor. They are currently being interpreted in conjunction with the gravity and magnetic modeling described in the last newsletter.

HYDROGEOLOGY

B. Bloomgren, R. Kanivetsky, B. Olsen, B. Palen, and T. Wahl
As an outgrowth of the Aquifer Recharge and Greenhouse projects conducted by the Minnesota Geological Survey, Barbara Palen developed annual water budgets for each major watershed in Minnesota for which surface runoff data are available. She tested the hypothesis that on an annual basis precipitation (P) - (minus) evaporation (E) - recharge (R) - surface runoff (S) 0. Aside from the expected annual changes in storage, she found that the equation is not true. In northern Minnesota P-E-R-S <0 because local recharge is recycled as surface recharge on a seasonal basis. In southern Minnesota P-E-R-S >0. There a portion of annual precipitation is unaccounted for, perhaps as surface runoff that infiltrates into the beds of losing streams or as secondary evaporation from water bodies.

Other factors, such as soil moisture, change in lake storage, and deep recharge to bedrock, will be added to these annual water budgets for Minnesota watersheds, with the eventual goal of a detailed event-based input-output model of water resources for the state.

Through an award from the Minnesota Department of Natural Resources (DNR), Division of Waters, MGS is creating a state-wide summary file of water-well data called INDEX. Information describing well location, construction, use, hydrology, geology, and state identification number will be entered. INDEX will form the central file of a state ground-water data system which is being developed through DNR and the Planning Information Center (PIC) at the State Planning Agency. The Systems for Water Information Management (SWIM), the coordinating body for the state approach to interactive water data systems, provides an overview for the entire project. An example of another state agency using INDEX data elements to store well information is the Minnesota Pollution Control Agency (PCA). PCA is establishing an internal data system using EPA funding and will store ground-water data collected under PCA regulatory programs. INDEX data entry is made via micro or personal computers, and thus this file will be suitable for use by local governments or by the public. For additional information contact Bruce Olsen or Tim Wahl.

Goldich medal awarded to G.B. Morey, MGS Associate Director and Chief Geologist, at the 32nd Annual Institute on Lake Superior Geology.

STAFF NEWS

Roman Kanivetsky presented a paper at the American Institute of Hydrology meeting in Orlando, Florida, March 6-7, 1986. He also gave a lecture on "Hydraulic characteristics of ATES" at the Minnesota Department of Natural Resources, Winter Seminar Series, St. Paul, February 7, 1986. On February 19 and May 1, 1986, he conducted special seminars on basic ground-water hydrology in Bloomington, Minnesota, for county and city representatives sponsored by the Center for Advancement of Water and Environmental Studies. On May 22 he presented a lecture in St. Paul on "Hydrogeological approach for protection of ground water in Minnesota" at a seminar on Current Topics in Hydrology and Water Resources.

John Splettstoesser was in Antarctica for the twelfth time since 1960, this last season (November-January) at a remote field camp about 350 miles from the South Pole. He was the National Science Foundation representative in charge of coordinating scientific requirements for helicopter operations for the 65 geologists operating out of the camp. After the field season he spent 3 weeks on geologic trips in New Zealand and Australia.

Doug Bergstrom rejoined the staff on a full-time basis following a year's graduate study at the University of Delaware.

Terry Boerboom successfully defended his M.S. thesis, titled Tourmalinite, nelsonite, and related rocks (Early Proterozoic) near Philbrook, Todd County, Minnesota.

Jim Miller received his Ph.D. in March; his dissertation is titled, The geology and petrology of anorthositic rocks in the Duluth Complex, Snowbank Lake quadrangle, northeastern Minnesota.

Mark Jirsa, Mary Jo Kuhns, John Mossler and ***Dave Southwick*** attended the Symposium on New Perspectives in Basin Analysis, held May 8-9, 1986, in Minneapolis in honor of Francis J. Pettijohn, one of the founders of basin analysis and an alumnus of the University of Minnesota (B.A., 1924; M.A., 1925; Ph.D., 1930). Dr. Pettijohn received an honorary doctorate from the University of Minnesota on May 8. Dave Southwick was a co-leader (with R.W. Ojakangas, University of Minnesota-Duluth) of a field trip in northern Minnesota that followed the Symposium.

Howard Hobbs presented a paper on a recently discovered paleosol in Minnesota at the North-Central Section meeting of the Geological Society of America, in Kent, Ohio, April 24-25, 1986.

Rich Lively gave a seminar for the Department of Plant and Earth Sciences at the University of Wisconsin-River Falls on April 29 on uranium dating of cave deposits. Also, he presented a paper on May 3 for the Minnesota Academy of Science at St. Cloud State University on results of U-series dating of stromatoloids in Minnesota lakes.

Matt Walton was Chairman of an Engineering Foundation Conference on "Core Drilling for Ultradeep Scientific Targets," in Dillard, Georgia, April 20-25, 1986.

MGS staff who presented papers at the Institute on Lake Superior Geology meeting at Wisconsin Rapids, April 29 - May 4, 1986, were

Terry Boerboom (Early Proterozoic tourmaline-bearing metasedimentary rocks in northeastern Todd County, central Minnesota); ***Val Chandler*** (Gravity and magnetic anomalies and the structure of the central Duluth Complex; and [as a co-author with Kelley Carlson] A combined analysis of gravity and magnetic anomalies in east-central Minnesota); ***Mark Jirsa*** (Iron-formations in the subsurface of southwestern Minnesota); and ***Peter McSwiggen*** ([with co-authors G.B.Morey and Val Chandler] Gravity and magnetic modeling of the Midcontinent Rift system in Minnesota and adjoining parts of Wisconsin). Mary Jo Kuhns, G.B. Morey, Dave Southwick, and Matt Walton also attended.

Dave Southwick attended meetings of the Geological Association of Canada in Ottawa and went on associated field trips in May. He and Morey attended a DOSECC workshop in Rapid City in June to present arguments for drilling a 5-km-deep hole in the Minnesota gneiss block.

Diamonds in Minnesota?

Diamonds in Minnesota?

A recently completed part of our detailed aeromagnetic survey has revealed small, almost round positive anomalies that were not revealed by earlier aeromagnetic surveys. Several occur near Little Falls, surrounded by a diffuse swarm of about 70 others in Morrison County and adjacent parts of northeastern Stearns and northwestern Benton Counties. The Archean and Proterozoic bedrock in the area is largely covered by glacial deposits from 60 to 300 feet thick, and the rocks responsible for the circular magnetic highs do not crop out.

Shallow core holes were drilled into 18 feet of sound crystalline rock at one of the highs and into the surrounding magnetically flat area. The rock presumably responsible for the high is a biotite-bearing olivine pyroxenite, which is related to kimberlite, a rock that is commonly associated with diamonds.

Diamonds form under extreme temperatures and pressures, at great depth, and are carried to the surface by pipes of igneous rock. It is possible that the swarm of positive anomalies reflects pipes of this type. The new data, which have aroused commercial exploration interest, were acquired with funding from the Legislative Commission on Minnesota Resources.

Publish or Perish?

Lynn Swanson, MGS librarian, is preparing a supplement to the Bibliography of Minnesota Geology, 1951-1980, published as MGS Bulletin 46 in 1981. The 1981-1985 supplement contains nearly 1,100 references, more than half the number produced during the 30 years covered by Bulletin 46.

MGS STAFF

Matt Walton, *Director*
G.B. Morey, *Associate Director and Chief Geologist*
David L. Southwick, *Associate Chief Geologist*

Douglas J. Bergstrom, *Geologist*
Bruce A. Bloomgren, *Geologist*
Val W. Chandler, *Geophysicist*
Howard C. Hobbs, *Geologist*
Marcus C. Hoyer, *Geologist*
Mark A. Jirsa, *Geologist*
Roman Kanivetsky, *Hydrogeologist*
Mary Jo P. Kuhns, *Geologist*
Richard S. Lively, *Geochronologist*
Peter L. McSwiggen, *Geologist*
Gary N. Meyer, *Geologist*
James D. Miller Jr., *Geologist*
Sarah J. Mills, *Geologist*
John H. Mossler, *Geologist*
Bruce M. Olsen, *Geologist*
Barbara M. Palen, *Geologist*
Dale R. Setterholm, *Geologist*
John F. Splettstoesser, *Geological Engineer and Program Manager*

Timothy E. Wahl, *Analyst/Programmer*

Nancy H. Balaban, *Editor*
Richard B. Darling, *Graphic Designer*
Linda L. McDonald, *Senior Accounts Specialist*
Lynn M. Swanson, *Librarian*
Gail DeShane, *Secretary*
Denise Fletcher, *Secretary*

Telephones: (612) 373-3372 Main Office and Geologists
373-3591 Water-well Records and other Subsurface Data
373-0223 Maps and Publications Sales

Staff Changes

Jeanne Perrin, MGS secretary since January 1978, retired in June. She and her husband are moving to Seattle, Washington. ***Lori Martin***, secretary since August 1985, was lured away by an advertising agency in Minneapolis at the end of May. Both will be missed.

Linda McDonald, who has been promoted repeatedly since she started with MGS in 1977, will replace Jeanne as the mainstay of our operation. ***Gail DeShane*** and ***Denise Fletcher*** were hired to complete the secretarial staff. Gail has a background in court reporting and has worked in the accounting department of a local company. Denise has a degree from Mankato State University in recreational therapy and has worked in that field; she was seeking a change when she applied for secretarial work at the University. We are glad to welcome both aboard.

Centennial medal of the Geological Survey of Finland awarded to Matt Walton in April by Heikki Ignatius, Deputy Director of the Finnish Survey. Dr. Ignatius was here to give a seminar before the Department of Geology and Geophysics, and to discuss continued exchange of scientists with MGS.

FUNDING REPORT

The State Special appropriation was $895,300 for the first year of the 1985-1987 biennium, and $899,700 for the second. For FY 1986 the total funds from all sources approached $1.8 million. The contracts and grants listed below were active in the fiscal year ending June 30, 1986, and many will carry over into the next fiscal year and longer.

Federal Contracts and Grants

Midcontinent Strategic Minerals Mapping—U.S. Geological Survey.
Structural Analysis of an Archean Greenstone/Granite Terrane in Northern Minnesota—National Science Foundation. (In cooperation with University of Minnesota Department of Geology and Geophysics.)
Aquifer Thermal Energy Storage—Battelle Pacific Northwest Laboratory.
Field Logistics, Beardmore Area, Antarctica—National Science Foundation subaward through University of Maine.
COGEOMAP—U.S. Geological Survey.

State and Other Contracts, Grants, and Appropriations

Surficial and Subsurface Geology of the New Brighton 7½-Minute Quadrangle, Minnesota—Minnesota Pollution Control Agency.
Public Sample Analysis Program—Minnesota Department of Natural Resources.
Review of Crystalline Rock Program—Minnesota Environmental Quality Board.
Aquifer Thermal Energy Storage District Cooling Project for Downtown St. Paul, Minnesota—District Heating Development Company, St. Paul.
Olmsted County Geologic Atlas—Phase I and II—Olmsted County, Minnesota.
Ground-Water Data Automation—Minnesota Department of Natural Resources.
Glacial Drift Stratigraphy and Gravity Measurements—Minnesota Department of Natural Resources.
Hydrogeologic Study of the Mesabi Iron Range—Iron Range Resources and Rehabilitation Board.
Age, Residence Times, and Recharge Rates of Groundwater—Legislative Commission on Minnesota Resources.
Lanesboro Watershed Management Techniques—Legislative Commission on Minnesota Resources.
Aeromagnetic Mapping—Legislative Commission on Minnesota Resources.

GRANT-IN-AID PROGRAM

MGS is soliciting proposals from students and faculty for projects on Minnesota geology. Successful proposers will receive grants of as much as $1,200 mainly to cover field and laboratory expenses related to the work. Proposers need not be from a Minnesota college or university, but the research must be on the geology of Minnesota. Both graduate and undergraduate thesis projects are welcome. Contact the MGS Director for details.

Recipients for fiscal year 85-86:

K. Dokken, Ichnofossils of the Platteville Limestone Formation (Middle Ordovician) in southeastern Minnesota. University of Minnesota, Duluth, M.S. candidate.

S.D. Samson, Chemical correlation and absolute dating of Middle Ordovician bentonites in southeastern Minnesota. University of Minnesota, Minneapolis, M.S. candidate.

D. Vidrine, Geochemistry and petrogenesis of the felsic rocks of the Duluth Complex. University of Minnesota, Minneapolis, Ph.D. candidate.

R.L. Wunderman, A magnetotelluric traverse across the Midcontinent Rift and adjacent basement, Central Minnesota—Wisconsin. Michigan Technological University, Ph.D. candidate.

Recipients for fiscal year 86-87:

B. Brasaemle, Giants Range batholith petrographic and geochemical analyses. University of Minnesota, Minneapolis, M.S. candidate.

B. Saini-Eidukat, Petrology of the anorthositic/troctolitic series boundary, Duluth Complex. University of Minnesota, Minneapolis, M.S. candidate.

B.T. Hayden, Petrological study of the Lower Ordovician Oneota Dolomite, southern Minnesota. University of Minnesota, Duluth, M.S. candidate.

C. Schwandt, Petrogenetic examination of composite tonalite-diabase dikes . . . in Vermilion Granitic Complex of northeastern Minnesota. University of Missouri, Columbia, M.A. candidate.

S. Shank, Petrology of the Beaver Bay and Black Bay gabbros. University of Minnesota, Minneapolis, M.S. candidate.

D. Thomas, Sedimentology, diagenesis, and petrography of the Jordan Sandstone, southern Minnesota. University of Minnesota, Duluth, M.S. candidate.

We would like to know of anyone engaged in research concerned with the geology of Minnesota, whether you are a candidate for a grant or not. Replies will be published in later issues of the Newsletter. We would also like to hear about theses on Minnesota geology prepared at institutions outside our immediate area.

PUBLIC INQUIRIES PROGRAM

As part of our service to the public, we provide technical information through publications and also to individuals through direct contact. Our water-well data program, for example, logged 226 telephone requests for geologic data in March 1986, and 277 in April. Walk-in vistors and written requests amounted to perhaps half as many more.

The MGS Public Geologic Sample Program, described in the last newsletter, identifies rocks and minerals submitted by the public free of charge. Frequent inquiries about fossil and mineral collecting sites are answered by our Educational Series, and we also have publications to answer questions about oil, gas, and gold in Minnesota. Sample boxes of three minerals and three fossils of Minnesota (free over the counter, $1.00 if ordered by mail) are popular with school children.

Entertaining, but difficult to answer was a recent request, "I'm ten years old and in 4th grade. I'm in a high performance class. We are doing a project called discovery topics. Mine is Minnesota Maps. I would like some good information like: maps I could get, how to make maps, or other information you could send me." Requests for information arrive frequently, and we are happy to be of service in answering questions on any geological topic.

MINNESOTA GEOLOGICAL SURVEY
2642 University Avenue
St. Paul, Minnesota 55114-1057

Nonprofit Org.
U.S. Postage
PAID
Minneapolis, Minn.
Permit No. 155