GEOLOGY

and

GEOLOGICAL ENGINEERING

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University of North Dakota
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And some rin up hill and down dale, knapping the chucky stanes to pieces wil' hammers, like sære mony road-makers run daft. They say 'tis to see how the world was made.

"Sir Walter Scott, St. Ronans Well (1824)"

Perhaps the most valuable result of all education is the ability to make yourself do the thing you have to do, when it ought to be learned' and probably the last lesson that he learns thoroughly.

"Aldus Huxley, Point Counter Point (1928)"

A teacher tries to teach everything he knows, just as a generation tries to pass along all its collected knowledge. The futility of these endeavors is manifest. If for no other reason, because old men who do most of the teaching and define most of the generations forget most of what they once knew. It is inevitable, therefore, that each generation will know less than those preceding it, and that the total knowledge of mankind will shrink. The intriguing question is: what will be the last thing forgotten?

"Sandie Dreggs, Speculations (1952)"

We ask your pardon ere we go,
For having agonized you so,
So pardon us, so pardon us . . . or die!

"Gilbert and Sullivan, Ruddigore (1887)"
Chair's Report--Fall 1995

The Department of Geology and Geological Engineering made a number of significant strides during the 1995-1996 academic year.

The focus of the fall semester was the Accreditation Board for Engineering and Technology (ABET) evaluation of our Geological Engineering program. The evaluators were very complimentary of the curricular and staffing changes we had made, and we have received notification that the program has been fully reaccredited. Thank you to all the alumni, especially members of the Alumni Advisory Council, who provided input and support during the period of uncertainty about the GE program!

I am sorry to report that geological engineer Joel Kusmazau, who joined the faculty in 1993, resigned his position last January to take a faculty position at the University of Queensland, Australia. Joel had made outstanding contributions to the Department during his time here, and we were sorry to see him leave. Fortunately, UND quickly approved a search for a replacement, and we are excited to have Frank Beaver (BSGE 1984, MS 1984, PhD 1986) as our new geological engineering faculty member. After nine years at the Energy and Environmental Research Center, Frank decided to pursue his love of teaching. We are very glad to welcome him back to the Department!

Changes have been made in other areas as well. We have streamlined our course offerings, eliminating from the catalog courses that have not been taught in recent years. We also modified admissions and graduation requirements for our graduate programs.

Last September we received word that the National Science Foundation would fund our new Water Quality Laboratory. Under the directorship of Ron Mathew, equipment is being purchased and analyst Sally Eckert-Tilotta was hired. We are very excited about the enhanced educational opportunities that the new lab will provide our students. In addition, the Department received an infusion of funds from the School of Engineering and Mines to purchase new equipment, including hydrogeologic field equipment, a petroscope, and microscopes.

Our Department distinguished itself by garnering several awards last year. At the Founders Day banquet, we received UND’s Departmental Research Award, and Patricia Kelley was awarded the Sigma Xi Award for Outstanding Scientific Research. Gloria Pederson received a Staff Meritorious Service Award last spring for her outstanding service as Department secretary. And several graduate students competed successfully for national research awards.

Figure 1. The front of Leonard Hall. How many alums know what the FH above the third floor windows means?
A number of outstanding speakers visited campus this year. Stephen Jay Gould provided a dynamic and provocative Spring Banquet address, and our LEEPS (Leading Edge of Earth and Planetary Sciences) Lecture Series brought 9 nationally eminent scholars to campus. Homecoming activities included a talk by former Department chair Lee Gerhard and Leonard Medal awards to alumni Sid Anderson and Bruno Hansen.

As in past years, I wish to thank you, alumni, for your loyal and faithful support. Your advice, encouragement, and financial contributions continue to be invaluable. We could not manage without you!

Terra Kelley

Figure 2. The Little Missouri River Valley in western North Dakota
A Letter from the (Interim) Dean

October 20, 1995

Dear alumni and friends of the Department of Geology and Geological Engineering,

It is a pleasure to be asked to communicate with you through the department’s newsletter. As you probably already know, I am sitting in the dean’s “chair” because Dr. Mogens Henriksen resigned as Dean of the School of Engineering and Mines last December 31 to become dean of engineering at Mercer University in Macon, Georgia. The search process for a permanent successor to Dean Henriksen began early in the year, and the search committee will begin screening applications early in October. The committee hopes to be able to recommend three outstanding candidates to the university administration around the first of the year.

The Department of Geology and Geological Engineering has a number of significant accomplishments that will be recounted in more detail in the newsletter. Welcoming new members to the faculty is always exciting, and it is a pleasure to have Dr. Frank Beaver as Assistant Professor of Geological Engineering. Frank comes to the department from the UND Energy and Environmental Center, and before that he was associated with the North Dakota Mining and Mineral Resources Research Institute (MMMRI).

The university was notified a few weeks ago that the geological engineering program was reaccredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET). The evaluators, who visited the campus last fall, complimented the department on the curricular improvements and staffing changes that had been made.

Several members of the departmental faculty have been recognized during the past year for their accomplishments, and the department received the Departmental Award for Excellence in Research at the Founders Day banquet. Details on those awards and accomplishments can be found elsewhere in the newsletter, but I want to congratulate the department faculty collectively and individually and commend them for their contributions to the School of Engineering and Mines and to the University. Of special note is the receipt by Gloria Pederson of a Staff Meritorious Service Award for her outstanding service as the department secretary.

I hope each of you will have the opportunity to visit the department and the university sometime in the near future. We are proud to show our alumni the progress we’ve made. You have played an important role in our past, and we rely on your support as we move into the future.

Tom Owens
Interim Dean
School of Engineering and Mines

Training is everything. The peach was once a bitter almond; cauliflower is nothing but cabbage with a college education.

*Twain, Pudd'nhead Wilson* (1894)
Searching For a New Dean

Tricia Kelley and Ron Matheney are the departmental representatives on the search committee to find a new dean for the School of Engineering and Mines. Vacancy announcements appeared in professional journals in the late spring and early fall, and requests for nominations were mailed nationwide to geology and geological engineering departments (as well as other Engineering departments) earlier this fall. The committee hopes to arrange campus visits for the top candidates and to submit its nominations for dean to the UND administration later this fall.

Leave it to Beaver...

This fall the Department welcomed a new faculty member, Dr. Frank W. Beaver. Frank was hired to replace Joel Kuszmaul, our geological engineer who departed for Australia last winter. Frank is no stranger to UND; he received BS degrees in Civil Engineering and Geological Engineering and his MS and PhD in Geology from UND. He also holds the BA degree in chemistry, physics and mathematics from Bemidji State. He is also a registered professional engineer.

For the past nine years, Frank was employed by the Energy and Environmental Research Center, including two years as Associate Director. Prior to that he spent nine years as an enforcement agent with the U.S. Environmental Protection Agency. His areas of interest and expertise include geological and environmental engineering, hydrogeology, glacial geology, agriculture, natural resource management, wetlands, and remediation technology.

Frank's teaching responsibilities will include Engineering Geology, Geomechanics, Geology for Engineers, and technical electives in areas of his interest.

...And to an Additional Engineer to Be Hired Soon!

After years of asking too much of our geological engineering faculty, we have finally bitten the bullet and decided to hire an additional one. A search began this fall. Phil Gerla, an old hand at finding and hiring geological engineers is the Chair of the Search Committee. Look for ads in all the usual places! If you, or someone you know, are interested in the job, contact Phil or Tricia for a job description.

But search the land of living men,
Where wilt thou find their like again?
Sir Walter Scott, Mermion (1808)

They seek him here, they seek him there,
Those frenchies seek him everywhere
Baroness Orczy, The Scarlet Pimpernel (1920)
1995 Arthur Gray Leonard Awardees:  
Robert K. Aaker and Walter L. Moore

"Established in 1992 in honor of Arthur Gray Leonard (1865-1932), scholar, leader, and pioneering geologist of North Dakota. Award of the medal recognizes outstanding achievement in the geosciences in research, technical studies and projects applied to societal needs, teaching, educational development, or leadership in conservation of Earth's resources and environment conferred by faculty and alumni of the Department of Geology and Geological Engineering, University of North Dakota."

ROBERT K. AAker - Exploration, Geological Management, Training

Robert K. Aaker was born August 7, 1922, in Hatton, North Dakota. After graduating from Larimore High School in 1940, he enrolled at the University of North Dakota. Bob's education was interrupted by service in the Air Force during World War II. He received his B.S. in Geology, with a minor in Mathematics, from UND in 1949.

Bob Aaker has been a leader in the areas of petroleum exploration and management. After graduation, Bob was employed by Continental Oil Company in Billings, Montana. His long and illustrious career with Conoco later took him to Salt Lake City, Denver, Durango, Midland, Roswell and finally to Houston. Bob served two terms as Director of Geology and was Manager of Conoco's northern exploration operations. In this capacity he was responsible for exploration in the forty-eight contiguous states plus Alaska, exclusive of the Permian Basin and offshore Gulf of Mexico. Bob Aaker's work with Conoco involved a variety of activities, including supervision of ongoing projects, development of properties, and recruitment, training, placement, and maintaining technical proficiency of personnel.

Bob has been a generous and loyal supporter of UND and the Department of Geology and Geological Engineering. He has served on the departmental Alumni Advisory Council and is a member of UND's National Alumni Leadership Council.

Bob is married to the former Bernita Erbele, a native of Larimore, North Dakota. They have two children. Son Steve is a geologist in Salt Lake City; daughter Kristin is a professor at Rice University in Houston. Bob and Bernita also have two grandchildren. Since retirement, the Aakers have lived in Littleton, Colorado.
WALTER L. MOORE — Teacher, Mentor, Researcher

Walter L. Moore was born October 24, 1925, in Omaha, Nebraska. After service in the U.S. Marine Corps, he received his B.S. in Geology from Utah State in 1950 and his M.S. (1954) and Ph.D. (1959) from the University of Wisconsin. While completing his education, Walt worked as a geological assistant for California, Sun Oil, and Schio Oil companies. He was a staff geologist for Gulf Oil Corporation in Fort Worth, Texas, and Roswell, New Mexico, from 1954 to 1960.

Walt was appointed Associate Professor of Geology at the University of North Dakota in 1960. In recognition of his accomplishments, he was promoted to the rank of Professor in 1966. Walt taught a variety of courses capably and with enthusiasm. His demanding teaching load included physical and historical geology, petroleum geology, stratigraphy, paleontology, exploration geophysics, oceanography, and structural geology. During his time at UND, Walt placed a strong emphasis on teaching and mentoring of students. This concern extended to training of public school teachers; Walt directed an In-Service Institute in Earth Science funded by the National Science Foundation from 1963-1966.

While at UND, Walt also held an appointment with the North Dakota Geological Survey. In this capacity, he contributed significantly to knowledge of North Dakota stratigraphy, particularly that of the Williston Basin. His summer research projects spanned the upper Paleozoic to Tertiary.

After twenty-one years of teaching at UND, Walt returned to industry. He joined Conoco in Houston in 1981, where he was involved in Gulf Coast exploration. He retired in 1989.

Walt and his wife Alvena have three children and two grandchildren. Son Jeff is in computer management in Minneapolis. Daughters Elizabeth and Kate are both in Colorado; Liz is a medical technician in Fort Collins, and Kate teaches computer graphics in Denver.

Figure 6. Neil Sherrod (MS '63), Walt Moore (fac 60-'81), Fred Ballard (MA '63)) and Al Moore after the Leonard Award Banquet.
Leonard Award Nominations Invited!

Alumni and Friends of the Department of Geology and Geological Engineering: we seek your help in choosing deserving candidates for the Arthur Gray Leonard Award! An award committee, consisting of faculty and alumni, will review all nominations. Please submit nominations, including your summary of nominee achievements which meet award criteria (in italics at top of page 6), to the committee at any time. For consideration for the proposed Fall, 1996, awards, please submit by January 31, 1996. Nominations will be retained for later consideration if not chosen for this coming year.

Past awardees were:

1992: Wilson M. Laird
1993: Andrew G. Alpha
1994: Sidney B. Anderson and Bernold M. Hanson

Thank You! (Frank Karner, for the A.G. Leonard Award Committee)

Figure 6. Walt Moore at the blackboard in 1978

Figure 7. Tina Langtry (MA '82) was one of those on hand to help honor Walt Moore (fac '60-'81) and Bob Aaker (BS '49)

Figure 8. Odie Christensen (fac '74-'78) was also present for the A. G. Leonard Banquet. (Compare this photo with the one on page 35)

Leadership and learning are indispensable to each other.
J.F. Kennedy, Remarks made in Dallas (1963)
Faculty Happenings

Frank Beaver (Fac. '95-present): Having joined the geological engineering faculty in August, I am still in the process of settling into new accommodations and responsibilities and am enjoying every minute of it. I am teaching geomechanics, geology for engineers, engineering geology, and will be involved in the senior design course, as well as the evolution of the geological engineering program. I took the summer off and spent a lot of time with my daughters, Diane, 14, Karen, 11, and Lisa, 9 at our farm in Minnesota at Leech Lake. We also went to the mountains of Colorado and traveled in the North Dakota badlands where we watched young bald eagles learning to fly. Altogether it was a great summer getting back to nature (and geology) in general and it invigorated me for my new adventure. Presently I am exploring a number of opportunities in research and consulting that promise to provide relevant and interesting experiences for students. On the lighter side, we are finishing up a jeep rebuilding project and are attempting to roust a family of black bears that has taken up residence at our farm, and who are systematically shredding the oak and apple trees.

Nels Forsman (Fac.'89-present): During the past year, I completed my work with the Cretaceous-Tertiary boundary in south-central North Dakota with Ed Murphy and John Hoganson of the NDGS and Doug Nichols of the USGS. We documented the character of the easternmost exposures of the K-T boundary in North America. Yes, we looked for shocked quartz, but found none. Our results have been published as NDGS R.I. 98. I also continued investigation of the Newport structure (subsurface Renville Co.) with Tim Gerlach. We've expanded upon Tim Gerlach's thesis work, which found conclusive evidence of an impact origin. AAPG Bulletin has accepted our manuscript. I attended a symposium on the White River Group at SC-NC GSA in Lincoln, NB. There was much interest in the results of the COGEOMAP study in North Dakota conducted by Murphy, Hoganson, and myself. A manuscript has been submitted to that symposium for probable inclusion in a GSA Special Paper. I received training this past year in SGID (Small Group Instructional Diagnosis), which enables me to act as a consultant for faculty by acting as a liaison between them and their students. The program is not evaluative, but rather simply aimed at getting useful feedback to faculty who request it. I also worked this past summer on a committee to assess the activities of UND's Integrated Studies Program that satisfy General Education Requirement (GER) criteria. That was a major project with implications for overall GER improvements at UND.

Phil Gerla (Fac. '88-present): The addition of Scott Korom to our faculty this past year has greatly stimulated activity in our hydrogeology program and expanded our course offerings. I've caught a little of Scott's youthful enthusiasm and, as a result, have become involved in some new projects. Scott, Dave Rush (a grad student) and I are studying salt transport from brine disposal pits at a site near Tioga ND. The pits, abandoned since the early '60s, were used during petroleum development activities and may now be damaging nearby cropland. Scott and I are also providing groundwater consulting for two North Dakota rural water systems and will probably have U.S. Department of Agriculture funding for groundwater denitrification studies later this year. Ron Matheney and I are continuing our research on wetlands; we currently have an article in press that describes research conducted near Manvel ND.

I spent most of the summer working on a proprietary research contract with Barrick Goldstrike Mines, Inc., with senior geological engineering student Mark Osborn. The project, aimed at solving some dewatering problems at the company's mine in the Carlin Range NV, involves geochemical and flow modeling. In June, I attended a USGS Meeting near Walker, Minnesota, where the Survey has a multidisciplinary lake and wetland research area. We are exploring some research projects in the area. While all this is going on, my life has been complicated by the fact that I am now an editor for the Journal of Ground Water. I now understand what Tricia and Dex are talking about when they complain about handling too many manuscripts for the journals they edit.

My family and I have been living out in the country near Climax MN for over a year now. We enjoy it greatly. Our totally undisciplined dogs, Smith and Wesson, however, along with our continual garden weeding and lawn mowing, greatly limited our travels this past year.
Will Gosnold (Fac. '82-present): 1994 and 1995 have been productive years so far. I have given four papers, written several reports, and submitted a manuscript to Science for publication. I and my students continue with our research on heat flow, groundwater flow and climate change. We also have initiated a new project: gravity studies of the Lake St. Martin Impact Crater in Manitoba. Fortunately, we have been successful in getting grant funding for all our projects—major grants have come from DOE and EPA. Several others are pending.

Annie is an A student in school and she earned her second varsity letter in high school gymnastics this past year. She also received an award for Best Underclassman Gymnast at Central High School. Of course gymnasts are young and Annie just entered ninth grade this fall. I still swim with the Masters swim club every day, run in the afternoons and hope for good cross-country skiing conditions in the winter. Deb has joined me in daily exercise activities and is making great strides in fitness achievement.

Bud Holland (Fac. '54-'89): By far the most exciting event of the year for Mardi and me was the celebration of our 50th wedding anniversary 7/14 at Kona, Hawaii, in the midst of a two-week tour of four islands. On the way home we visited Mardi's aunt (her mother's older sister) and cousin in Orange Co., Calif. We were also able to visit older son, Del, in Iowa City several times this fall and got to watch his second son, Jon, play football. We also had several visits with Erik and Susan in Williamsburg, Va., where he continues as a costumed interpreter of history in the Native American village at the Jamestown Settlement. Because of her employment in research and as an interpreter with the Colonial Williamsburg Foundation, they were able to move into the restored Alexander Craig house right on Duke of Gloucester St. just a block west of the colonial capital with CWF as their "landlady." A good bit of the winter was taken by joining Joseph Hartman in nominating Marshall Lambert, retired Ekalaka, Montana, high school science teacher who helped us with excavation of UND's Triceratops skull, for the Harrell Strimple Award of the Paleontological Society for outstanding contribution to paleontology with aid to many paleontologists and geologists. Our nomination was successful and I'll be presenting Marshall for award at the PS luncheon at GSA convention in New Orleans. I was able to get in the field with Mark Erickson and John Hoganson for a couple of days in the spring after John presented our note on Fox Hills shark teeth to the North Dakota Academy of Science, and Mark and I now have over 95 percent of the more than 1600 postage stamps with fossils on them. I keep busy but I don't know how I ever found time to meet classes!

Frank Karner (Fac. '62-present): The major news last year was our NSF award for the Water Quality Laboratory which is now becoming a reality as Ron Matheney and I work with Sally Eckert-Tiliot and an interdisciplinary group of faculty and students. We appreciate all of the positive feedback and help we've received from alumni and the alumni committee.

In teaching, I'm still modifying petrology to be less theoretical with more emphasis on common geological materials and practical applications. Your comments and suggestions are welcome! Geology 101 is a highlight for me as I see signs of change in the somewhat unimpressed and critical generation of college students of the 90's. I've received funding for a microscopy short course in petrology and also for environmental projects in 101 where we'll be able to support some of our majors and grad students as mentors to work with student teams.

In my own and student research, Sherry Samson completed a senior thesis on physical and chemical properties of some saline Red River Valley soils. Sherry also completed an internship at Battelle's Pacific Northwest Research Laboratory working on computer modeling and geochemistry and is currently beginning graduate work in soil geochemistry at Wyoming. Chad Tomforde, a new Graduate student and I are working with John Hurley at EERC on a geochemical and electron microscope study of bituminous coal. In August, along with grad students Jon Ellingson and Bethany Bolles, we sampled the Pittsburgh #8 coal at the current largest underground mine in the U.S., the Enlow Fork Mine near Pittsburgh. I'm currently beginning some geoscience education projects including participation in the UND, NSF-funded DREAMS Project which will assist disabled North Dakota Native American grade school students in science and mathematics.

Meanwhile, working on the Leonard Award, LEEPS Lecture Series, departmental recruiting, advising and curricula as well as co-chairing the UND Curriculum Committee keep me involved in university activities. Personally, I still play handball regularly, spend a little time with Joan, and travel to visit our almost grown-up girls and their families. I miss being a hockey father as Jim is concentrating on graduate
school in geology at the University of New Mexico. He's using transmission electron microscopy and diffraction of synthesized microparticles to evaluate materials and processes of vapor phase condensation in the early solar system.

**Tricia Kelley** (Fac. '92-present): I have continued my NSF-sponsored research on predator-prey evolution and mass extinctions, a project that involved M.S. students Vicky Andrews and Rob Sickler and undergraduate Karri Bradbury this past year. My coauthor Thor Hansen (Western Washington University) and I published one paper this past year and had two more accepted. We also presented papers at a meeting in Plymouth, UK, GSA in Seattle, North Central GSA in Lincoln NE, and the North Dakota Academy of Science. Thor and I collected 2,000 more pounds of molluscs (*Anyone for a clam bake?*) fossils (*Might be hard to chew!*) from the Virginia and North Carolina Coastal Plain this summer, so that should keep us all busy.

I felt like I spent nearly as much time off campus last year as I did in Grand Forks. Besides attending all the meetings, I also made a research visit to the Smithsonian, and lectured at five universities across the country as a Paleontological Society Distinguished Lecturer. I'm still a technical editor for the Journal of Paleontology, and an officer of the Paleontological Society, American Association for the Advancement of Science, and the North Dakota Academy of Science.

**Scott Korom** (Fac. '94-present): It's been a good year! I taught four 400-level courses, two of which were team-taught, two included graduate credit, and one was a new course (Groundwater Monitoring and Remediation). I was also involved with three engineering design projects and have worked with a handful of students on groundwater related research projects.

Phil Gerla and I continue to investigate denitrification in the Elk Valley and Icelandic aquifers. We have a proposal in to the USDA that has been recommended for funding (although this is no guarantee that it will be funded). A proposal to investigate bromide as a groundwater tracer in anion-sorbing sediments was funded earlier this year. Since last year, two of my papers have been published and two others are in press. I am also working on the fourth edition of a hydraulics textbook with my master's thesis advisor, Andrew Simon.

In July, I became a registered professional engineer in North Dakota. Some of my geology colleagues seem to enjoy guessing what the initials "P.E." really mean. With Joel Kuszmaul's move to the University of Queensland, I unexpectedly became the chair of the Geological Engineering Curriculum committee. Fortunately it was after the ABET review. Joel, Nels and Trish Kelley did all the hard work that made the review a success. However, we can't celebrate long because ABET will be back in two years. We have decided to increase our engineering faculty before they return. We hired Frank Beaver to replace Joel, and we are beginning a search for another person.

In my free time, I like to get outdoors. This year I visited Cumberland National Seashore off the Georgia coast, the north and south units of Teddy Roosevelt National Park, Itasca State Park, and John Reid dragged me out to the Dahlen Esker.

**Rich LeFever** (Fac. '80-present): Rich continues to be an active researcher. In 1995 he had five publications. His coauthors included Jerry McCloskey, Tom Heck, Julie LeFever and Jon Ellingson. Research continues on salts and salt-related features in the Williston Basin, the stratigraphy and sedimentology of the Newcastleton Formation, and the stratigraphy of the Winnipeg Group. Rich attended the 7th International Williston Basin Symposium in Billings in July, where he presented two papers. He continues as Director of Graduate Studies, handling admission and advisement of new graduate students.

**Ron Matheney** (Fac. '89-present): Ron was tenured and promoted last year, so he now begins his seventh year at UND as an associate professor. He continues to teach historical geology and a number of geochemistry courses at the undergraduate and graduate levels. He is working with M.S. student Kristjan Bekker on extracting an oxygen-isotope climate record from diatoms deposited in lake sediments over the last 1000 years, with M.S. student Curt Rockwell on the origin and stable isotope fingerprint of the Knife River flint from western North Dakota, and with Phil Gerla and an M.S. student Eron Dodak on the age and origin of groundwaters beneath the Lunby and Stewart sloughs wetland west of Grand Forks. Ron is Director of the new multidisciplinary Water Quality Laboratory, and is working with analyst Sally Eckert-
Tilotta to bring the National Science Foundation funded facility on line. Ron also is organizing GGE alumni to present a panel discussion on careers in environmental geology, geology, and geological engineering. The panel will be held on October 13, amidst the homecoming and Leonard Award activities. If you would be willing to sit on a jobs panel in future years, please contact Ron.

**Dexter Perkins** (Fac. '81-present): The past year has been a busy one. Professionally, I have been emphasizing writing and teaching, to the (probably unfortunate) near-exclusion of research. Two years ago I signed a contract with Macmillan/Prentice Hall to write a Mineralogy textbook. The book was supposed to have been completed in draft form this fall—maybe it will be. I didn’t undertake this project with blinders on, but I am nonetheless amazed at how slow it seems to go at times. Fortunately, I have a good editor who doesn’t get down on my case very often. As well as writing, I have attended several meetings and workshops on undergraduate teaching. At one meeting, sponsored by AGU and AGI, I heard “mineralogy class” used as a euphemism for boring and bad teaching. In trying to figure out why, I have discovered many bad things about traditional mineralogy classes. It has always seemed to me that there must be better ways to teach mineralogy—I have now taken steps to learn them.

Outside of the University, I continue to get my exercise. This fall I am the assistant coach for the Central High School boys soccer team. It is a lot of fun, except when the boys remind me what a bunch of jerks teenagers can be. Unfortunately, our team isn’t setting any win records. We will, however, probably do well enough to make it to the state tournament next month. Once there, I know we are capable of putting together some good games and giving the Bismarck and Fargo teams a challenge.

The rest of my family is, as usual, involved in many things. Doug is now seriously involved in music: he is taking both piano and cello lessons. He is also active in the Community Theater where he is currently one of the stars in The King and I. George, now that he is in High School, has an active social life and a drivers license: a bad combination sometimes. He is also a star on the soccer team. Betsy continues to manage the food coop, which has now been renamed Amazing Grains.

**John Reid** (Fac. ’61-present): The academic year 1994-95 flew by at a higher velocity than normal! However, I can’t say that I accomplished very much. Department committees and students have kept me busy. Trent Hubbard, a graduate of St. Lawrence University, began his thesis research on evidence of tectonic uplift as recorded in steam profiles. We had hoped to have a GPS unit ready, but had to borrow one from Mark Luther (NDGS). Will Gosnold and I submitted a proposal to NSF to acquire a GPS facility, but funding was denied despite some very positive reviews; we plan to try again. Karyn Alme has begun her field study of relict ice-wedge polygons in the southwestern part of North Dakota. In addition, Ken Harris, Mark Luther and I are preparing the field guide for the Friends of the Pleistocene field conference on Lake Agassiz this coming May/June. I have been busy writing papers for that, too. Eric Brevik, with Chart Services, Inc., and I have been writing another paper on the calculated thickness of ice that occupied the Grand Forks area.

Barbara and I continue to care for my 88 year old father (with heart problems, an aneurism, and Alzheimer’s disease). It is at times difficult. Then, this past spring, I lost hearing in one ear; it has not recovered. Hearing loss is a severe handic...I don’t hear punch lines! I just have to listen harder when people talk. I must be getting older! Other wise, I feel great and can still outpace my students at Grand Beach.

**Sundar Saluja** (Fac. ’82-present): This year being the last rung of my phased retirement, we went to India to explore if we would like to spend some part of the retirement there. This trip did help me discover what others discover very early, that this country with all its drawbacks daily highlighted by the news media, is still the best to live.

During a summer field trip of coal mines, we conducted a resistivity survey of the County Highway 21 site (between Hazen and Beulah, ND), which had provided mirror images of the underground openings in 1983-84 when a research project on the Reclamation of Abandoned Mine Lands was started with a grant from the ND Public Service Commission.

Much of my time has been spent organizing Panel Discussions/Round Tables this year. They included:
- Prescriptions for Achieving Peace of Mind: Challenges and Rewards
Prescriptions for Improving the Quality of Human Life: Challenges and Rewards
Nurturing Children, Prayer and Volunteering as Prescriptions for Improving the Quality of Human Life.

I also attended several conferences
International Seminar on "Environment, Sustainable Development and Human Health," held at Banaras Hindu University in Feb., 1995 (it may be mentioned that I was the Director, BHU Institute of Technology at BHU from 1971 to 1981).
I was invited to address the Panel Discussion on "Energy, Technology and Sustainability of Development."
The Foundation ROUSE (Foundation for the Reclamation of Our Spiritual Environment) was founded in May, 1992 with discussions on Values, Technology and Society and continued over 3+ years in collaboration with the Great Plains Forum; the deliberations have encouraged me to undertake compiling the "Book of Prescriptions" for improving the quality of human life which will be published before May, 1996 when I will retire from UND. In addition I have undertaken two more writing projects for the Renaissance which are to be completed by 1999.

On the home front we are expecting our third grandchild, the first one to be born in USA, to Bhupinder and Ravita at Sunnyvale, California. Dipender, the younger son who started his education at UND in 1982 has continued on his lucky streak and was promoted to senior section manager in charge of the Application Engineering Division of the Spectrum Services at Cadence. Our daughter Urvashi, who practices in Delhi with her husband will visit us in the summer after I retire in May. We will take a tour of the country.

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E-Mail Addresses for Geology and Geological Engineering Faculty

Be sure to include the underscore ("_") in addresses that have one!

<table>
<thead>
<tr>
<th>Name</th>
<th>Email Address</th>
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Gosnold, W.D., Jr., and Todhunter, P.E., 1994, Analysis of the geothermal gradient as a means of paleoclimatic reconstruction. Fall Meeting, American Geophysical Union, EOS 75: 76.


Among scientists are collectors, classifiers, and compulsive tidiers-up; many are detectives by temperament and many are explorers; some are artists and others artisans. There are poet-scientists and even a few mystics.

Sir Peter Brian Medaway, The Art of the Soluble (1967)


The scientist values research by the size of its contribution to that huge, logically articulated structure of ideas which is already, though not yet half built, the most glorious accomplishment of mankind.

Sir Peter Brian Medawar, The Art of the Soluble (1967)
**Seen At Meetings This Year**

*Geological Society of America Annual Meeting (Seattle, Oct. 24-27, 1994)*

Many of our friends, students, alums and faculty (present and past) were at GSA last fall. We didn’t have a big enough room for our UND reception! People there included:

Karen Alme
Floyd Anderson
Vicky Andrews
Allan Ashworth
RaeAnn (Brown) Baldwin
Arne Bakke
Ross & Marion Berglund
Diane Catt
John Douglas
Jon Ellingson
Mark Erickson
Rod Feldmann
Nels Forsman
Lee and Darcy Gerhard
Phil Gerla
Will Gosnold
Tom Gustavson
Thor Hansen
Joe Hartman
Erik Harvey
Bud & Mardi Holland
Frank Karner

Tricia Kelley
Alan Kehew
Cory Lee
Joanne Lerud
Steve Lund
Stephanie Mealman
Ron Metzger
Bob McKenzie
Darryl Pederson
Dex Perkins
John and Barbara Reid
Mark & Symma Rich
Sherry Samson
Mitch Schulte
Mary Scott
Eileen Starr
John and Annette Tucker
John Tinker (and Christine)
Pat Videtic
Tom Walker
Nate Wilkens
Roger Zejdlik

*North Dakota Academy of Science (Bismarck, April 20-21, 1995)*

The people listed below were at the North Dakota Academy of Science Symposium Commemorating the Centennial of the North Dakota Geological Survey (April 20-21, 1995):

Presented papers:
Vicki Andrews
John Blumerle
Randy Burke
Jon Ellingson
Nels Forsman
John Hoganson (organizer)
Mark Luther
Ed Murphy
John Reid

Others in attendance:
Karen Alme
Dave Brekke
Kelly Carlson
Mark Erickson
Bud Holland
Trent Hubbard
Tricia Kelley
Fred Lobdell
Wes Norton

If we do meet again, why, we shall smile.
*Shakespeare, Julius Caesar (1598)*
Happy Anniversary North Dakota Geological Survey!

1895 - 1995

100 Years of Excellent Service

The North Dakota Geological Survey was created by an act of the North Dakota Legislature in 1895, six years after statehood. The Geological Survey was directed to make a

... complete account of the mineral kingdom ... including the number, order, dip and magnitude of the several geological strata, their richness in ores, coals, clays, peats, salines and mineral water, marls, cements, building stones and other useful materials, the value of said substances for economic purposes, and their accessibility.

Such studies continue, but over the years the Geological Survey's mission has grown and is now three-fold: to investigate the geology of North Dakota; to administer regulatory programs and act in an advisory capacity to other state agencies; and to provide public service and information to the people of North Dakota.

The Geological Survey serves as the primary source of geological information in the state. A large amount of geological information can be obtained from NDGS publications; comprehensive collections of cores, samples, and fossils, oil and gas records; coal and subsurface mineral records; and through the NDGS affiliate office of the nationwide Earth Science Information Center.

Figure 9. The North Dakota Survey offices on the third floor of Leonard hall in 1987. The Survey moved to Bismarck several years ago. We miss them!

My father's theory was defined by a hasty press as being this—
that God hid the fossils in the rocks in order to tempt geologists into infidelity.

Sir Edmund Gosse, Father and Son (1907)
Enrollment Trends: Number of Students Levels Off--At Last

We attract majors by exciting them in our introductory courses. Most years we offer five sections of Physical Geology, two sections of Historical Geology, two sections of Introduction to Environmental Issues, and one section each of Views of Earth and Planetary Science and Geology for Engineers.

During the last four or five years, these courses have been full. Faculty have had to teach overloads, and classrooms were crowded. As the accompanying chart shows, our undergraduate introductory courses peaked in enrollment in '92-'93. While we like to have lots of students, we were relieved when the numbers stopped rising. Resources, both faculty and physical, are spread very thin.

The peaking and slight decrease in introductory course enrollment has resulted in the number of geology majors leveling off. For the last several years we have had about 100 majors. About 20% are in Geological Engineers, 20% in Geology and 60% in Environmental Geology and Technology. We consider this a good mix. At present most, if not all, of our graduates are able to find good jobs in fields related to their education.

It's too soon to tell what next year will bring, but all indications are that enrollment and majors numbers will stay about the same.

In the day of prosperity be joyful, but in the day of adversity consider.

Ecclesiastes 7:14
Recent Graduates

**December, 1994 Geology Graduates**
Johnson, Kyle (BS Geol)
Kuchera, Andrew (BS)

**December, 1994 Environmental Geology & Technology Graduates**
McNeil, Ann (BS EGT)
Salender, Henriette (BS EGT)

**May, 1995 Geology Graduates**
Ellingson, Jon (MS)
McCloskey, Jerry (MS)
Solie, Kevin (MS)

**May, 1995 Geological Engineering Graduates**
Forsman, Don (BSGE)
Davidson, Joey (BSGE)
Lenz, Bernie (BSGE)
Sickler, Scott (BSGE)

**May, 1995 Environmental Geology & Technology Graduates**
Brooks, Ryan (BS EGT)
DeWeese, Michele (BS EGT)
Ellingson, Christine (BS EGT)
Nygaard, Scott (BS EGT)

**August, 1995 Geology Graduates**
Johnstone, Stephen (BA)
Kroeger, Timothy (PhD)
Pagnac, Darrin (BS Geol)
Sampson, Sherry (BS Geol)

Recent Theses/Dissertations


Education is the best provision for old age.
*Aristotle, Diogenes Laertius (ca 350 B.C.)*
Scholarships and Awards

SPRING 1995:

C. Burt Folsom Memorial Scholarship
Christopher Rousseau

Henry Hinds Scholarship
Robert Burrows

Nicholas Kohanowski Mineralogical Studies Endowment
Robert Burrows

Reba Laird Scholarships
Carissa Munson
Sherry Samson

Harold J. Polta Scholarships
Lee Evans
Carissa Munson
Christopher Rousseau
Bryan Zinda

Emil and Audrey Stoltz Geological Engineering Scholarship
Lee Evans
Carissa Munson

1995-96 ACADEMIC YEAR:

Estwing Pick Award
Robert Burrows

C. Burt Folsom Memorial Scholarship
Carissa Munson

Henry Hinds Scholarship
Robert Burrows
Christopher Klaus

Reba Laird Scholarships
Taunya Ernst
Mark Osborn
Darrin Pagnac

Hugh and Ruth Palmer Scholarships
Abigail Burkett
Constance Holtin
Christopher Klaus
Michael Miller
Steve Miller
Lawrence Sauber
Brian Thomas
Damon Williams

**Harold J. Polta Scholarship**
Joel Galloway
Christopher Rousseau

**Emil and Audrey Stoltz Geological Engineering Scholarship**
Lee Evans
Christopher Rousseau
Bryan Zinda

**Charles H. Waldren Scholarships**
Joel Galloway
Stephanie Mealman

Thou art a scholar; speak to it, Horatio.
Shakespeare, *Hamlet* (1600)
Department Wins UND Research Award Again

In 1985, our department won the Fellows of the University Award for Departmental Research Excellence. On Founders Day in February, 1995, we received the award once again. What makes this award especially pleasing to us is that we also receive many accolades for our teaching. There are other departments on campus that excel at teaching, and some that excel at research, but few who do both. The $1500 award money is being made available to students to support their research.

Other Awards and Honors

Department Chair Patricia Kelley received the Sigma Xi Faculty Award for Outstanding Scientific Research this year.

Graduate students Vicky Andrews and Christina Davids both received Geological Society of America Research Awards. Vicky's proposal was one of 22 (out of 579 submitted) judged to be of exceptionally high merit. Chris is studying a meteor impact structure in Manitoba, Vicky is studying the effect of mass extinctions on predator-prey relationships.

Graduate student Trent Hubbard received a national Sigma Xi Research Grant. Trent is working with John Reid, using “GPS to measure stream irregularities” (whatever that means!).

Former undergraduate Sherry Samson (BS '95) has received the W.A. Tarr Award (a National Sigma Gamma Epsilon award). Sherry is now at the University of Wyoming doing graduate work on soil geochemistry.

Undergraduate Carissa Munson (Geol Eng) was presented with the Ann Peterson Walsh Memorial Engineering Scholarship. The Scholarship is awarded to a woman engineering student entering her junior year at UND who has demonstrated through her academic capabilities and personal attributes that she will grow and succeed regardless of personal and professional obstacles.

Undergraduate Penny Sakry was presented with the Thomas J. Clifford Outstanding Freshman Award at the UND Honors Day Luncheon on April 18. Penny, from International Falls (no wonder she finds Grand Forks winters to be mild) is majoring in Environmental Geology and Technology.

Gloria Pederson, the Geology Department Administrative Secretary, was presented with a Meritorious Service Award this year. The award was long overdue—Gloria has been doing outstanding work for the department for many years.

Karen Alme (BS '94) received the first grant from the North Dakota Research Foundation (North Dakota Academy of Science). Karen is now a graduate student with John Reid. She is working on glacial stratigraphy in Walsh County.

Rob Sickler was this year’s recipient of the F.D. Holland, Jr., Service Award from the local chapter of SGE.

The Department awarded some of the Faculty Departmental Research Award money to help students with their research. Christina Davids, Jon Ellingson, Lee Evans, Jo Ann Harrer, Constance Holth, Trent Hubbard, Mark Osborn, Curt Rockwell and Dave Rush all received funding.

Brothers all
In honor, as in one community,
Scholars and gentlemen (sic).  
William Wordsworth, The Prelude (1799)
Association of Undergraduate Geologists (AUG)
Spring Break Field Trips in Recent Years

In the 1960's, Walt Moore organized AUG Spring break field trips. He led students to the warm climates of West Texas, Utah and other places in the southwest. By all accounts, his trips were a great time—except for all the times they ran out of gas. More recently, in the 1980's, Rich LeFever organized trips to the Ouachitas, the Ozarks, and several other areas of Oklahoma, Arkansas and Missouri. Rich never ran out of gas. Other spring break trips have gone overseas. Frank Karner led students to the Canary Islands and to Hawaii. Dex Perkins, with Frank's help, organized a trip to Spain and Morocco.

There was a decade-long diastem, and then in 1992 Nels Forsman organized a trip to the desert southwest. The students spent the first part of the winter semester putting together an informative, and entertaining, guidebook for use during the trip. (Subsequent trips have done the same thing.) High points of the trip were Death Valley, Meteor Crater, the San Francisco volcanic field north of Flagstaff, and the Grand Canyon (where participants enjoyed a Nels Forsman led death march in and out of the canyon).

The 1993 Spring Break field trip to the southwestern U.S. was a testimony to the spirit and talents of UND's Geology and Geological Engineering students. They planned the trip, obtained funding for travel, and produced a treasure of a guide book. On March 13, 1993, twelve students and Will Gosnold flew to Albuquerque where they rented vans and drove to a planned campsite in El Paso. They spent the next day visiting White Sands National Monument, Carlsbad Caverns and Guadalupe Mts. National Park. The following day they struck out for Big Bend National Park where they hiked, looked at a variety geological features, rode horses, visited Mexico, and had a great time overall. The only blemishes on the trip were on the first day when the airline sent Brent Stafford's borrowed tent to another planet or some where like that and on the second day when Paul Brown sprained his ankle playing football. Paul earned the dreaded Giotkin for missing out on all "out of vehicle" activities for the rest of the trip.

Students basically organized their own trip in 1994. Two months before departure, Dex Perkins was coopted as faculty advisor for the trip. They flew to Las Vegas, undertook the usual searches for lost luggage and delays at the car rental agency, and then made a week long big loop in Utah/Arizona. The first night was at Valley of Fire State Park, Nevada (where the latest Star Trek movie was filmed). Zion National Park was, by most participants' accounts, the most spectacular scenery of the trip.

It was a delightful visit—perfect, in being much too short. 
_Jane Austen, Pride and Prejudice (1813)_

Figure 12. Students on field trip to Canary Islands in 1978

Figure 13. Bryce Canyon in 1984
They also visited Bryce Canyon (Brrr. Cold!) and Capitol Reef N.P.’s before getting to Canyonlands and Arches N.P.’s near Moab. Two days of mountain biking near Moab preceded a rapid trip back to Vegas via the Four Corners and the Grand Canyon. The trip was a great success, although it is rumored that some of the participants would have preferred not to have had their Visa cards when they were in Vegas.

![Biking the Slickrock Trail in 1995](image)

Excited by some of the places visited in 1994, students and Dex Perkins returned to Moab, Utah, in 1995. This time they drove. Along the way, they visited several sites in Wyoming, including Vedawoo and Flaming Gorge. They stopped at Dinosaur Nat’l Monument in Utah and then continued to Arches and Canyonlands National Parks. A high point of the trip was an overnight hiking trip into Grand Gulch Primitive Area (two hours south of Moab), where they saw many Anasazi ruins. The hike was, according to a couple of people, reminiscent of the Forsman death march into the Grand Canyon in 1992. Near Moab, they enjoyed mountain biking on famous trails including Slickrock. The bikes allowed them to get to many spectacular places (see cover photo of this newsletter).

We need the tonic of wildness...
We can never have enough of nature.
Henry David Thoreau, *Walden* (1854)
Columbia Icefields Trips

Spring break trips are not the only time groups of students travel to scenic places. John Reid leads trips to glacier-land every couple of years. Because glaciers are not easily studied when they are still completely snow-covered, the four expeditions to the Columbia Icefields have been either just after classes have finished for the semester, or just before they were to begin in the fall.

The first organized trip was in 1980, when 6 graduate students traveled with John in late May on a tour of the glaciers between Jasper and Banff, Alberta. The second, four years later, involved eight students, including 2 undergrads. That trip, also taken in late May, encountered much more snow, convincing John that future trips should be taken in late summer, instead.

The third trip, in August of 1990, was the largest with 11 participants, including three faculty. The group was too large and so the next trip, in August 1993, was limited to seven graduate students. Although participants on each of the trips learned a great deal about glaciers, those on the last trip benefitted the most. The almost perfect weather didn’t hurt a bit, either! The value of such trips has been enormous; former participants still share stories about their adventures and how much they learned. Thanks to partial alumni support, the cost to students was low enough to allow them to participate.

Figure 15. Mark Elliot (MS ’91) and Jim Sorensen (BS ’91) on the trail to the Bow Hut near Banff in 1990

Seek roses in December, ice in June...
   Lord Byron, English Bards and Scotch Reviewers (1809)
Figure 16. Playing in Florida Bay on a carbonate field trip in May 1990: Jim Sorensen (BS '91), Tim Kroeger, Erik Harvey (BS '91), Mitch Schulte, Barb Sahi (MS '94), Pat Videtic (faculty '88-92)

Figure 17. Geomorphology Class field trip, Birds Hills, Manitoba, 9/17/95
Heat Flow and Recent Climate Change Inferred From Borehole Temperature Profiles

By Will Gosnold

CLIMATE CHANGE FROM BOREHOLE TEMPERATURES

Geophysicists measure temperature-depth profiles (T-z profiles) of the earth by lowering temperature sensors down boreholes. They have, in the past, ignored data from near the surface because near surface temperatures are distorted by surficial affects. Today, we know near-surface measurements may be a key to unraveling climate histories.

Borehole temperature data from North America have been analyzed in many recent studies to assess climatic warming during the past several centuries. The basis for these studies is that the ground remembers changes in surface temperature as thermal signals that move downward by conduction. During very hot times, the earth's surface heats up, and the heat causes the subsurface temperatures to increase. Ground surface temperature varies regularly on diurnal, seasonal and annual scales and irregularly in response to weather systems, interannual climate variability and long-term climate change. All can affect subsurface temperatures, but each becomes negligible over a vertical depth proportional to the period of variation and to the thermal diffusivity of the bedrock. The thermal diffusivity of most continental rocks is such that diurnal signals disappear below a few centimeters, annual signals disappear below about 20 - 30 meters but century-scale disturbances are detectable over lengths of hundreds of meters. Thus, assuming a direct correlation between air temperature and ground temperature, the data acquired in heat flow research may contain considerable information on climate change during the past few centuries.

A common approach to measuring climate change in this type of research is to use a least-squares inversion of the temperature-depth (t-z) profile to calculate a ground surface temperature (GST) history at the borehole site. The result of the least-squares inversion is typically reported as warming above the long-term temperature mean; that is, warming above the GST that would be seen by the borehole in a steady-state condition where no climate change has occurred. An alternate approach is to use a forward model that provides a best fit to the observed t-z profile assuming a ramp or step increase in GST from a steady-state condition. The results of these two methods are comparable and show that ground surface warming in North America has been about 0.3 K to 4.0 K, depending on the locality, during the past 100-150 years.

These results have significant implications for our understanding of global climate change in that they show an unambiguous, century-long warming trend. However, questions remain about the precision and nature of the borehole record. Does the warming calculated from borehole data match the warming observed in the air temperature record on local, regional and continental scales? Do changes in ground-surface temperatures correspond 1:1 with changes in air temperatures? How large is the geographic area represented by a single borehole?

We are investigating these questions by comparison of GST histories and surface-air-temperature records along a 2000-km north-south transect in the midcontinent of North America and by examining air-ground coupling at many localities along the transect. The key aspect of the study area is that simulations of global climate change based on increased greenhouse gas concentrations predict that warming should increase with latitude along the transect. Thus, our project offers the possibility to test one of the critical questions about global warming.

They fell upon an ungenial climate, where there were nine months of winter and three months of cold weather...
U.S. Grant, Speech in 1880
Besides the heat flow holes drilled in Texas, South Dakota and Manitoba, we have measured t-z profiles from 28 boreholes drilled and completed specifically for heat flow research in the Great Plains province between 1979 and 1990. Special criteria determine the suitability of a borehole for climate research, i.e., absence of microclimatic disturbances due to surface topography, no land use changes, no potential for vertical ground water flow, and no terrain effect on the geothermal gradient. Although the boreholes near Grand Rapids are in karst regions, they satisfy all other criteria and offer the possibility of extending our transect northward by 500 km. Consequently, we felt that an opportunity to make temperature measurements in those boreholes must be accepted.

RESULTS OF CLIMATE CHANGE ANALYSIS

Analysis of century-long warming trends in the Northern Plains by linear regression of air temperature data and inversion of borehole temperatures gives average values of +1.1 K for the air temperatures and +1.4 K for the borehole data. The amount of warming in both data sets increases with latitude, but the increase is greater for the borehole data. Warming amounts determined for the two different data sets generally agree south of 42 N latitude but disagree for points to the north. To investigate the reason the results from the two data sets disagree, we analyzed decade-long time series for daily mean air and soil temperatures. We found that the two temperatures correspond well when the average daily air temperature is above freezing but not when it is below freezing. The winter departure between air and soil temperatures varies erratically from year to year, but it consistently begins when the average daily air temperature falls below freezing. This departure point does not necessarily correspond with the onset of seasonal snow cover, but it does correspond with the initiation of freezing. The latent heat released during freezing of a moist soil layer holds the ground temperature near the freezing point causing the average annual GST to be warmer than the average annual air temperature. An increase in fall precipitation in the Northern Plains during the past 30 years has increased soil moisture at the time of ground freezing and has caused a secular increase the average GST. This is significant since only 15 of the 362 borehole sites in North America analyzed for GST histories lie in regions that do not experience seasonal ground freezing.

However, our research in Manitoba suggests that this potential problem may not apply to all borehole sites. Forward modeling and inversion of M-4-94 near Grand Rapids, Manitoba shows that ground warming has been approximately 1.4 K over the past century. This point falls three degrees below the trend predicted from our boreholes drilled in the Pierre Shale in the Northern Plains. The critical difference at the M-4-94 site is that glacial scouring removed the soil cover so the ground cannot become saturated and insulate the subsurface from extreme temperatures. Consequently, we believe that the GST history obtained from boreholes in exposed impermeable bedrock may contain an accurate record of temperature change, but the GST history obtained from boreholes drilled in thick soils or porous bedrock may be "contaminated" by secular variations in precipitation.

What men call gallantry, and gods adultery,
Is much more common where the climate's sultry.
Lord Byron, Don Juan (1819)
Confessions of a Schizophrenic Science Teacher

by Dex Perkins

In 1989, the Department of Geology an Geological Engineering began offering a course (Geology 103) called Introduction to Environmental Issues. Because I was active in environmental politics, I was one of the first instructors asked to teach the course. Consequently, when I returned from leave in the Spring of 1990, I taught for the first time a course that is now my favorite. I have taught it 10 times since.

My original goals for the course were to educate students about environmental issues. It was clear to me that greed, ignorance and arrogance were destroying the world—or at least many important aspects of the world. Surely, I could convince students of the same thing. Maybe they would become better citizens for it. Practically before I got started, I ran into problems.

It is one thing to be an environmental activist. It is another to try to put together a reasonable curriculum for a course. What should I teach, and how should I teach it? I looked at many text books that had the word “environment” in the title. I concluded that too many of them were full of biology, chemistry, economics, politics and other things that I really did not think I would feel comfortable teaching. So, I elected to use an environmental geology text. Students read the text, and I supplemented it with, often anecdotal and poorly researched, views on environmental issues.

After two semesters, I realized that the course needed changes. It did not excite me, and I was sure I was not giving the students a good introduction to environmental issues. Instead I was giving them an introduction to earth science, the same introduction they could get from several other classes, and a some highly biased political commentary. I finally had to acknowledge that teaching a reasonable course meant teaching an interdisciplinary course. So, I began to read lots of different books, and I decided to use textbooks that were more interdisciplinary. I also began to look at the arguments of the “bad guys” with more care. Rather than just dismissing what they said, I tried to figure out why they believed what they did. Along the way, a scary thing happened—some of their arguments began to make a little more sense.

In the following semesters, I taught Introduction to Environmental Issues as a truly interdisciplinary course. Using environmental issues as the framework, I covered geology, biology, chemistry, economics, politics, sociology and many other things. Rather than discussing each by itself, over several semesters I discovered ways to weave them together. I had always liked undergraduate teaching, but now I found myself getting excited about it, and I studied ways it could be done better. The students responded with great enthusiasm. They seemed to find the material very accessible—and many said that this was the first course they had taken which cut across discipline boundaries and tied things together. I, and they, realized just how artificial some of those boundaries are.

As part of the revised course, I emphasize that the issues we discuss are not always straightforward. The students read many contradictory articles and have to choose sides. I have students write weekly essays, forcing them to express their own opinions in reasonable English. Many of them are uncomfortable with the writing assignments—in part because they are poor writers, and in part because they have never written papers that required original thought before. Nevertheless, the class evaluations come back overwhelmingly positive. Every semester, several students say that the writing is a pain and that there is too much of it. Yet, they always acknowledge that they learned a lot and that their writing got better.

If teaching a large interdisciplinary course was fun, what about teaching a smaller one? In 1992, Scot Stradley (Department of Economics) and I taught a course entitled Evolution of Environmental Thought. We had about 10 students and lots of fun. We read philosophical essays, science articles, economics books—lots of different things to get student reactions and to entertain ourselves. The students wrote papers and graded each other. That course was so much fun that, in 1994, I tried another small course
(with Colin Hughes of the Biology Department) called *The Diversity of Life*. The course was based on E.O. Wilson's book of the same title. Although emphasizing biology, it included much politics and economics. Students wrote papers on a variety of topics. The first assignment was to explain why birds sing at sunrise. (The best answers to this question, one that does not have a correct answer, came from the non-biology majors who could not regurgitate some non-applicable science they had learned.) Since then I have taught two other small interdisciplinary courses.

I enjoy teaching interdisciplinary courses. They stimulate me because I read new material, and think about new things. Teaching with others is especially fun because I learn a lot from my colleagues. The classes stimulate the students and show them that everything connects to everything else. They may learn, for example, that chemistry is not just a bunch of formulae, but a science that has relevance to their lives. Throwing in open ended writing assignments makes the students think rather than memorize—surely a desirable goal. Surprisingly, some students who have unexceptional academic records excel at this sort of course work. All students who take such courses learn a lot more than from traditional courses.

The lessons I have learned from teaching interdisciplinary courses have helped me improve teaching of traditional geology courses. I no longer stick to the standard curricula, and I actively get students involved in the learning process in ways I did not previously. I cover most, but not all, of the same material as before. The students enjoy the courses more and, I am convinced, take much more of value away from them.

To teach is to learn twice.  
*Joseph Joubert, Pensees* (1842)

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### Won’t You Help?

If it were not for the generous support of our alumni and friends, we just couldn’t do all the necessary things we do. You’ve been wonderful, but we need your support even more as our programs grow and state support decreases.

**Are there some things you are willing to contribute money for, and others you are not?** That’s fine, just let us know: your contributions will go to the right place! You can choose from one of our “special accounts,” or just tell us what you want done with your contribution. In other words, your contributions are sincerely appreciated and we abide by your specific wishes on use of contributed funds.

Some of the special accounts we keep are:

- N.N. Kohanowski Memorial Fund (for student/faculty support in mining, economic geology, geochemistry, petrology, or mineralogy)
- Carbonate Geology Studies Fund
- Sedimentology Lab Fund
- Stable Isotope Geochemistry Fund
- Alan M. Čvancara Graduate Research Award Fund
- F.D. Holland Jr. Geology Library Endowment Fund
- Water Quality Lab Fund
Honor Roll of Patrons

In order to recognize and honor contributors to the Department of Geology and Geological Engineering, the Geology Alumni Advisory Committee has designated the following categories: Life Patron—$10,000; Honor Patron—$5,000; Sustaining Patron—$1,000; Patron—$500. All contributions to the Department are accumulative and applicable toward the next larger category. Many companies match, or double or triple match your contribution. Gifts may be sent directly to the Department or channeled through the UND Alumni Office to any Department fund, or the Geology Development Fund and may be designated for a specific purpose, if the donor so chooses. You may be assured that your donation will be used for the purpose you designate. To express our continued appreciation and gratitude for their generous gifts to the Department, the names of our Patrons will be listed in each issue of the Alumni News.

Life Patron ($10,000):
Dr. & Mrs. Thomas Hamilton
Bernold M. Hanson
Dr. & Mrs. F. D. Holland, Jr.
Dr. Wilson M. Laird
James W. McKee
Hugh and Ruth Palmer

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Mr. & Mrs. Charles Cook
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Catullus, the worst of all poets, gives you his warmest thanks; he being as much the worst of all poets as you are the best of all patrons.
Catullus, Carmina (ca 70 B.C.)
Former UND Geology Faculty:
Where are they and what are they doing?

(There are a few gaps in our knowledge-help us fill them if you can!)

Wilson M. Laird (fac 1940-71)
Kerrville TX
Retired

Erving Grossman (fac 1946-49)
Yardley PA
?

Donald F. Towsse (fac 1951-54)
San Jose CA
?

Gordon L. Bell (fac 1953-57)
Bismarck ND
Retired, part time consultant

F.D. (Bud) Holland, Jr. (fac 1954-89)
Grand Forks ND
Retired

Jon L. Rau (fac 1957-58)
Bangkok THAILAND
Officer-in Charge, United Nations Mineral Resources Program

T.T. Quirke, Jr. (fac 1958-60)
Golden CO
Retired, Genealogical research with Quirke, Quirke and Assoc.

L.B. Gillett (fac 1959-62)
Plattsburgh NY
Teaching/research-SUNY Plattsburgh

Mark Rich (fac 1959-63)
Athens GA
Retired, Univ of Georgia

Richard McCammon (fac 1960-61)
Bethesda MD
?

For rigorous teachers seized my youth,
And purged its faith, and trimmed its fire,
Showed me the high, white star of Truth,
There bade me gaze, and there aspire.
Arnold, Grand Chartreuse (1855)
Walter L. Moore (fac 1960-81)
Houston TX
Retired

Arthur Reesman (fac 1962-63)
Franklin TN
Retired

Alan Cvancara (fac 1963-91)
Casper WY
Retired, writing

E.A. (Ned) Noble (fac 1965-78)
Reston VA
Retired

Lee Clayton (fac 1965-80)
Madison WI
Geologist-Wisconsin Geological Survey

Arthur F. Jacob (fac 1969-76)
Denver CO
Environmental Software Sales, and consulting

Steve Moran (fac 1971-76)
Alberta Resources Council
Geologist

Odin Christensen (fac 1974-78)
Denver, CO
Chief Geologist, Newmont Mining Corporation

Timothy Cross (fac 1976-78)
Evergreen CO
Teaching/research-Colorado School of Mines

David B. Johnson (fac 1978-80)
Socorro NM
Department Chair, Teaching/Research-New Mexico Tech

L.C. Gerhard (fac 1978-81)
Lawrence KS
Director, Kansas Geological Survey

Don L. Halvorson (fac 1979-88)
Show-Low AZ
Teaching-Northland Pioneer College and Northern Arizona University

Come forth into the light of things,
Let Nature be your teacher.
   Wordsworth, *The Tables Turned* (1798)

Figure 20. Odie Christensen and Fred Wossick
(BS '74 MS '77) in 1974

Figure 21. Dave Johnson in 1979
Alan Kehew (fac 1980-86)
Portage MI
Teaching/research-Western Michigan University

Ken Harris (fac 1981-88)
Champlin MN
Geologist-Minnesota Geological Survey

Robert Stevenson (fac 1981-88)
Oak Ridge TN
Research Scientist

Min Chu (fac 1982-93)
Bakersfield CA
Energy Engineer

Howard Fischer (fac 1982-88)
Tallahassee FL
Teaching/research-Tallahassee Community College

Patricia Videtic (fac 1988-92)
Jenison MI
Teaching/research-Grand Valley State University

Joel Kuszmaul (fac 1993-95)
Queensland, AUSTRALIA
Teaching/research-The University of Queensland, AUSTRALIA

Figure 22. Howard Fischer in 1982

For we have hirelings in the camp, the court, and the university...
Milton, Poems from the Pickering Manuscript (c 1809)
LEEPS Lecturers 1994-1995

The LEADING EDGE OF EARTH AND PLANETARY SCIENCES (LEEPS) lecture series is now in its fifth year. It is known as the most successful lecture series on campus. The goal of the series is to bring outstanding scientists to our campus to share their research and their ideas with us. While they are here, we show them what a wonderful department we have. (Excellent advertising!) We have long concluded that LEEPS is especially beneficial to students who can’t help but be inspired by the energy and drive exuded by our visitors.

Funding for LEEPS remains a problem. We have no reliable source, and are forced to go “foraging” every year. If you would like to contribute to this excellent lecture program, we would be delighted!

During the 1994-95 year, LEEPS speakers and their presentations were:

Dr. Robert Slaughter, Southern Methodist University
- CREATIVITY IN SCIENCE AND ART
- ICE AGE CLIMATE, FAUNAL EXTINCTION AND THE FIRST AMERICANS

Dr. John Annexstad, Bemidji State University
- SEARCHING FOR METEORITES IN ANTARCTICA
- METEORITE CONCENTRATIONS IN ANTARCTICA, GLACIOLOGICAL CONSIDERATIONS

Dr. David Chapman, University of Utah
- BOREHOLE TEMPERATURE STUDIES LINKING SOLID EARTH AND METEOROLOGICAL SIGNALS OF GLOBAL CHANGE
- HEAT FLOW AND HYDROTHERMAL CIRCULATION THROUGH THE OCEAN FLOOR: NEW RESULTS FROM THE JUAN DE FUCA RIDGE

Louisa Wilcox, Greater Yellowstone Coalition
- YELLOWSTONE NATIONAL PARK AND ECOSYSTEM MANAGEMENT: HYPE OR HOPE?
- BISON AND WOLVES AND BEARS, OH MY! WILDLIFE OF YELLOWSTONE

Dr. Brian B. Looney, Westinghouse Savannah River Company, Oak Ridge Institute for Science and Education
- TECHNICAL INNOVATIONS IN GROUNDWATER REMEDIATION

Dr. Eric Essene, University of Michigan
- GEOLOGICAL TERRANES IN NEW YORK AND ONTARIO
- CLAY MINERAL AND OTHER GEOTHERMETERS IN SEDIMENTARY BASINS

Dr. Guy Hovis, Lafayette College
- PREDICTING MINERAL BEHAVIOR IN THE EARTH’S CRUST
- THERMODYNAMIC PROPERTIES OF MINERAL SERIES, WHAT DO WE KNOW AND WHERE DO WE GO?

If for the sake of a crowded audience you do wish to hold a lecture, your ambition is no laudable one, and at least avoid all citations from poets, for to quote them argues feeble industry.
Hippocrates Precepts (ca 420 B.C.)
Dr. Inge Arseth, University of Bergen, Norway
- WESTERN NORWEGIAN FJORDS: THEIR FORMATION AND SEDIMENTS
- ENGINEERING GEOLOGY IN NORWEGIAN FJORDS: PROBLEMS WITH TUNNELS, CHANNELS AND OIL PIPELINES

Dr. Paul A. Hsieh, USGS (1995 Henry Darcy Lecturer)
- A MULTIDISCIPLINARY, MULTISCALE INVESTIGATION OF FLUID FLOW AND SOLUTE TRANSPORT IN FRACTURED CRYSSTALLINE ROCKS: FINDS FROM THE MORROR LAKE SITE, NEW HAMPSHIRE

Figure 23. Standard after-LEEPs-lecture goodies

Wanted: Information!

We are always trying to find out what our alums are up to. And, we never find out anything unless someone tells us.

Please, let us know what’s going on in your life...
or, even what’s going on in someone else’s life.

Why not fill out the information form (last page of this newsletter) and send it in now?

Suspense in news is torture.
*Milton, Samson Agonistes (1671)*
During the past year, the University of North Dakota Energy & Environmental Research Center (EERC) expanded its international scope, formed new partnerships with government and industrial clients, and helped bring new wealth into the northern plains region to create jobs and economic growth. The EERC continues to evolve to help meet the energy and environmental needs of society. The scope of its research includes a broad range of renewable and nonrenewable energy resources and environmental technologies focused on pollution prevention and the cleanup of air, soil, and water contamination.

Water-related issues are becoming a more important part of the EERC’s research programs. The Center conducts the groundwater research program for the North American oil and gas industry and operates a regional project for the Department of Agriculture studying the impacts of agricultural chemicals on groundwater. The EERC is also actively involved in the formation of the Red River Basin Water Management Consortium, a partnership between key industry, government and research organizations that will address water management issues in the Red River basin. Another project in which the Center is participating is the Red River Basin Riparian Demonstration project which is aimed at restoring riparian areas and improving surface water and groundwater in eastern North Dakota.

The EERC is actively developing innovative technologies to clean up contaminated or unusable water. For example, using a process called freeze–thaw evaporation (FTE), salty water in a marshy area west of Grand Forks could be transformed economically into high-quality water that’s usable for drinking, irrigation or agricultural processing. The process relies on evaporation in warm weather and ice crystallization in below-freezing temperatures to separate salts, organic material and other contaminants from brackish water to make it a source of potable water.

Recognized as a world leader in the field of mercury research, the EERC’s ongoing Project Mercury encompasses a broad range of research and technologies aimed at preventing mercury from entering the

Figure 24. Gerry Groenewold (MS ’71 PhD ’72), the Director of the EERC, a few years ago!

Technology...the knack of so arranging the world that we don’t have to experience it.

Max Frisch, Homo Faber (1957)
environment and cleaning up mercury contamination. The focal point of this project is the EERC’s Center for Air Toxic Metals, funded by the Environmental Protection Agency. Research activities focus on collecting data on how mercury behaves in energy-producing systems, improving mercury sampling and analytical procedures, enhancing existing pollution control technologies, and developing more advanced technologies to control mercury and other hazardous pollutants.

Working with the Gas Research Institute (GRI), the EERC is also developing innovative methods to clean up and prevent mercury contamination of groundwater at thousands of gas industry sites around the country. In addition, the EERC has teamed with GRI and DOE to provide education and training on mercury research and control technologies for oil and gas industry personnel.

Late last year, the EERC became an active partner in DOE’s Environmental Restoration and Waste Management Program, which is aimed at demonstrating and commercializing new technologies to characterize and clean up environmental contamination at nuclear weapons facilities and other sites. Critical to this effort is the need to accelerate the commercial development of new technologies. The EERC’s EM Program is designed to assist the private sector in advancing faster, safer, and cheaper analytical techniques and environmental cleanup technologies toward demonstration and full commercial application. Working in cooperation with DOE's Morgantown Energy Technology Center (METC), the EERC provides technical support and serves as a broker in arranging and implementing jointly sponsored research projects.

In the area of renewable energy and alternative fuels, North Dakota's Turtle Mountain Band of Chippewa is working in partnership with the EERC to develop its wind energy resources. The project began in May 1995 and is being conducted in three phases on the 36-square-mile Turtle Mountain Reservation in north central North Dakota. The goals are to develop a model wind program for the Chippewa Tribe and determine the feasibility of building a larger-scale wind power plant to produce the reservation's electricity. The Center recently received approval to conduct a similar wind energy project with the Devils Lake Sioux. The EERC is working with EnerTech Environmental, Inc., a nationally recognized leader in reuse technology for municipal solid waste (MSW), to develop hydrothermal treatment methods for producing a pumpable liquid slurry fuel from MSW and coal. The EERC continues to operate its National Alternative Fuels Laboratory, which has worked with government and industry organizations to study evaporative emissions from ethanol.

On the international front, the EERC's initiative in East Central Europe took a big step forward in November 1994 with the successful completion of the Center's second energy and environmental conference in Prague, Czech Republic. The conference and its associated workshops attracted more than 300 industry representatives, government officials, and researchers from 20 countries. Entitled "The Second International Conference on Energy and Environment: Transitions in East Central Europe," the conference was organized and cosponsored by the EERC and the Power Research Institute of Prague (EGÚ Praha).

Other international developments include a project with the Electrical Generating Authority of Thailand (EGAT), which is working with the EERC on a study to determine the feasibility of producing energy using underground coal gasification near the Krabi mining area of southern Thailand. The EERC assisted the Lagoven Amuay Refinery in Judibana, Venezuela, one of the world's largest refineries, in recovering vanadium, a valuable element found in unusually high concentrations in the crude petroleum of northern South America.

The EERC's market-oriented approach has enabled it to build partnerships with key industries leading to opportunities for technology commercialization and export, as well as the creation of spin-off businesses that hire more people and foster growth, multiplying the economic benefits to local communities and the surrounding region.

The imperatives of technology and organization, not the images of ideology, are what determine the shape of economic society.
Memoria

Wally Bakken (BS '58, MS '60), 60, of Denver, died unexpectedly in November, 1994. He was born in Grand Forks in 1934. He received two degrees from the University of North Dakota before beginning a career as a petroleum geologist. When he was young, Wally worked on his uncle’s farm near Adams ND. Throughout his life, his love for the land was a constant. In 1991, he and Marian purchased a farm in the beautiful rolling hills of southwestern Wisconsin. They were in the process of building a home on that land when he passed away.

Reuben Vig (BSMIE '37, MS '63) passed away on January 3, 1995. Reuben was a Crookston MN native, and earned two degrees at UND. He was a retired project geologist for the U.S. Corps of Engineers in Kansas City MO. He was preceded in death by his wife, Elmira.

Wendell (Bill) Orndorf (BSMIE '31) passed away in January. Bill graduated in 1931, and although he soon left North Dakota for Texas, he was a true son of North Dakota.

Raymond Blum (BS '57) passed away in July. Raymond was retired from Pacific Gas and Electric (San Francisco CA) and working at a new career with Bell Co. in Denver when he died. He is survived by his wife, Billie-Jean, who lives in Denver.

Ken Peterson (BS '42) was from Finley ND. He entered the University of North Dakota in 1940 after attending Concordia College in Minnesota for one year. Most of his professional life was spent with Teledyne Exploration Company as a geophysicist, working in Canada, many southwestern states and overseas. He is survived by his wife, Beulah, a son and a daughter, three grandsons, two granddaughters and three sisters.

John Rouzie (friend of the Department), formerly of Bowman ND, died in May. John was a businessman and banker in North Dakota, and held numerous state and national positions during his career. He was a benefactor of numerous education and health institutions throughout North Dakota. The John Rouzie Endowment at UND supports scholarships and fills priority needs that benefit students.

It has come to our attention that Stanley Fisher, a former faculty member, passed away during the last year. Stanley was on our faculty from 1947-53. Our condolences go out to his family.
Alumni News Notes

1940's, 50's and 60's

Bob Aaker (BS '49), an A.G. Leonard Medal awardee this fall, retired from Conoco. He finds more time for playing the organ now! (You didn't know he was an organist?) Congratulations, Bob! (See Charles Meldahl, BS '62, below.)

John Redmond (BS '55) was honored with a Sioux Award this fall. John is Vice President of Research and Engineering for GTE Corporation and President of GTE Laboratories Inc. in Waltham, Massachusetts. E-mail: JCR2@GTE.SPRINT.COM. Congratulations John!

Jan Beiers (BS '60) has a new address. He is living in Indonesia where he works as operations and project planning and development manager for Santa Fe Resources Jabung Ltd.

Bob Harris (BSGE '60) visited the alumni gathering in Seattle at GSA last year. Bob is Chairman and CEO of the Harris Group, Inc., a diverse company originally organized to service oil, gas, chemicals, marine, power, and the pulp and paper industries! In 1992, Harris Group International, Inc., was established as a subsidiary of Harris Group, Inc., adding to the offices in Wisconsin, Denver, South Carolina, Portland and Seattle. The company's motto is "Engineering for optimum performance." We salute you, Bob, for your achievements!

Charles Meldahl (BS '62), now in land work and environmental consulting in Wisconsin, read humorous letters from relatives honoring his uncle Bob Aaker (see the first Alumni News Note, above) at the Leonard Award banquet.

Erling Brostuen (PhB '65) is Director of the Energy and Minerals Field Institute at the Colorado School of Mines in Golden CO. He and his wife, Pearl, live in Thornton.

Bob Sigsby (PhD '66) - see Frank Schulte (BS '65, MS '71, PhD '72), below.

Rod Feldmann (BS '61, MS '63, PhD '67) is Assistant Chairman of the Department of Geology at Kent State University. In 1994, he did field and museum work in New Zealand in January and February, as well as work at the British Antarctic Survey, Cambridge, UK, in May, and taught Summer Field Camp in the Black Hills in June and July. In 1995, he did field work in Argentina in January and February, and in Mexico in May. Between those trips, he vacationed in Hawaii, France and the Canadian Rockies. It's a tough life! And, by the way, he published his usual great papers too.

Jerry Pope (BSGE '68) is the head engineer with Ensign, an oil and gas leasing firm operating under British Merchant Marine pension fund investments. Ron Brown (BS '68) also works for Ensign.

Wilson Laird (fac 40-71) says he's doing fine in retirement. This year he moved to a new house and spent a week at his lake cottage near Bemidji. His biggest challenge, he says, is trying to figure out how all the new computer programs work on his Macintosh. "They keep on getting new programs and ways of doing things that are beyond me. Getting old I guess." (Actually, Doc, the rest of us haven't figured those things out either. Age has nothing to do with it!) He has mastered E-mail. His address is WLAIRD@KTC.COM.

What though youth gave love and roses,
Age still leaves us friends and wine.
Thomas Moore, National Airs (1815)
1970's

Tom Hamilton (MS '67, PhD '70) is now on the UND Alumni Association and UND Foundation Board of Directors. He was elected at the Annual Meeting on May 25th. Tom is group vice president for Pennzoil Company and president, Pennzoil Exploration and Production Company. Tom has been with Pennzoil since 1991. He and his wife, Carolyn, have two children and live in Houston.

Terry Bailey (BS '70) continues as a development geologist in Chevron's Gulf of Mexico Business Unit. He says he spends 50% of his time at a work station as he "sees more emphasis on 3-d seismic interpretation." He is part of Chevron's oil spill response team. He and Marie took a vacation to Germany this spring to visit relatives. Terry is a member of the University of North Dakota Foundation Presidents Club.

A. Kirth Erickson (BS '67, MS '70) was with Jacobs Engineering out of Richland WA for six years before being furloughed. He is now working out of Ogallala NE where his minister wife and two adopted boys live.

J. Mark Erickson (MS '68, PhD '71) has been appointed to the James Henry Chapin Professorship in geology at St. Lawrence University in Canton, N.Y., where he is chairman of the Geology Department. E-mail: MER@MUSIC.STLAWW.EDU

Harold Ziebarth (MS '62, PhD '72) is a consultant out of Denver, working as "Zoroil."

Mary Scott (MS '72) has now received tenure at assistant professor rank, at the Ohio state University Science and Engineering Library. E-mail: SCOTT.38@OSU.EDU

While in Denver instructing at a workshop for the Corps of Engineers in April, John Reid visited with Kent Johnson (BSGE '69, MS '71) and Charlie Cook (BS '68, MS '74). They work for Kodiak Oil & Gas Co. Where business is "moderate this year, but not great yet." Kent and Cathy have two sons, one in Santa Clara and one still in high school. Cathy works as a proposal coordinator for Denver University. Charlie and Nancy have four children, one at the University of Colorado, one at Colorado State University, and two younger, including the youngest, an adopted Korean girl. It was great to see Kent and Charlie again.

Frank (BS '65, MS '71, PhD '72) and Cindy Schulte dropped by unexpectedly in August while in the area for a family reunion. Frank, with Exxon, has been busy establishing exploration possibilities with CIS (the former Soviet Union) as well as working on a project in Italy. Most of his time is spent in Houston, though. He is so tired of planes that when he goes on vacation he drives, even if the drives are long. Frank reports that Bill Bickley (MS '70, PhD '72) is involved with planning international activities based on what he learns about competitor companies. He has been transferred by Exxon to Midland TX. Ladd Hagmaier (MS '67, PhD '71), also with Exxon, is working almost entirely with CIS possibilities. Ladd is a member of the University of North Dakota Foundation Presidents Club. Bob Sigsby (PhD '66) is recently retired...any more years of income would just go to his heirs! It was great seeing Frank and Cindy after so many years of missing their visits. Frank is getting grey, but not Cindy. They looked great.

Ladd Hagmaier (MS '67, PhD '71) - see Frank Schulte (BS '65, MS '71, PhD '72), above.

Roland Connors (Ex '71) is a very successful school teacher after a start in the mining business. He was "Teacher of the Year" at South High School in Denver. Congratulations Roland. (Anyone have his address?)

Darryll Pederson (MS '66, PhD '71) won the Geological Society of America Hydrogeology Division Distinguished Service Award. The award was presented at the GSA meeting in Seattle last year. Congratulations!

All the news that's fit to print.
Adolph Simon Ochs, Motto of the New York Times (1858)
Bill Bickley (MS '70, PhD '72) - see Frank Schulte (BS '65, MS '71, PhD '72), above.

Marcella (Hanson) Melsted (BS '75), sister of Bruno Hanson (BS '51) received a Sioux Award in 1995. Her career has included employment with the U.S. government in Washington DC, terms with the U.S. Foreign Service at embassies in Norway and France, and Administrative Assistant the North Dakota Geological Survey. When working for the Survey, she devoted much time to the expansion of the Department during the 1950s through the planning of the building and the move to Leonard Hall in 1965. She was an outstanding secretary and administrator. Congratulations Marcella.

Lee Nusich (BSGE '72) is living in Beaverton OR. He is a practicing lawyer, having received a law degree from the University of Oregon in 1977. But he still does geology stuff; he recently took a field course from Eastern Oregon University.

Bill Hickey (MA '73) was working for Edwards Brokerage Co. We are not sure of what he is doing now. Someone tell us!

Fred Wosick (BS '74, MS '77), vice president of operations and acquisitions at Fidelity Oil Group, has been elected to the Rocky Mountain Oil and Gas Association's Board of Directors and Executive Committee. He and his wife, Beth, live in Bismarck.

Dennis Storhaug (BS '70, BSGE '77) is presently with Snyder Oil and Gas.

Odin Christensen (Fac '75-78) is still Chief Geologist for Newmont Mining Corporation in Reno. He returned for homecoming this year to give a talk on "Carlin-type sedimentary-rock-hosted gold deposits in Nevada and China: Similar rocks – worlds apart."

Terrance Zich (BSGE '77) - see Kale McNaboe (BSGE '94), below.

Kip Carroll (MS '78), by all accounts, did a splendid job as general chairman of the 7th International Williston Basin Symposium in Billings in August. It was good to see Kip at the Leonard Award Banquet this fall.

Gail Bergan (BS '79) reports that 1994 "was a good year. My consulting business took off and I am doing a pleasant mix of geological consulting (carbonates) and technical writing/editing." She was remarried in March to Bill Devlin, a geologist with a PhD from Columbia. "Life is good in Houston," she says!

1980's

Ray Butler (BSGE '70, MS '73, PhD '80) coauthored a paper "Environmental Impact of Fly Ash Disposal at Colorado, Illinois, and Ohio Test Sites—Hydrogeological Approach" at the Groundwater Quality: Remediation and Protection GQ '95 Conference in Prague, Czech Republic. Ray also coauthored a paper titled "Extinction and Recovery of Nonmarine Molluscan Assemblages in the Late Cretaceous and Early Tertiary" that Joe Hartman (EERC, Adj Fac '92-'94) presented at the Rocky Mountain Sectional Meeting of GSA in Bozeman. Hartman, himself, presented a paper entitled "India and North Dakota: A Temporal If Not Faunal Connection" at the Annual Paleontology Symposium at the Pioneer Trails Museum in Bowman.

The people people have for friends
Your common sense appall,
But the people people marry
Are the queerest folk of all.
Charlotte Perkins Gilman, Queer People (1899)
Fred O'Toole (BS '78, MS '81) is currently living in Rangely CO. He is a Geologic Supervisor for Enhanced Recovery Operations at Chevron’s Rangely Field CO. Karen and two sons, Daniel (8) and Andy (6), are doing great and enjoying the benefits of life in a small town.

Randy Nesvold (BSGE '81) received his bachelor’s degree and then went on to get a Masters in Petroleum Engineering from the University of Houston in 1992. He has worked for Phillips Petroleum since '81. Last November, he was transferred from Houston TX to Stavanger Norway. His new position is Ekofisk Reservoir Engineering Director for Phillips Petroleum Company.

Paula Leier-Englehardt (BS '82) and husband, Jim won the National Rowing Regatta Championship in Augusta GA, and came in third in the next younger class!

Tina Langtry (MA '82) is a Conoco Oil Company VP. Tina manages Conoco’s Norway exploration program. She supervises 70 employees and coordinates the company’s activities. Tina was back for Homecoming this year and presented a noon seminar (“A Glimpse of an Integrated International Oil Company”) in honor of Walt Moore and Bob Aaker, this year’s A.G. Leonard Medal recipients.

Gary Stefanovsky (BS '83) is an environmental scientist in the ND Department of Health, Bismarck.

Dave Brown (MS '83) is an environmental geologist in St. Paul. He and his wife Lori have a son, Alex, and twin girls, Abby and Colleen. Having three pre-schoolers makes life “bedlam” according to Dave.

Kyle Hodenfield (BSGE '84) stopped by with wife, Kim, to report on his work with Schlumberger. He is now manager of the region encompassing Wyoming, Utah, Montana and part of Colorado. Kyle works out of Evanston WY. Schlumberger is eagerly looking for geological engineers, especially those with petroleum backgrounds. Kyle reports that Dan Miller (BA '84) is with Schlumberger in Denver, Jeff Sande (BSGE '84) is with Cal Resources (formerly Shell) in Bakersfield CA, and Dave Gillis (BSGE '84) is an off shore seismic specialist working out of New Orleans.

Larry Thrasher (MS '85) is “doing great in sunny, southern Arizona.” Larry is a certified mineral examiner for the feds, working for the BLM. He spends of most of his time evaluating the validity of mining claims and reviewing mine reclamation. He and his wife, Karen, and two kids (John and Sarah) have just bought a new house.

John Hoganson (PhD '85) was the after dinner speaker at the North Dakota Academy of Sciences (April 25, Bismarck) and the organizer of the Centennial Symposium for the North Dakota Geological Survey at the same meeting.

Chris Quinn (MA '86) reports that Alan Gatheridge (BS '79) is working with him as a mud logger with Conoco in the Newport Field, Dickinson ND.

John Harju (BS '86) presented a paper entitled “Mercury Remediation in the Gas Industry” at the Second Annual Conference on Soil Remediation, sponsored by Environmental Week, in Washington D.C. John also made a presentation on “Rapid Field Screening, Sampling and Analysis and Field Site Research Results” at an EERC sponsored workshop in New Orleans.

Gary Winbourn (BS '78, MS '86) - see Kale McNaboe (BSGE '84)

Chris Zygarlickie (MS '87) presented a paper, coauthored by Don McCollor (EERC) and Steve Benson (EERC), entitled “Study of Inorganic Transformations During Low-NOx Combustion” at the 9th Annual Technical Conference of the Advanced Combustion Engineering Research Center, Provo, Utah.

Fond memory brings the light of other days around me...
Thomas Moore, *National Air* (1819)
Kurt Eylands (BA '81, MA '89) and John Kay (BSGE '93) coauthored a paper titled "Mineral Phase Determinations for Non-Naturally Occurring Materials" at the Applications of X-ray Analysis 44th Annual Conference in Colorado Springs.

Rod Perkins (MS '87) now works for Tamarack Environmental Services, Inc., in Lakewood CO.

1990's

Jim Cron (BSGE '90) is currently a reservoir, operations and acquisitions engineer for Petro Gulf, Inc., a company operating in 5 states. Recent accomplishments include a 200 bopd uplift of a Wyoming lease, a major facilities redesign, and multi-well waterflood acquisition. His future plans include travel and work in (offshore) Australia.

Alan Cvancara's (Fac '83-'91) book, A Field Guide for the Amateur Geologist, has been revised and released by John Wiley and Sons. Al has been a prolific author since he left UND a few years ago. He and his wife Ella still live in Casper, Wyoming. This summer he returned to Grand Forks, revived his old musical group "The Gentle Country Folks" and performed at a festival in Manitoba. Al has also been fiddlin' away in Wyoming, where he is a member of the Casper Fiddlers.

Dean Goebel (BS '86, MS '92) is now working at UND's Energy and Environmental Research Center. Dean was one of the speakers on a panel discussing careers in geology during Homecoming this year.

Gale Mayer (MS '88, PhD '92) coauthored a paper titled "Autotrophic Denitrification in a Shallow Aquifer" at the 9th General Meeting of the American Society for Microbiology in Washington, D.C.

Pat Skibicki (BSEG '93) is now working for the North Dakota Department of Health in Bismarck. Pat was one of the speakers on a panel discussing careers in geology during Homecoming this year.

Jennifer Kouba (BSEG '93) is attending graduate school in the Civil and Environmental Engineering Department at Utah State University.

Grant Larson (BSEG '93) is now working for Great Plains Environmental in Fargo. Grant was one of the speakers on a panel discussing careers in geology during Homecoming this year.

Barb Sahl (MS '94) is now working for the West Polk County Soil and Water Conservation District in Crookston. Barb was one of the speakers on a panel discussing careers in geology during Homecoming this year.

Harry Abercrombie (BSEG '94) is presently a staff hydrologist with American Colloid. He lives in Belle Fourche, SD.

Kale McNaboe (BSGE '94) is working, with 2 other alums, Terrance Zich (BSGE '77) and Gary Winbourn (BS '78, MS '86), at Huntingdon Engineering & Environmental Inc., Bismarck.

Tim Kroeger (PhD '95) is assistant professor of geology at Bemidji State U. He's bought a farm north of Bemidji. E-mail: TJKROEGER@VAX1.BEMIDJI.MSUS.EDU.
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Wenker, Grant (BS Geol 1993)  
West, Roger W. (MST 1969)  
Wetzel, Mark O. (BS 1987)  
Wetmore, Michael J. (MS 1994)  
White, Stanley F. (MS 1980)  
Wiken, Kent W. (BSGE 1984 BS 1986)  
Willie, Kenneth G. (PhB 1953)  
Wilkinson, Michael (MS 1982)  
Williams, Barrett J. (BS 1958 MS 1960)  
Williams, David (MS 1984)  
Wilson, Robert G. (MS 1967)  
Wilson, Barry J. (BS Geol 1983)  
Wilson, Everett E. (BS Geol 1956 MS 1958)  
Wilson, Garth  
Wilson, James W. (BSGE 1976)  
Winbourn, Gary D. (BS Geol 1978 MS 1986)  
Winterer, Timothy R. (BSMIE 1959)  
Wockovich, Marvin R. (PhB 1953)  
Wold, Paul D. (BS 1949)  
Wolff, Robert A. (BSGE 1982)  
Woods, Mary L.  
Woolsey, Earl (BSGE 1988)  
Wosick, Frederick D. (BS 1974 MS 1977)  
Wyborny, Sylvester J. (BSMIE 1958)  
Wylie, Jan D. (BS 1971)  
Yarow, Jany D. (BS 1985)  
Young, Daniel R. (MA 1980)  
Zabel, Dean A. (MS 1979)  
Zajdlik, Roger C. (BS Geol 1957)  
Zich, Terrance J. (BSGE 1977)  
Ziebarth, Harold C. (MS 1962 PhD 1972)  
Zimmer-Dudefille, Susan (MS 1983)  
Zimmerman, James T. (BS Geol 1955)  
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Zygarlicke, Christopher J. (MS 1967)  
157 Lake D Este Dr Slide LL 70461-3608  
RR 6 Country Club Acres Box 124 Minot ND 58701  
8854 W Quarto Avenue Littleton CO 80123  
2225 Orchard Street Lake Charles LA 70601  
6049 NE Davis Portland OR 97213  
9123 Palomas Ave NE Albuquerque NM 87109  
1001 N Randolph St Apt 1022 Arlington VA 22201-5610  
512 Pearl Circle Elkorn NE 68022  
PO Box 114 Reynolds ND 58275-0114  
7727 Keimgreen Ln Spring TX 77379  
PO Box 430 Meeeteea WY 82433-0430  
SEE SOWOKIOS  
819 East Mount Faith Fergus Falls MN 56537  
18414 N High Rock Rd Monroe WA 98272  
8719 Craigton Ct Dublin OH 43017  
17296 83rd St SE Wahpeton ND 58075  
2601 Fairway Drive Moorhead MN 56560  
524 8th Ave N Grand Forks ND 58203  
208 Suncoast Dr McCook Lake SD 57038  
6535 S Garfield Ct Littleton CO 80121  
3441 Knob Oak Dr Grapevine TX 76051  
904 11th St SE High River AB T1V 1L2 CANADA  
1128 N Marine Dr #304 Tamuning GU 96911-4305  
2757 Ardlowne Drive Tucker GA 30084-2514  
1839 61st Ave North St Cloud MN 56303  
1614 Rickey Road Charlottesville VA 22901  
15935 Wingdale Drive Houston TX 77082  
7724 Sandalwood Dr Oklahoma City OK 73132  
8101 E Dartmouth No 49 Denver CO 80231  
3612 Golden Oaks Dr Salt Lake City UT 84121  
1227 Pocatello Dr Bismarck ND 58504  
12614 Vindon Dr Houston TX 77024  
2184 Green St San Francisco CA 94123  
3104 Hamilton Way Casper WY 82609  
1061 E Sandpiper Drive Temple AZ 85283  
4415 Crown Point Road Mandan ND 58554  
SEE SCOTT  
901 S 11th St Grand Forks ND 56201-4449  
220 E Brandon Drive Bismarck ND 58501  
RR3 Box 555 Frazee MN 56544-9244  
1753 Bingham St Stephenville TX 76401-2103  
1528 S 15th St #1 Lincoln NE 68502  
2507 W 43rd Ct Anchorage AK 99517  
PO Box 1951 Dahlgren VA 22448  
115 Sudden Vly Bellingham WA 98226-4821  
414 Laredo Dr Bismarck ND 58504-7211  
7352 S Delaware St Littleton CO 80120  
2425 Country Club Dr SE Corners GA 30208  
6905 Edenvale Blvd Eden Prairie MN 55346  
1112 South Main Minot ND 58701  
1335 S 20th St Grand Forks ND 58201
**GEOLOGICAL INFORMATION FORM**

Please fill out and return to the address on the back as soon as possible.

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On the back of this sheet please send us any news of your "doings" to be included in the next issue. Tell us about some incident or recollection you remember from your days in the Department, e.g., the time Bud Holland shot a hole in his car. Or, in any event, return this sheet so our records will be more complete and current. We want to hear from you!

October, 1995