NEW MEXICO INSTITUTE OF MINING AND TECHNOLOGY

DEPARTMENT OF GEOSCIENCE

ALUMNI NEWSLETTER

OCTOBER 1, 1984

About the Cover - The "Techtonics" logo appearing on the cover was designed and executed by Bob Lowey (M.S.,'84). Since February 21, 1982, it has occupied a position on the masthead of our bimonthly, inhouse newsletter, which is circulated to Geoscience students, staff and Bureau members. Bob also penned several cartoons (like the one above) that feature Geoscience faculty, among others. Perhaps in future years we can share some of these with you.

A WORD FROM THE CHAIRMAN

Daniel B. Stephens, Associate Professor of Hydrology - The 84-85 academic year is off and running, and I am frantically trying to keep pace. During orientation, the department and student services hosted a soiree for our 24 new undergraduate students in the Workman Center courtyard. This year Tech is making a special effort to improve student retention through student service and advising programs; national statistics indicate that we have one of the poorest records for retaining students. In the Geology/Geochemistry group, I have designated faculty coordinators to become the focus for our undergraduate and graduate program, Drs. John MacMillan and Andy Campbell, respectively. They will pay particular attention to student problems, advisor assignments, curriculum changes and information dissemination, among other responsibilities. We would welcome any feedback which could strengthen our program and enhance student retention.

I want to thank those of you who responded to my letter this summer. Your generous contributions are most appreciated. I know there are a lot more of you out there who can help us out. During the phone-a-thon October 2-4, we hope to have talked with you about Tech and to solicit your financial support. Please consider making a tax deductible contribution to Tech and the Geoscience Department by dropping us a letter and check when it is convenient for you. Through your contributions, this fall we will be helping students further their education by partially supporting travel to the GSA meeting in Reno and the NM Geological Society Fall Field Trip in Taos; a $500 award will also be given to the outstanding geoscience faculty member who, in the eyes of his peers, has contributed most to improving our Department - this award will be used for research and travel. We hope to continue to expand our programs, facilities and reputation for excellence in geoscience through your benevolence. Thank you for your support.

BARKLEY WYCKOFF MEMORIAL

Some of our alumni are aware that Barkley Wyckoff (M.S., 1969) passed away in a plane crash in Nevada on March 17, 1981. Barkley was one of our most popular and respected graduate students equally admired by professors, colleagues and friends at Tech; Gary R. Lowell (Ph.D, 1970), a close friend and classmate, and the Wyckoff family organized an endowment in Barkley's memory and the success of that endowment testifies to Barkley's impact on those he encountered. The endowment provides for one or more annual scholarships to be presented to outstanding, first year students of ore deposits. The first recipient of the Barkley Wyckoff Memorial Scholarship was Michael Palin (M.S., 1984) in 1981-82. At the spring, 1984 commencement ceremonies Palin received the Founder's Award, an honor bestowed on "... the recipient of an advanced degree who has made an outstanding contribution to the Institute through scholarship, research, and involvement in campus affairs." High standards of scholarship, research, and a positive contribution to campus affairs typified the tenure of Barkley Wyckoff at Tech, so it is fitting that the first recipient of the Wyckoff Memorial demonstrates the same qualities as Barkley. Palin began work on his doctorate at Yale University in the fall of 1983. Subsequent recipients of the Scholarships are:

1982-83 John Wakefield
1983-84 David Wronkiewicz

Anyone who would like to add to the Barkley Wyckoff Memorial, should send their contribution to: Dr. Clay T. Smith, Director of Alumni Relations and Annual Giving, Campus Box K, New Mexico Tech, Socorro, NM 87801.

NEWS AND NOTES

Reno G.S.A. - Alumni Get Together - A number of Tech Geoscience faculty and students will attend the 1984 Geological Association of America Meetings in Reno, NV, November 5-8. We would like to meet with you and provide alumni an opportunity to visit with one another. Ted Wilton (3326 Silverhorn Lane, Sparks, NV) has voluntereed his home for "Beer (keg), Burgers, and Bits." The festivities will begin at 7:00 p.m., Tuesday, November 6, 1984. Please R.S.V.P. with $3.50 to:

Brent Anderson ('73)
Freeport Mining Co.
P.O. Box 1911
Reno, NV 89505

Clay Smith is sending a separate announcement to each of you which will include a map to Ted's home. We will look forward to seeing you there.

Fall 1984 Enrollment at Tech - The chairman shared with you the pessimistic outlook for fall enrollment, in his recent letter to geoscience alumni. As it happens, this "worst case" (30%) decline did not materialize. A final head count confirmed a decline of 5.5% for Tech. Based on the state funding formula, our funds will still decrease, but nothing like the devastating reductions that would accompany a 30% decline in enrollment.

Mineral Science and Engineering Complex III (MSEC III) - The long-time dream of the Department of Geosciences, namely a new building, is coming closer to reality. After several attempts to obtain funding from the state legislature, the 1984 session gave approval for the issue to be decided by the voters of New Mexico. A state bond issue in the amount of $6 million will be decided in the November elections. All you New Mexicans please get out and vote for the General Education Bond.

Planning for the building is progressing well in association with the architect, Ken Guthrie of Leedshill-Herkenhoff, Inc., Albuquerque. The building will be situated behind the library, where the tin-can is presently found. Don't worry. The tin-can is being moved to the south end of campus, closer to the dormitories, so the good times should continue.

President Lattman has introduced the concept of modular construction for the building. This will allow interior walls to be easily moved to accomodate the changing needs of the department. Such a concept was used in a recent building at the University of Utah. We are excited by the concept and believe the building will be a show-piece for the 1980's; it could be the model for many future buildings on campus. It is nice to think that we are out leading the way for the future.

Funding for the building will cover the cost of the building and some furnishings. However, our equipment needs will not be met. Much of the equipment within the department is either old or inadequate. Our mineral and rock suites are poor, microscopes archaic, and facilities for state-of-the-art research are in desperate need of upgrading. Prior to moving into the building we hope to solicit funds from state and federal sources and from industry and alumni to purchase equipment so as to make the building a truely quality place to teach and do research. Submitted by Philip R. Kyle, Chairman, Building Committee.

Annual Spring Ore Deposits Field Trip - This past spring our annual field trip went to Idaho and Montana, led by Dr. Andrew Campbell. In Idaho, the group of graduate ore deposit students visited the Coeur and Lucky Friday Mines in the Coeur D'Alene district. Coeur D'Alene is one of the most famous silver mining districts in the U.S. By visiting two mines in different parts of the district, students got a chance to see the variety of mineralization that can occur in the district. From Idaho, the group went to Montana to visit the Stillwater Complex, a layered mafic intrusion, which is the only such igneous complex in the U.S. It contains concentrations of nickle sulfides, chromium and platinum. Several companies are evaluating the area for platinum potential. If platinum mining starts, it will be the only platinum mine in the U.S. After leaving the Stillwater, the group took a scenic stop in Yellowstone National Park and pondered the connection between the geothermal system which makes the park so famous, and the geothermal systems which form hydrothermal ore deposits. Many people believe that the hot springs are modern day analogs to the hydrothermal environment which created ore mineralization.

The purpose of these trips is to acquaint our students with well-known mining districts and the mining industry, because many of our graduates will go on to work in mining-related fields.

In the past, alumni and visitors from mining companies have gone on the trips. Everyone seems to have benefited; the industrial geologists get a chance to interact with the academic group and the students learn from the geologists' experience. We hope to encourage alumni and industry participation in the future.

Past trips have gone to S.E. Missouri, Canada, Colorado and Europe. Next year (Spring 1985), the trip is tentatively planned for Scandinavia, to take advantage of Dr. David Norman's presence in Oslo while on sabbatical. Other trips in the future may go to Peru, Nevada and Mexico.

If you are interested in ore deposits and want more information, contact Dr. Andrew Campbell.

SIGMA GAMMA EPSILON, Delta Upsilon Chapter - In May 1981, the NMIMT (Delta Upsilon) chapter of Sigma Gamma Epsilon was installed. SGE is a National Honorary Society for the Earth Sciences. It gathers members from diverse fields covered by the term "Earth Sciences" -- Geology, Geophysics, Hydrology, Petroleum and Mining Engineering. As such, SGE is the only society which unites the students of these fields. As an Honorary Society, SGE recruits the top students from the Earth Sciences, upper classmen and graduates with a B average or better.

This year SGE will once again be sponsoring many activities on the Tech campus. The bi-monthly SGE noon-time film series began Wednesday, September 19, in Weir 120. Our annual T-shirt design contest is well underway. The winning design T-shirt will be sold to the masses at 49'ers. We have had a successful venture renting or selling mineral ID kits to students in introductory Geology classes. Other items SGE supplies to students are: grain-size charts, Silva compasses, and Geologic Time Scale charts. SGE helps organize and sponsor field trips ant this year is taking an active role in the first ever 49'ers Geoscience Field Trip. This year, Christmas and Spring Break trips are in the planning stage. We hope to interest many new students in our society. Our fall recruitment campaign is underway. Submitted by Sylveen Robinson, Vice-President, SGE, C/S Box 2895.

(Ed. note: They may not know it at this time, but SGE will also help assemble this newsletter.

Catagories for Giving - The Department has identified several areas that are in special need of support. To help those of you who contribute to the Geoscience Department, these special catagories are designated below:

undergraduate scholarships	building
research/teaching equipment	travel
Geoscience general fund	graduate research

Contributions to the Department - In response to the chairman's request, alumni listed below contributed directly to the department. Contributions ranged from $5.00 to $2000.00. A very sincere thank you to each of you. Your generosity will help maintain high quality teaching and research at New Mexico Tech.

Armstrong, Rodney M. ('67)
Biles, Norman E. ('67)
Bonem, Rena M. ('70,'71)
Brown, Terry ('83)
Butler, Patrick ('64)
Cappa, James Allan ('75)
Chamberlain, Richard M. ('67,'74)
Falkowski, Stephen K. ('78)
Heckart, Ernst W. ('68)
Murray, Diane ('82)
Olsen, Craig L. ('70,'72,'73)
Reid, Alastair Milne ('62)
Richter, Donald H. ('50)
Riese, Arthur C. ('76,'78)
Scott, George L. III ('81)
Shell Co. Foundation (match of Falkowski donation)
Shenk, John C. ('63)

VISITING SCHOLARS AT TECH

In the past three years the department is fortunate to have been host to four visiting scholars. These scholars have brought a wealth of special talents and differing perspectives from the: Soviet Union, India, and Peoples Republic of China. We are delighted to have Professor David Reid as our current, visiting scholar.

David Reid, Associate Professor of Geochemistry, University of Cape Town, South Africa - A native of Wellington New Zealand, transplanted in South Africa, Dr. Reid, his wife and son are in residence here, until the end of 1984. A friend and classmate of Philip Kyle's, Reid is cooperating in an analysis of Proterozoic igneous rocks from Southern Africa, with Kyle and a comparison of Proterozoic rocks in Southern Africa and the S.W. United States with Kent Condie and James Robertson of the Bureau. At the same time he is undertaking, for us, the development of computer software for petrogenetic modelling of igneous rocks.

Active research interests include: igneous history and crustal evolution of Proterozoic terranes in Southern Africa, with particular emphasis on the 2.0-1.0 B.Y. Namaqua Province and the 0.9-0.5 B.Y. Pan-African Subprovinces in the lower Orange River region; and development of analytical and computer techniques in geochemistry.

His special teaching talents are not wasted here at Tech, where he is teaching Igneous Petrology (Geol. 521), and guest lecturer in Isotope Geochemistry (Geoc. 445).

FACULTY NEWS

George Austin, Deputy Director NMBMMR and Adjunct Associate Professor - George continues to work principally on administration within the Bureau but also with the Geoscience Department and Tech. He writes, "I taught a course on clay mineralogy to approximately 10 students at Tech the fall semester of 1983. In the spring of 1986, I will teach a course on Industrial Minerals that will rely heavily on recently published material, both nationally and within New Mexico. Industrial Minerals, whether one likes it or not, are gaining more and more importance in the world's economy.

My research interests center around industrial minerals and I am soon to publish an article on adobe as a building material in New Mexico Geology, something that interests New Mexicans. My efforts this last year have been greatly assisted by James Barker, the Bureau's new Industrial Minerals Geologist, who has proved to be invaluable in the study of industrial minerals within the state. My other recent activities at Tech have been on the Institute Space Utilization and Campus Planning Committee, and at this point, it looks as though Tech will have a new building soon to house the Geoscience Department among others.

Other professional activities have principally been in the area of the Industrial Minerals Division of the Society of Mining Engineers-AIME and I am currently the program chairman for the division and planning meetings in Denver in the fall of 1984, and New York in the spring of 1985. Next year SME will hold its 1985 fall meeting in Albuquerque and the division will stress New Mexico's contributions to the nation's economy with our minerals, principally industrial minerals. Jim Barker and I expect to have considerable input into the planning."

Christina Lochmann Balk, Professor Emeritus of Geology - During the past spring and summer I have reviewed 3 papers for the GSA Bulletin and the Journal of Paleontology. Am sorry to say that they all needed considerable revision before publication. In late May, Jim Miller (conodonts) passed through briefly with two students, at which time I learned that the department at the University of Wisconsin-Madison was interested in gathering together and curating for study all of Raasch's extensive faunal collections from the Cambrian of Wisconsin. Was delighted to hear this as I had a collection Raasch had loaned me for comparative work years ago, so I packed them up and shipped them back to them. Then toward the end of the summer I learned that Dr. Rena Mae Bonem, BS '70; MS '71 had been promoted to Associate Professor at Baylor University, so I got busy and assembled the Upper Cambrian material which she used for her thesis and sent it to her. Am now gradually gathering up some borrowed material which should go back to the University of Montana. In the meantime, I have also been busy trying to keep up with all the literature on paleo and stratigraphy in different fields and can't resist following the constantly changing opinions in plate tectonics, especially as so many of them ignore stratigraphic evidence. Also, the big discussion on catastrophic faunal extinctions (especially Cretaceous-Tertiary boundary) by a BIG meteorite. Don't believe a word of it. Just finished reading T.J.M. Schopf's last (sadly) paper - Rates of Evolution and the Notion of Living Fossils - which is very interesting and thought-provoking. And, oh yes, I also had a pretty good garden this year.

Lynn Brandvold, Senior Chemist, NBMMR and Adjunct Assistant Professor - Born and raised in Fargo, N.D., B.S. and M.S. in Chemistry from North Dakota State University.

Currently serving as Chairman of the Rio Grande Section of the Society for Applied Spectroscopy and as Chairman-Elect of the New Mexico Tech Chapter of Sigma Xi. Member of the New Mexico Water Quality Control Commission for the last 10 years.

Research interests include trace metal analysis, water chemistry, acid rain, ground water pollution, and ore analysis.

Recent publications are in the areas of acid rain, wastewater problems, chemistry of atmospheric particulates, and characterization of sediments in the Rio Grande.

Other interests and activities include husband, two children, house, and large yard and garden.

Ron Broadhead, Petroleum Geologist, NMBMMR - Activities include: 1.) studied gas-producing Abo Formation red beds in the subsurface of east-central New Mexico resulting in Bureau Circular 183; 2.) initiated, organized, and co-lead a 2 day field trip to the Abo red beds in central and south-central New Mexico in April, 1983, the trip was co-sponsored by the Bureau and Roswell Geological Society; 3.) investigated the petroleum geology of the Santa Rosa sandstone in northeast New Mexico resulting in Bureau Circular 193; 4.) presently investigating the petroleum geology and stratigraphy of the Tucumcari Basin, northeast New Mexico, Bill King is helping with fusulinid biostratigraphy. 5.) taught Geology 464, Petroleum Geology, in the spring of 1984; 6.) monitor oil and gas drilling in New Mexico.

Antonius J. Budding, Professor of Geology - The first weeks of summer 1983 were taken up by the geology field course, in which three other staff members cooperated. The first three weeks were spent around Socorro, mapping sediments and volcanic rocks; during the last three weeks, we used the facilities of Western State College in Gunnison, CO, as a base and worked in igneous and metamorphic rocks. The Iron Hill carbonatite, and a great variety of Precambrian rocks are all highlights of the Gunnison area. This arrangement was so successful that we decided on a repeat performance for summer 1984, and have already made reservations for a similar stay in Gunnison in 1985.

The summer of 1984 brought an increased number of students in the field course; 34 from Tech, one from Notre Dame, and one from Michigan Tech. Our second year in Gunnison included a field trip to N. Colorado and S.E. Utah, during which we camped out. Arriving at 9 p.m. at Dead Horse Point State Park, we were informed at 9:30 that group camping was not allowed. After a half-hour debate with the park ranger, cooler heads prevailed and we were allowed to stay for the night. Never have I experienced a night out with 36 students under such impressive silence!

Mapping exercises in the vicinity of Gunnison impressed us with bedding-foliation-lineation relationships in deformed Precambrian rocks, and with the excellent preservation of primary structures in metasediments and metavolcanics. As usual, the last days of our stay required some 36 hour-days on the part of the students to finish maps, cross-sections, and reports on time.

I received an invitation to present a paper on the Santa Rosa tar sands at the AAPG/UNITAR Research Conference in October 1984, at Santa Maria, CA. Because it has been several years since I did the study on the tar sand deposit, I solicited the help of Ron Broadhead of the New Mexico Bureau of

Mines and Mineral Resources as a co-author. Ron has kept up with developments in the Santa Rosa area (see his Circular 193).

Work with graduate students east of Socorro revealed interesting structural complexities in the sedimentary cover. Steve Rosen has worked out structural detail that shows Permian rocks thrust over Triassic and Cretaceous. The gypsum member of the Yeso Formation seems to be the surface along which detachment of overlying strata has occurred. The possibility that the horizontal movements are of Late Laramide age, and are largely due to gravitational forces, is being investigated.

This fall, we are continuing our study of decollement structures, and starting a study of joint density in coal-bearing rocks, supported by the New Mexico Mining and Mineral Resources Research Institute. This, and the normal teaching load, should keep me busy.

Andrew R. Campbell, Assistant Professor of Geology - This is the beginning of my second year at New Mexico Tech. I just recently received my Ph.D. (1983), from Harvard University. My research in graduate school dealt with a tungsten deposit in the Peruvian Andes. I used fluid inclusions and stable isotopic analysis to determine the origin of the tungsten mineralization. Luckily for me, my results proved to have application to a number of tungsten deposits and I was able to speculate on the origin of tungsten deposits in general. If you are interested, some of my results are published in "Economic Geology", (1984), v. 79, #8.

One of the reasons I am excited about being here at New Mexico Tech is that now I'll be able to find some ore deposits closer to home. New Mexico is filled with interesting, unstudied deposits and I am anxious to begin learning about, and studying them.

My future research revolves around fluid inclusions and stable isotope studies of ore deposits. These two techniques go together very well and can tell us a lot about the genesis of ore deposits when combined with geologic mapping and standard ore petrography. Tech has a very good laboratory set up for the study of fluid inclusions and we are always trying to improve it. Our most recent acquisition is an infrared microscope which I use for observing fluid inclusions in opaque minerals. I hope in the near future to construct a laboratory for measuring stable isotopic composition of geologic materials including ore deposits, volcanic rocks and ground waters.

My teaching responsibilities include undergraduate courses in mineralogy and ore deposits and graduate courses in stable isotope geochemistry, fluid inclusion analysis and ore deposit genesis. Together with Dr. David Norman, I help organize an annual spring field trip to visit ore deposits in the United States and abroad. Alumni and other interested persons are encouraged to attend.

Kent C. Condie, Professor of Geochemistry - During September 1983, Kent Condie attended the International Precambrian Conference in Peking, China. At the conference presented a paper on the development of the early terrestrial crust which summarized model studies involving experimental, geochemical, and isotopic constraints. Also, attended 10 day field trip examining early Proterozoic and Archean rocks in the Hebei region of NE China. During March 1984, attended NSF-sponsored meeting in Brazilia, Brazil aimed at defining possible collaborative research projects between U.S. and Brazilian scientists. Presented paper on Proterozoic greenstone belt evolution and attended 2-day field trip.

Research during the past year has concentrated on continuing Proterozoic studies in the SW U.S. Geochemical studies are now complete for Proterozoic

supracrustal rocks in the Dos Cabezas Mountains and Pinal Mountains in SE Arizona and nearly complete for older terranes in the Pedernal and Manzano Mountains in central New Mexico. Graduate students are currently working on projects in the Jerome area (central Arizona), SE Arizona, the Mazatzal Mountains (S central Arizona) and the Gunnison-Black Canyon area (W central Colorado). In addition, NASA sponsored research has continued in southern India where we are currently studying the origin of Archean granites emplaced in high-grade charnockite terranes.

Attended NASA-sponsored conference in April 1984, at Lunar and Planetary Science Institute (Houston) on the Early History of the Earth, and presented a paper on Sm-Nd isotopic constraints for the development of the earth's early crust. Attended the Precambrian of the Southwest GSA Symposium in Durango, Colorado (May, 1984) and presented a review paper on Proterozoic evolution of the SW U.S. and co-authored several other papers.

Guided New Mexico Tech students on a white-water geological raft trip (May 1984) on the San Juan River in southern Utah followed by a private raft trip on the Delores River in W. Colorado. High-water made for two exciting trips. Assisted with the Tech field course in Gunnison, Colorado (June 1984).

Continue to serve on board of editors for Geological Society of America Bulletin and Precambrian Research. Also, elected as chairman for IGCP Working Group 217, Proterozoic Geochemistry and member of three other Working Groups for IGCP projects.

Gerardo W. Gross, Professor of Geophysics - During the fall semester, 1984, I taught Geology 302 (Geomorphology) and Hydrology 466 (Prospecting for Groundwater), and during the spring semester, 1984: History 381 (Survey of the History of Science) and Geophysics 466 (Electrical Methods).

Hydrology research in the Roswell Basin has been concerned primarily with the sources and flowpaths of groundwater and of the baseflow to the Pecos River in its middle course. The water budget can only be balanced if deep recharge through the Yeso Formation is assumed. Accordingly, we began an analysis of geophysical well logs for characterizing the hydrologic properties of this formation.

Research on the electrical properties of ice dealt with the effects of an antifreeze glycoprotein, extracted from Antarctic fishes, on the thermodynamic properties of the ice/water interface. In collaboration with Prof. Ralph McGehee of the Computer Science Department, a new method for analyzing the dielectric relaxation spectrum of ice has been developed and a special bridge for measuring capacitance and conductance of ice at very low frequencies (as low as 0.01 Hz) has been designed in collaboration with the Insulation Research Lab of M.I.T. It has been constructed in the new CETR Electronics Lab of New Mexico Tech.

David B. Johnson, Assistant Professor of Geology - I come to Socorro by way of (the University of) Iowa (Ph.D) and (the University of) North Dakota where I taught for two years. My research and teaching interests revolve around conodont micropaleontology and carbonate petrology. Since my arrival in Socorro, several graduate advisees and I have begun projects that are intended to produce a better understanding of Pennsylvanian paleogeography and conodont biostratigraphy for the southwest. Research projects are underway in the Big Hatchets (SW New Mexico) but, structural complexities have left few sequences complete enough for confident stratigraphic collecting. For this reason I am delighted to learn that I will have access to 1250 ft. of Madera Limestone in a Continental Scientific Drilling Program

core from an area near Los Alamos. Three projects are planned for the core. Organic thermal maturation reflected by color changes in conodonts is now employed by the petroleum industry. The detailed temperature logs available from this well will permit closer calibration of conodont color alteration index (CAI) and a better understanding of the effects of time on the alteration process. Lithologic materials and biota from the core will provide new data on middle and upper Pennsylvanian paleogeography and paleoenvironments for that region. Because the core is nearly all limestone and fossiliferous, recovered conodonts can be compared with fusulinids for an integrated biostratigraphic zonation. This is an important check on the biostratigraphic schemes we are developing in the Big Hatchets. Enough of conodonts. In November, I will present a model on the origin of reverse grading in pisolites (large oolites if you wish) at the Meetings of the Geological Society of America in Reno. This work is the result of analyses of Carboniferous pisolite beds from the Williston basin and from the Yates Pisolite (Permian), exposed in SW New Mexico.

Teaching duties in the past year have been varied. I now teach the second semester of our (introductory) Principles of Geology course (President Lattman teaches the first semester). My other undergraduate offering is Elementary Paleontology (formerly taught by Christina Lochmann-Balk). Graduate courses include Carbonate Petrology and last year I tried Micropaleontology for the first time here. Mac and I share a course titled Depositional Systems and Basin Analysis.

Duties around the department include keeping an eye on our vehicles, organizing this years 49'ers Geoscience Field Trip, ramrod for this newsletter and flogging recalcitrant graduate advisees. I took a turn on the Campus Space and Utilization Committee last year and feel fortunate to have escaped, although it was fun planning for the new MSEC III (Geoscience +) building. If you can, be sure to vote FOR the state bond issue in November.

Recreation these days seems to have boiled down to racquetball and bicycling, although this summer I did manage to sneak in some fishinackpacking in th

Raziuddin Khaleel, Assistant Professor of Hydrology - During the past year, I have been involved in several research projects. A study on the effects of proposed pumping stresses in the Mesilla Bolson aquifer in New Mexico is in its second year of investigation. Dr. John Hawley, Senior Environmental Geologist with the New Mexico Bureau of Mines & Mineral Resources and a co-principal investigator on the project has developed several geologic cross-sections for the Mesilla Bolson and Mesilla Valley. These cross-sections have been utilized to develop a flow model for the Bolson and Mesilla Valley stream-aquifer system. David Peterson, a Ph.D. graduate student in Hydrology, is currently in the process of completing remaining simulations so that the effects of proposed pumping in the Mesilla Bolson on aquifer drawdowns and streamflow depletion in the Rio Grande can be quantified.

Another project, also funded by the New Mexico Water Resources Research Institute that started this past July, deals with investigating effects of variably saturated flow on the stream-aquifer interaction. A full three-dimensional variably saturated flow model will be utilized in the study. This research will lead to a better understanding of various recharge and discharge mechanisms affecting stream-aquifer interaction.

A two-year project funded by the U.S. Bureau of Mines commenced this September. The project is concerned with a study of spatial variability of hydraulic properties of mill tailings. Dr. Dan Stephens, Geoscience Department Chairman, is co-principal investigator on the grant. Currently, we are in the process of selecting one or two mill tailings sites in New

Mexico to conduct our field sampling and experiments.

In addition to the above projects, I am also involved in the development and application of a multiphase numerical code for predicting transport of organic contaminants in saturated-unsaturated porus media systems. The research has applications in the area of groundwater contamination resulting from gasoline and other petroleum products that can enter subsurface flow systems from leaking pipelines and storage tanks.

During the past year, I attended and presented papers at the National Water Well Association meetings in Columbus, Ohio, and Las Vegas, Nevada. A paper entitled, "Miscible Displacement in Porous Media: A MOC Solution", has been accepted for publication in an ASCE Journal. The past year I taught courses on Numerical Simulation of Subsurface Flow and Surface Hydrology.

Frederick J. Kuellmer, Professor of Geology - In January 1984, became Dean of Graduate Studies when Dr. Marvin H. Wilkening retired. Geoscience now has the most graduate students. Also, Geoscience was rated the highest geotype department of all those in the state (in Chronicle of Higher Education).

Since returning to the department (in 1976, that is) Fred has engaged in coal research. Paper published in the International Journal of Coal Geology, v. 2, (1983), p. 216-277., coauthored with Students: Janet Nuter and Frank Kimbler. Also Master's student, Indira Balkissoon, presented her thesis at the 1982 GSA national meetings in New Orleans. (Fred is junior author.)

Fred is studying diffuse reflectivity of coals, trace element distribution in coals (Cooksey, Balkissoon, Kendrick, Diaz), Infra-red and NMR spectroscopy of coals (with John Dooley).

Fred is a co-principal investigator on a project to characterize the properties of New Mexico coals along with Kottlowski of the Bureau, Art Cohen of Los Alamos, Ed Beaumont (consultant) of Albuquerque. Other Bureau participants are Frank Campbell, Gretchen Roybal, and Brian Arkell.

There are some absorption measurements on coal done with Mary Ann Hall-Baumgart which have to be studied and collated.

Fred writes:

> This summer (1984) I had faculty research preparation support to work at the Argonne National Laboratory with Dr. Gary Dyrkacz. Gary, an organic chemist, has developed a density-gradient separation technique for coal macerals (physical consitutents of coal, like minerals in a silicate rock). I wished to learn this and to see how it might apply to the coal research I am doing.
>
> I got a turkey last spring. In two weeks I'm going muzzle-loader hunting for deer. To get in shape for hauling the deer back, I'm running about two miles per day.
>
> A year ago at field camp (1983), I slipped on a Precambrian basalt outcrop in Colorado while going downhill to show some foliation and lineation to the observant students. Broke and dislocated my left shoulder. Everything is now O.K. except for the rainy-day pains.

Philip R. Kyle, Associate Professor of Geochemistry - I joined the department in August 1981, as Assistant Professor of Geochemistry. My research interests are varied and multidisciplinary, but are in the main centered on Antarctica. Between November 1983 and January 1984, I spent my thirteenth

field season working in Antarctica. This was my seventh consecutive season with the National Science Foundation sponsored US Antarctic Research Program. My team consisted of a total of 10 people, including 1 past and 4 current graduate students from the Geoscience Department. Amongst our major achievements were to measure the SO_2 and particulate emission rates from Mt. Erebus, a 12,500 foot active volcano on Ross Island. Erebus is a unique volcano as it contains a persistent convecting lava lake about 60 metres in diameter. We discovered the lake in 1972, and have been monitoring the behaviour ever since. Interestingly, the lava is composed of anorthoclase phonolite magma an unusual alkali-rich magma. The summit of Erebus is like no place on earth. Lava in the crater is 1,000°C., while the air temperature in summer averages -30 to -40°C. This results in amazing thermal features, such as tall cylindrical ice towers (frozen fumaroles) and ice caves (caves melted out of the snow and ice by the hot gasses). To keep you on your toes, Mt. Erebus erupts 2 to 6 times a day and throws out bombs up to 3 metres in length. Several other Antarctic projects were started, including mapping of Late Cenozoic alkali volcanic rocks. As I write this, a message has just come in to say Erebus is erupting quite violently. Glowing incandescent bombs can be seen reaching over 600 metres above the crater. The sounds of eruptions and earth tremors can be heard and felt at McMurdo Station, about 25 miles away from the volcano.

Enroute to Antarctica we stopped in New Zealand and measured the SO_2 output from White Island, an active volcano off the coast. In addition, we were able to land by New Zealand Air Force helicopter inside the crater and make measurements on the ground. I don't know if we angered the volcano gods, but shortly after we left, the volcano entered a new eruptive phase and sent out a high plume of ash and steam. While in New Zealand, we had a two week field trip around the Central North Island, examining other active volcanoes and sampling the numerous tephra units. The Tanpo eruption in ~186 AD was the most violent known and the resulting pyroclastic rocks are classic. It was nice to enjoy a second summer in my homeland.

In August 1983, I attended the IUGG meeting in Hamburg, Germany. I presented two papers dealing with the geochemistry of the Jurassic Ferrar Supergroup tholeiites in Antarctica. Before IUGG, I spent a week in London at the Institute of Geological Sciences, sorting out some Sr and Nd isotope data.

John R. MacMillan, Associate Professor of Geology - Two M.S. advisees of Dr. MacMillan graduated during spring and summer 1984; they are Galo Salcedo, a Fulbright Scholar from Equador who studied a body of complexly deformed, Cretaceous to Eocene turbidites and associated andesitic to basaltic rocks in southwestern Equador, and Ken Lemley who gathered paleocurrent data and analyzed the paleoenvironment of the Permian Abo Formation at Abo Pass, NM. A third M.S. advisee, Curtis McKallip, will finish his subsurface study of sedimentary structures, stratigraphy and paleoenvironment of the Triassic, upper Santa Rosa Sandstone in northeastern New Mexico (where a steamflood to enhance recovery of low API density oil is in progress) in the fall 1984 semester.

Mac has also been busy as chairman of the Geology/Geochemistry Graduate Admissions Committee and is happy to report that about two-thirds (rather than the more typical one-third based on previous years) of the attractive applicants came to Tech for the fall 1984 semester. At the undergraduate end of recruitment, Mac offered a one-week course in geology to high school students between their junior and senior years this past summer; we will look for, hopefully positive, responses in a year.

The 1983 summer was also used by Mac for field work on paleocurrent analyses of the Abo Formation in the Zuni and Sacramento Mountains and near Bingham, N.M.

David I. Norman, Associate Professor of Geochemistry - In 1983 Norman was promoted to Associate Professor and received tenure. He was invited, and accepted a five year post on the editorial board of Economic Geology. He was elected to Vice President of the New Mexico Geological Society and became president of that organization in 1984. During the spring of 1984 he went to Cameroon for six weeks to investigate Au deposits in cooperation with the Cameroon geological survey. Returning via Canada in May, he presented an invited paper on the Hansonburg deposit at a symposium on geochemistry of ore deposits which was part of the GAC-MAC (Geological Association of Canada-Mineralogical Association of Canada) annual meeting. Proceedings will be published in a special issue of the Canadian Mineralogist. In July Norman left for a sabbatical year in Norway on an NSF funded grant to study evolution of magmatic fluids in granites.

Wupoa Ting, a chinese visiting scholar spent a year with Norman. He conducted research on the Hansonburg deposit and took classes.

During the past year, research by Norman's graduate students and himself concerned precious metal and Sn-W-Mo deposits. Together they published six papers and five abstracts at national meetings. A symposium on precious metal deposits was organized by Ted Eggleston and Norman as part of the spring meeting of the New Mexico Geological Society. A number of Norman's students presented papers which will be published as a special publication of the NMGS.

Norman plans on organizing an economic geology field trip in the spring or summer of 1985 to the Scandinavian countries. Information concerning the trip will be available from Clay Smith late this fall. Several newly discovered precious metal deposits in Proterozoic rocks will be visited as well as the well- known Scandinavian deposits and deposits in the Oslo paleorift.

Fred M. Phillips, Assistant Professor of Hydrology - I grew up in Bishop, California, directly east of the 10,000 foot front scarp of the Sierra Nevada. The outstanding Quaternary geological features of the area provoked an interest in geology at an early age. I pursued this interest academically while wandering among the redwood groves of the University of California at Santa Cruz. After I graduated, an urge for practical applications of geology without being at the whim of mineral economics led me to study ground-water hydrology at the University of Arizona. Five years later I emerged, transformed from a qualitative but applied geologist into a quantitative but theoretical ground-water geochemist.

My Ph.D. research was on the use of dissolved noble-gas concentrations in ground water as paleoclimatic indicators (the concentrations are temperature-dependent). I have continued this type of research here in New Mexico, using noble gases, stable isotopes, and ^{14}C in ground-water of the San Juan Basin to demonstrate cooler temperatures during the late Pleistocene. A new area of research I have embarked on is the application of tandem accelerator mass spectrometry (a powerful method for measuring very rare isotopes) to hydrologic studies. Some of these studies have a distinctly geologic aspect; for example, dating the age of evaporites using ^{36}Cl and dating the surface-exposure time of volcanic rocks and using ^{36}Cl and ^{10}Be. Others are more straightforwardly hydrologic; such as dating very old ground water and determining the sources of salts in surface and ground

waters, both using ^{36}Cl.

Socorro is one of those places that seem to produce an instant division of opinion: people either love it or hate it. I definitely fall in the category of those who love it. I like small towns and I like New Mexico, with its long history and heterogenous population. My personal interests are largely related to the outdoors, and Socorro's sure got lots of that. I enjoy hiking, backpacking (not that I'll do much until my kids grow a bit!), four-wheel driving, fishing, and hunting, especially big game hunting. In addition to these outdoor activities, I enjoy the study of history (I actually have a published book on the exploration of the Great Basin), woodworking, and building models of seventeenth and eighteenth century warships. My wife, Lois, shares many of these interests and also likes Socorro a lot. I'm sure my son, Andrew, does too, although he doesn't have much basis for comparison, since he's only two.

Allan R. Sanford, Professor of Geophysics - The principal research interest for me and my students continues to be the numerous earthquakes of the Socorro segment of the Rio Grande rift. From analyses of their seismic signals we determine physical characteristics of the crust and obtain information on the mechanisms of tectonic and magmatic processes within the rift.

New Mexico Tech and the U.S. Geological Survey have jointly operated a seismological observatory on the Tech campus since January, 1982. (We are fortunate to have Larry Jaksha, a USGS seismologist in residence.) The seismic network covering the Socorro area consists of nine telemetered stations within 80 kilometers of Tech.

Analyses of data from the present permanent network and previous temporary networks is revealing interesting characteristics of the Rio Grande rift. Phil Carpenter (Ph.D., August, 1984) determined an average Q_s for upper crustal material, 535, which is, perhaps, not quite as low as one would have expected for a continental rift. Steve Jarpe (M.S., May, 1984) found evidence for magmatic intrusion during an earthquake swarm, February 25 through March 16, 1983, that occurred 28 km north of Socorro. Included within that swarm was a magnitude 4.0 earthquake, the strongest in the Socorro area since 1961. Closer to home, Jon Ake (M.S., May, 1984) analyzed a swarm of more than 700 earthquakes which occurred beneath Socorro Mountain. An interesting result of his study was to find hypocenters all originating from a crustal volume smaller than 4 km^3.

For alumni with an interest in seismology and our studies of the Rio Grande rift, we would be pleased to send you reprints or if you visit Socorro, we would be happy to give you a tour of our seismological observatory.

John William Schlue, Associate Professor of Geophysics - Since the first part of 1983, I have been involved with C.L. Edwards of LANL in recording surface waves generated by underground explosions at the Nevada Test Site. Most of 1983 was a learning experience; this past year, however, we have been successful in getting data for three lines across the Rio Grande rift (San Luis basin, Albuquerque basin, Socorro-Jornado basin). Paul Singer has reduced some of the Albuquerque basin data, and is interpreting the results for his Master's.

In March, 1984, the Atlantic Research Foundation gave the geophysics program $10,000 towards the purchase of a new computer. With internal matching funds, we have purchased a Ridge 32 (2 Mbytes RAM, 60 Mbyte fixed disk, clock speed of 125 nsec.). I am moving all of my progrms from DEC to

the Ridge, and will be doing all of my future number-crunching (3-D finite-elemental, etc.) on the Ridge.

Clay T. Smith, Professor of Geology - As those of you who follow alumni mattes are aware, Clay has been "kicked upstairs" and now serves as Director of Alumni Relations & Annual Giving. That is not to say that his activities in the department have ended. He still teaches, and directs graduate research on topics in economic geology. He has given up his duties as chairman of the New Mexico State Science and Engineering Fair, and last year was the General Chairman at the International Science and Engineering Fair in Albuquerque. That task required more than a year of preparation. Rumor has it that he still calls high school football games around the state.

John Wilson, Professor of Hydrology - John Wilson, formerly of M.I.T., has joined the department as coordinator of the Hydrology Program. John has spent the last year and a half with a Houston, Texas, energy consulting firm, INTERA Technologies, working on the hydrologic aspects of high level nuclear waste disposal. His research focus is in the field of stochastic groundwater modeling and parameter estimation. John replaces Lynn Gelhar who went to M.I.T. when John moved to Texas.

Confusing? It gets worse. John's family is still in Houston, unable to unload one of those expensive oil money houses, because no one down there seems to have any oil money these days. With a family in Texas, he has been a fan of Houston based professional meetings: the Society of Petroleum Engineers, National Groundwater Association, etc.

Although new to Tech, John has enthusiastically jumped into the teaching program - his senior level course on Subsurface Hydrology has sixty students in it, drawn from a wide range of disciplines. In research, besides his major interest in stochastic processes (what are they, anyway?) he has been working on simple mathematical models used to design restoration schemes for polluted aquifers. These models have been applied by several large consulting firms. This interest in aquifconsulting firms. This interest in aquifer research program in the recovery of petroleum - from polluted aquifers. Some may suggest that this interest in petroleum is just another excuse to visit home in Houston, and they may be partially correct. A more accurate motivation may be John's long time fascination with the micro-mechanics of fluid flow in porous media, and the associated movement of oil blobs (a high tech term borrowed from the petroleum engineers, Tech's own PRRC). Although only a few months old, this research program has yielded some simple, fundamental concepts for aquifer rehabilitation that will be presented at a meeting in Houston this November.

RECENT DEGREES

Name	Year	Advisor	Thesis
Beth S. Abramson	Jan. 1982 M.S., Thesis	Norman	The Mineralizing Fluids Responsible for Skarn and Ore Formation at the Continental Mine, Fierro, New Mexico, in Light of Ree Analyses and Fluid Inclusion Studies
Brian Arkell	Dec. 1983 M.S., Thesis	Smith	Geology and Coal Resources of the Cub Mountain Area, Sierra Blanca Coal Field, New Mexico
Bruce Baker	July 1981 M.S., Thesis	Kuellmer	Geology and Depositional Environments of Upper Cretaceous Rocks, Sevilleta Land Grant, Socorro County, New Mexico
Bruce L. Batory	Jan. 1982 M.S., Thesis	Kuellmer	Analysis of the Lacustrine Sediments of the Creede Formation, Mineral County, Colorado
John H.A. Bauch	July 1982 M.S., Thesis	Johnson	Geology of the Central Area of the Loma De Las Canas Quadrangle, Socorro County, New Mexico
Carl A. Bernhardt	July 1982 M.S., Thesis	Norman	Gas Analyses of Thermal Waters in New Mexico
Danny Bobrow	April 1984 M.S., Thesis	Kyle	Geochemistry and Petrology of Miocene Silicic Lavas in the Socorro-Magdalena Area of New Mexico
Jeffrey A. Bruneau	Dec. 1981 M.S., Thesis	Smith	Geologic Map of a Portion of the Salt River Canyon Area and the Geochemistry of the Tomato Juice Uranium Mine, Gila County, Arizona
Alan B. Carmichael	May 1982 M.S., Thesis	M. Bodine	Mineralogy and Geochemistry of Upper Cretaceous Clay Mineral Assemblages from the Star Lake-Torreon Coal Fields, San Juan Basin, New Mexico

Patricia Cooksey	Dec. 1983 M.S., I.S.	Kuellmer	Determination of the Distribution Coefficient of Iron Among the Organic Hydrocarbon, Non-pyritic Inorganic and Pyrite Fractions of Coal
Greg C. Coffin	Dec. 1981 M.S., Thesis	Chapin	Geology of the Northwest Gallinas Mountains, Socorro County, NM
John DeMelas	May 1983 M.S., Thesis	Condie	The Geochemistry, Petrology, and the Provenance of the Pinal Schist
John Dooley	Dec. 1983 M.S., I.S.	Kuellmer	Infrared Spectroscopy of Selected New Mexico Coals
Christopher J. Duffy	May 1982 Ph.D., Thesis	Gelhar	Stochastic Modeling of Spatial and Temporal Water Quality Variations in Groundwater
Ted Eggleston	May 1982 M.S., Thesis	Norman	Geology of the Central Chupadera Mountains, Socorro County, New Mexico
Kurt H. Fagrelius	May 1982 M.S., Thesis	Smith	Geology of the Cerro del Viboro Area Socorro County, New Mexico
David R. Guilinger	Sept. 1982 M.S., Thesis	Smith/ Chamberlin	Geology and Uranium Potential of the Tejana Mesa-Hubbell Draw Area, Catron County, New Mexico
Ingrid Klich	March 1983 M.S., Thesis	Robertson	Precambrian Geology of the Elk Mountain-Spring Mountain Area, San Miguel County, New Mexico
Stanley T. Kurkowski	March 1983 M.S., Thesis	M. Bodine	Mineralogy and Geochemistry of Upper Cretaceous Clay-Bearing Strata Torreon Nash/Johnson Trading Post Areas Southeastern San Juan Basin, New Mexico
Kenneth R. Lemley	July 1984 M.S., Thesis	MacMillan	Paleocurrent Analysis and Paleoenvironment of the Abo Formation, Abo Canyon Area, Valencia, Torrence and Socorro Counties, NM

Roger S. Lowe	Dec. 1981 M.S., Thesis	MacMillan	Depositional Environments of the Salt Wash and Recapture Creek Members of the Morrison Formation in Southern Montezuma Canyon, San Juan County, Utah
Robert F. Lowey	March 1984 M.S., Thesis	Smith	Detailed Stratigraphy of Northern Hansonburg Mining District, Socorro County, NM
Marie McCrink	March 1982 M.S., Thesis	Bodine	Diagenesis in the Creede Formation, San Juan Mountains, Creede, Colorado
Timothy P. McCrink	Feb. 1982 M.S., Thesis	Condie	Precambrian Geology of the Taos Range, Taos County, New Mexico
Charles Martell	March 1982 M.S., Thesis	Condie	Petrology and Geochemistry of a Progressively Metamorphosed Sedimentary Formation in Big Thompson Canyon, Larimer County, Colorado
Joe Paul Maulsby	Dec. 1981 M.S., Thesis	Johnson	Geology of the Rancho de Lopez Area, East of Socorro, New Mexico
Francois R. Nguene	May 1982 Ph.D., Dissertation	Norman	Geology and Geochemistry of the Mayo-Darle Tin Deposit, West-Central Cameroon, Central Africa
Michael Palin	April 1984 M.S., Thesis	Norman	Gas Analysis of Phyllosilicate-Bearing Rock
Timothy Post	Dec. 1981 M.S., Thesis	Norman	Geology and Mineralogy of the Calliham Uranium-Vanadium Mine, Sage Plains, Southeastern, Utah
Andrew G. Raby	May 1982 M.S., Thesis	MacMillan	Interpreted Depositional Environments of the Salt Wash and Lower Members of the Morrison Formation, Grand County, Utah
Bruce Rundell	May 1983 M.S., Thesis	Johnson	Depositional Relationship Between Carabonate and Clastic Environments of the Early Permian Laborcita Formation Near Tularosa, New Mexico

Galo Salcedo	May 1984 M.S., I.S.	MacMillan	Geology of the Santa Elena Peninsula, Southwest Ecuador
Mark A. Shellhorn	July 1982 M.S., Thesis	Kyle	The Role of Crustal Contamination at the Butcher Ridge Igneous Complex, Antarctica
Cynthia L. Spahr	May 1983 M.S., Thesis	Smith	Economic Geology of the Black Knight, Midnight, and Associated Magnetite Claims, Lone Mtn., Lincoln, Co., New Mexico
Robert Specter	Aug. 1984 M.S., Thesis	Johnson	Effects of Pore Structure on Mixing in Stable, Single-Phase Miscible Displacement
Wupao Ting	Jan. 1984 M.S., I.S.	Norman	Fluid Inclusion Studies of Hansonburg Deposits, NM
E. Timothy Wallin	June 1983 M.S., Thesis	MacMillan	Stratigraphy & Paleoenvironments of the Engle Coal Field, Sierra County, New Mexico
Theresia A. Ward	April 1982 M.S., Thesis	MacMillan	The Depositional Environment of the Upper Juassic Salt Wash Member of the Morrison Formaton, Slick Rock District, San Miguel County, Colorado
Lawrence J. Weber	Oct. 1983 M.S., Thesis	Johnson	Environmental Analysis of a Virgilian (Pennsylvanian) Carbonate Sequence within Rhodes Canyon, San Andres Mountains, New Mexico
Tian-Chyi Jim Yeh	Jan. 1982 Ph.D., Dissertation	Gelhar	Stochastic Analysis of Effects of Spatial Variability of Unsaturated Flow
John D. Young	May 1982 M.S., Thesis	Johnson/ Hawley	Late Cenozoic Geology of the Lower Rio Puerco, Valencia and Socorro Counties, New Mexico

<u>Geophysics</u>

Jon P. Ake	May 1984 M.S., I.S.	Sanford	An Analysis of the May and July 1983, Socorro Mountain Microearthquake Swarms

Margaret W. Barroll	Sept. 1984 M.S., I.S.	Reiter	Basin Formation by Lithospheric Extension and Graben Faulting
Delaney C. Byrd Jr.	May 1982 M.S., I.S.	Sanford	Spectral Analysis of Micro-earthquake S-Phase Attenuation in the Socorro Area
Douglas Carlson	Dec. 1982 M.S., I.S.	Sanford	Crustal Structure Study in Socorro, NM, Area Using Time Term Method
Phillip Carpenter	May 1981 M.S. Thesis	Schlue	Surface Wave Analysis Using Two-Dimensional Finite Elements Techniques
Phillip Carpenter	August 1984 Ph.D.	Sanford	Apparent Q for Upper-Crustal Rocks in the Rio Grande Rift of Central New Mexico from the Analysis of Micro-earthquake Spectra
Gerry Clarkson	August 1984 Ph.D.	Reiter	Implications for Thermal Histories of the San Juan Basin and San Juan Mountains Since Late Cretaceous Time
Mohamed Dahham	July 1983 M.S., I.S.	Schlue	Rayleigh Waves in the San Juan Basin
Roberta Eggleston	Dec. 1982 M.S., I.S.	Reiter	Estimates of Terrestrial Heat Flow in the Southwestern United States
Stephen Jarpe	May 1984 M.S., I.S.	Sanford	Characteristic and Possible Cause of an Earthquake Swarm in the Central Rio Grande Rift 28 Km North of Socorro, NM, February and March, 1983
Jeffrey Minier	Aug. 1983 M.S., I.S.	Reiter	Topics in Geothermal Studies
Craig A. Parks	May 1982 M.S., I.S.	Payne	Physical Characteristics of the Precambrian Geomagnetic Field as Recorded in Manzano Mountains, New Mexico
Jeffrey Roach	May 1982 M.S., I.S.	Sanford	The Mapping of Shallow Magma Bodies Near Socorro, New Mexico, by the use of Seismic Attenuation
Odon Sanchez	May 1982 M.S., I.S	Schlue	Deep Mantle Convection Inferred from Relative Attenuation of S and ScS Waves

Daniel P. Weider	May 1981 M.S., I.S.	Sanford	Tectonic Significance of Microearthquake Activity from Composite Fault Plane Solutions in the Rio Grande Rift near Socorro, NM
Robert A. Wills	May 1982 M.S., I.S.	Gross	Thermally Simulated Dicharge Currents in Pure Ice

Hydrology

Elizabeth Andrews	August, 1982 M.S., I.S.	Stephens	Geologic Predictors of Saturated Hydraulic Conductivity in the Fluvial Sand of the Sevilletta Wildlife Refuge
James T. Boyle	Sept., 1984 M.S., I.S.	Hawley	Soil Hydraulic Properties and Soil Water Movement of the M-Mountain Waste Storage Site
Laurel J. Izmirian	June, 1984 M.S., I.S.	Phillips	The Build-up of Epigene Chlorine-36 in Rocks and Its Release into Groundwater Systems
Mark B. Larson	August, 1984 M.S., I.S.	Stephens	A Comparison of Empirical/ Theoretical Laboratory and Field Techniques in Evaluating Unsaturated Hydraulic Properties of Mill Tailings
Richard R. Rabold	Sept., 1984 M.S., I.S.	Stephens	The Results of a Borehole Infiltration Test with a Shallow Water Table
Scott N. Tyler	July, 1982 M.S., I.S.	Stephens	Field Results of Borehole Infiltration Tests
David B. Watson	August, 1983 M.S., I.S.	Stephens	The Effect of Head on Constant Head Borehole Infiltration Tests and Other Related Flow Phenomenon
Scott R. Yates	May, 1982 M.S.,I.S.	Stephens	Numerical Simulation of Borehole Infiltration for Soil Parameter Estimation

GEOSCIENCE GRADUATE STUDENTS FALL, 1984

NAME	FIELD DEGREE	ACADEMIC ADVISOR	NAME	FIELD DEGREE	ACADEMIC ADVISOR
AKE, J.	PhD/Geop	Sanford	KEDZIE, L.	MS/Geol	Chapin
ALLEN, P.	PHD/Geoc	Condie	KENDRICK, T.	MS/Geol	Kuellmer
ALTARES, T.	MS/Geol	Johnson	KICKHAM, B.	MS/Hyd	Gross
ARDITO, C.	MS/Geol	Campbell	KING, K.	MS/Geop	Sanford
BARKER, J.	PhD/Geol	MacMillan	KNOPER, M.	PHD/Geoc	Condie
BARROLL, M.	MS/Geop	Reiter	KNOWLTON, R.	MS/Hyd	Stephens
BAZRAFSHAN, K.	MS/Geol	Budding	KRUKOWSKI, S.	PHD/Geol	Johnson
BECKNER, J.	SP/Geol	--	LAWRENCE, N.	MS/Hyd	Gross
BEGUM, F.	SP/Geol	Campbell	LEAVITT, M.	MS/Hyd	Wilson
BEHR, C.	MS/Geol	Kyle	LEAVY, B.	PHD/Geol	Phillips
BERZINS, G.	MS/Geop	Sanford	LEWIS, G.	MS/Hyd	Stephens
BIJAK, M	MS/Geol	Norman	LINDEN, R.	MS/Geol	Budding
BLANDFORD, T.	MS/Hyd	Wilson	LITTLE, G.	MS/Geol	Budding
BOADI, I.	MS/Geol	Norman	LIU, D.	MS/Geop	Schlue
BOWIE, M.	MS/Geol	MacMillan	LIVACCARI, R.	PHD/Geol	Kyle
BROWN, K.	MS/Geol	Campbell	LOGAN, L.	SP/Hyd	--
CARLSON, C.	MS/Hyd	Phillips	LOZINSKY, R.	PHD/Geol	MacMillan
CHILDERS, A.	MS/Hyd	Khaleel	MAIGA, B.	PHD/Geol	Kuellmer
COLPITTS, R.	MS/Geol	Budding	MANRIQUE, J.	MS/Geol	Norman
CONRAD, S.	MS/Hyd	Wilson	MATTICK, J.	MS/Hyd	Khaleel
COOK, K.	MS/Geol	Norman	McCORD, J.	MS/Hyd	Stephens
COPELAND, P.	MS/Geol	Condie	McGURK, B.	MS/Hyd	Stone
COX, E.	MS/Geol	MacMillan	McINTOSH, W.	PhD/Geol	Kyle

COX, W.	MS/Hyd	Stephens
DIAS, K.	MS/Geol	Kuellmer
DUNBAR, N.	MS/Geol	Kyle
DUVAL, T.	MS/Hyd	Khaleel
EGGLESTON, T.	PHD/Geol	Norman
EVENSIZER, J.	MS/Geol	Budding
FAY, R.	MS/Geop	Gross
FERGUSON, C.	MS/Geol	Kyle
GOODYEAR, G.	MS/Geop	Sanford
GRAMONT, B.	MS/Geol	Budding
HAMMOND, C.	MS/Geol	Budding
HARRIS, K.	MS/Hyd	Khaleel
HAVLENA, J.	MS/Hyd	Wilson
HEERMAN, S.	MS/Hyd	Gross
HEMINGWAY, M.	MS/Geol	Norman
HERST, W.	MS/Geol	Gross
HESTER, M.	MS/Geol	Kyle
HODGE, G.	PHD/Geoc	Norman
HOLFORD, D.	MS/Hyd	Khaleel
JANNIK, N.	PHD/Hyd	Phillips
JENKINS, J.	MS/Geol	Smith
JENNINGS, J.	MS/Hyd	Khaleel
JOCHEMS, T.	MS/Geol	Smith
JOHNSON, G.	MS/Hyd	Stephens
JOHNSON, N.	MS/Geol	Kyle
JONES, T.	MS/Geol	Kuellmer
KARASARLIOGLU, F.	SP/Hyd	--
McKALLIP, J.	MS/Geol	MacMillan
McKEE, C.	MS/Geol	Condie
MIKELL, C.	MS/Hyd	Gross
MINIER, J.	PHD/Geop	Reiter
MOORE, Jim	MS/Geol	Kyle
MOORE, Judy	MS/Geol	Norman
MYERS, L.	MS/Hyd	Khaleel
OLSON, W.	MS/Hyd	Wilson
PETERSON, D.	PHD/Hyd	Khaleel
RASHRASH, S.	PHD/Hyd	Wilson
REED, J.	MS/Geoc	Condie
REIMERS, R.	MS/Geol	Budding
RICE, J.	MS/Geol	Johnson
RINEER, D.	MS/Hyd.	Stephens
ROBINSON, S.	MS/Geol	Campbell
SINGER, P.	MS/Geop	Schlue
SMITH, S.	MS/Geol	Robertson
SPAULDING, C.	MS/Hyd	Stephens
SUNDERLAND, M.	MS/Geol	Condie
TERAUDS, V.	MS/Hyd	Phillips
TEZERA, B.	MS/Geol	Budding
VANCE, R.	PHD/Geol	Condie
WATERS, C.	SP/Geop	--
WOLFEL, S.	SP/Geop	--
WOLFF, M.	MS/Hyd	Wilson
WRIGHT, A.	PHD/Geol	Kyle
WRONKIEWICZ, D.	MS/Geol	Norman

ALUMNI NEWS

John Howard Bauch (M.S., Geology, 1982) - I've been promoted and transfered from the Midland office to the Denver Division where I am now exploring for oil in western Montana.

Tor John Stark Bejnar (B.S., Geology, 1976; DipSci 1977 & M.S., Geology 1983 Otago Univ. from Dunedin, N.Z.) - I believe I reported the birth of my daughter on January 4, 1984-Satya Grace Stark Bejnar (but maybe I only reported our expecting). We did not need the tax-deduction (by her expected date being in December), for we owed no federal income tax-as our response to the fact that a large portion of federal income tax money goes toward military spending which we are conscientiously opposed to.

Rena M. Bonem (B.S., 1970; M.S., 1971) - Advanced to Associate Professor (8-84) Baylor University South Central G.S.A. Management Board Chairman, Technical Sessions, National YMCA Underwater Activities Convention, Key West, Sept. 7-10, 1984.

Terry Brown (B.S., Geology 1983) - Chemgold staff includes-chief mining engineer Joe Sawyer (NMIMT alumni), Metallurgist tom Olsen, Art Champeny-mining engineer Republic, Was., geologist Terry Brown Chemgold operates Picache Gold Mine, Imperial County Calif. & has recently acquired the Yellow Aster Mine, Kern County, Calif. in the historic Rand Mining District. Terry has been transferred to Randsburg to initiate drilling & test mining this fall/winter.

Joseph C. Cepeda (M.S., Geology 1972) - Recently named field camp director (at Salida, CO)

Carolyn Sue (Leitzman) Daniels (B.S., Geology 1979) - Married to another alumnus, Douglas P. Daniels, and have a child, Amber Lee, who is now 2 years old.

Stephen K. Falkowski (M.S., Geology 1978) - Conducting exploration programs for precious metal deposits in the western U.S., concentrating in California.

Robert Stanley Fawlowski (B.S., Geophysics 1983) - Currently on educational leave at the Colorado School of Mines. Working on the M.S. degree in geophysics.

Nancy S. (Reynolds) Gilson (B.S., Geology 1974) - Eldest son, James, born in Socorro, an entering freshman at NMIMT for fall '84 in chemistry, awarded Undergraduate Honors Work Program for '84-'85 term. Two more children were born in New Brunswick, Canada, Billy 8 yrs, and Denise, 6 yrs. Husband Bruce, a former Tech student, is self-employed (Gilson & Son) doing welding fabrication and used heavy equipment sales in Santa Fe.

Ernst W. Heckart (B.S., Geophysics 1968) - Recently (6/84) reassigned to plan/coordinate all of Shell's computing services for its exploration effort.

David Samuel Jenkin (B.S., Geophsics 1982) - I am attending graduate school at the University of Minnesota (sedimentology/stratigraphy).

James Gordon Jensen (B.S., Geology 1972) - Resigned my position as District Exploration Geologist for Texas Oil & Gas Corp. to start my own consulting business in May, 1984.

James T. Johnson (M.S., Geology 1955) - Retired in 1983 from Mobil Oil Corp. after 27 years.

Joe Keeney (M.S., Geophysics 1964; Ph.D., Geochemistry 1968) - Research scientist, Geosource, Inc. (Div. of Gearhart Industries, Inc.)

Kenneth Mark Mallon (B.S., Geology Tulane 1964; M.S., Geology 1966) - Career change forthcoming since Gulf currently being "merged" into Chevron (but I don't know what the career change will be). Son, Mark, born in Albuquerque while I was attending Tech, starts as freshman in fall at Boston College.

Steve A. Mizell (Ph.D., Hydrology 1980) - Recent move from Idaho Falls, ID to Wyoming.

Cynthia L. Moore (B.S., Geology 1984) - Just moving to Tempe. I'm signed for courses in planetary geology and looking forward to work towards my master's.

Diane Murray (B.S., Geology 1982) - I have been working with the N.M. Bureau of Mines since Nov. 1983 on the U.S.G.S. M.R.D.S. (Mineral Resource Data System (formerly known as C.R.I.B.) project.

Craig L. Olsen (B.S., Mining 1970, B.S., Metallurgy 1972, M.S. Metallurgy 1973) general mill forman at Phelps Dodge Copper Corp. and Jean A. Olsen (B.S., Math 1972) teacher-Morenci Schools - Two children: Chad-8yrs. old-3rd grader, Megan-6yrs. old-1st grade.

J. Michael Palin (M.S., Geology 1984) - I am presently working toward a Ph.D. in Geology specializing in economic geology at Yale University.

Arthur "Sandy" C. Riese (B.S., Geology 1976; M.S., Chemistry 1978) - Resigned from Gulf Research & Development Co. in June 1984 to accept a position with Atlantic Richfield Co. in Los Angeles, CA as Technical Coordinator. Married Jeri Newman in Denver, Colorado, June 2, 1984.

Herman W. Sheffer (M.S., Geology 1963) - Recently completed 1 yr. commerce-science fellowship program in the office of US congressman Judd Gregg of N.H., ranking minority on science, research and technology sub-committee of S&T full committee. Presently detailed for 1 yr. to Dept. of Commerce to assist in writing legislation to transfer technology private sector for retraining workforce.

John C. Shenk (B.S., Geology 1963) - Resigned as V.P. Exploration, Cheyenne Petroleum Company to become another of many consultants in the Oklahoma City area. This job change with the associated lack of salary, sending a daughter off to her first year of college, and watching our son begin high school football puts us over the "family stress level" qualifying us for a separation or divorce. However, Kay and I are still enjoying life together in Oklahoma City. My biggest concern now is how to sell my daughter's 1973 Maverick. Any buyers out there?

John L. Sondereggar (Ph.D., Geology 1974) - I teach Rock-Water Interaction and Ground-Water Monitoring in addition to my regular (Montana) Bureau (of Mines & Geology) duties.

Cynthia Lee Spahr (M.S., Geology 1983) Dave Baker got me a mudlogging job with his company. Bought a new pickup truck and am leaving for Salt Lake City on Sept 18. Hopefully, I'll be working in Nevada. Still waiting to hear from the Air Force on whether or not they're going to turn me into an officer & meteorologist. Sorry I can't send any money - I'm still in debt from my own schooling.

Dan Keith Thomas (B.S., Geology 1982) - Poor employment opportunities in geology at the time of my graduation forced me to move in a different direction. I got a job building CO_2 lasers at Pulse Systems, Inc. in Los Alamos, NM. I have sinced moved up into a supervisory position managing the workshop and supervising the R&D staff. Although I am not involved in geology directly, I daily use principles I learned in geology in my work, especially the principles of optical crystallography. Many thanks goes out to Dr. Fredrick Kuellmer my optical crystallography professor.

ALUMNI ADDRESSES

In future Geoscience Newsletters, we would like to include the addresses of those of you that do not object. The newsletter is only circulated to faculty, alumni, friends and students of the Geoscience Department. If you feel strongly (either way) about this, address your comments to the Geoscience Newsletter Editor, Dept. of Geoscience, here at Tech.

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