



NEW MEXICO INSTITUTE OF MINING AND TECHNOLOGY

DEPARTMENT OF GEOSCIENCE

ALUMNI NEWSLETTER

November 1, 1985

GREAT MOMENTS at



The cartoon (above) was drawn by Robert Lowey (M.S., '84) and appeared in the May 9, 1982 edition of our inhouse newsletter Techtonics.

A WORD FROM THE CHAIRMAN

Welcome to the second annual Alumni Newsletter. The Newsletter, compiled by Dr. Dave Johnson, is our way to keep you informed of activities and changes in our department. It coincides closely with 49ers' Day when many alumni are thinking back on their student days in Socorro. One of the principal goals of our continued contacts with alumni is to solicit their advice and financial support, in order to improve the quality of services and education of our students.

Last year, our first annual fund raising program was very successful and from August '84 to date has generated \$3856 in contributions from you. Individual contributions ranged from \$5 to \$2000. However, only 5% of you responded to the call. A number of employers generously matched the alumni employees's contribution by as much as 3 to 1. Some of the contributions were used to help purchase well construction materials for a hydrology M.S. student, SEM photos for a geology M.S. student, display board for Geoscience Department, and teaching materials for our undergraduate geology labs.

As I mentioned in last year's newsletter, I established an award for the faculty member who made outstanding contributions in service to the department. I am very proud to tell you that Dave Johnson was chosen as this year's recipient of the \$500 award. This award, which Dave will use for research, departmental travel or student support, is made possible in part by your contributions.

We desperately need your continued financial support to maintain quality teaching and research. Outside contributions from alumni and industry are our only source of discretionary money outside of year-end surpluses in non-salary categories in the departmental budget. It is no secret that the mining and petroleum fields have fallen on tough times, and contributions from industry have declined considerably as a result. Therefore, your contributions are even more crucial. Please take a moment to reflect on the time when you as a student may have gone to your advisor or department chairman for money to support thin section preparation, travel to the NMGS field trip or GSA, mileage for a field vehicle, chemical analysis, or refreshments for a student social function. If there were money available at the time, it would probably have come from alumni or industrial contributions. Please help the geology, geochemistry, geophysics and hydrology students here today by sending a check to the Geoscience Department office or alumni affairs (Dr. Clay T. Smith).

Undergraduate enrollment at Tech and in our department is off a few percent from last year, however, graduate enrollment in geoscience is quite strong. The Graduate student population has increased to 111, in part because of poor job prospects for undergraduates in some fields, but also because of excellent opportunities in others which require advanced degrees such as hydrology. Hydrology now has 35 MS and PhD students comprising about 31% of the total number of geoscience department graduate students. In fact, the hydrology program is proposing a 5 year course of study which an undergraduate student can qualify for as early as his sophomore year that will lead to an MS degree in hydrology.

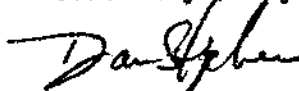
Educational facilities, especially for undergraduate laboratories, have taken a very definite positive step. Approximately \$60,000 has been set aside from state bond equipment funds by our administration for purchasing new petrographic microscopes; with an additional \$20K, we hope to completely replace 20 of the outdated scopes now in use. We recently have purchased new rock and mineral specimens with thin sections, crystal structure models, various hydrologic and porous media experimental apparatus, as well as miscellaneous items including new overhead projectors and slide carousel projector. We are very hopeful that, with continued improvements made possible partly by your contributions, coupled with occupation of the new building (MSEC III), that our research and educational facilities will be truly top-notch.

On some personnel matters, Dr. John Knapp came on-board last spring from Phillips Petroleum. John is an exploration geophysicist with a broad geological background. Also last spring, Dr. Dave Johnson was awarded tenure and was promoted to associate professor. Dr. Raz Khaleel has left Tech and now works with Rockwell International as a research hydrologist on the BWIPP project. We are very proud to have new adjunct faculty join our group: Dr. Jon Callender, currently Director of the NM Museum of Natural History, and Dr. Don Wolberg, vertebrate paleontologist with the NM Bureau of Mines. We are also glad to have Dr. Dave Norman return from his sabbatical in Norway. Dr. John MacMillan will be taking his long overdue sabbatical this coming spring, and he plans to do sedimentological research in Amherst, Massachusetts.

Overall, I feel that our department is extremely healthy. Attitudes are very positive in most respects, except for salary - what's new! We are very enthusiastic about moving into the new building sometime in late 1986 or early 1987. I sense a great deal of cooperation among our staff members in the various subdisciplines within the department. Our grant support picture for graduate students is improving and so is the quality of our student applicants. I am very proud of all of our students, faculty and staff, and I am looking forward to continued progress with their support and yours.

Best personal regards.

Yours very truly,



Daniel B. Stephens
Chairman, Geoscience Department
Associate Professor of Hydrology

NEWS AND NOTES

Tech Grad Covers EOS - Regular readers of EOS may recall a cover photo during the last year (December 25, 1984; Vol. 65, no. 52) that depicts the detonation of 2.032×10^4 kg of nitromethane buried in alluvium. The photo is from research conducted by Eric J. Rinehart (Ph.D., '80), Defense Nuclear Agency, Field Command, Kirtland Air Force Base, NM.

Awards To Geoscience Students -

New Mexico Geological Society Award	Scott Miller Phelps
Roswell Geological Society Award	Gregory E. Little Jeffrey M. Wilson
Estwing Award	Scott Miller Phelps
Barkley S. Wyckoff Memorial Scholarship	David Wronkiewicz (83-84) Karen Brown (84-85)
Tarr Award (Sigma Gamma Epsilon)	Scott Miller Phelps

Mineral Science and Engineering Complex III (MSEC III) - A year ago, a new building to house the Department of Geoscience was still only a dream. It was left to the voters of New Mexico to decide on the fate of the building. Fortunately the voters strongly supported the state bond issue in the November 6th election last year. So now the money is available and hopefully this time next year I will be able to report that MSEC III is nearing completion.

The building will have 70,000 sq. ft. and will be three stories high. Geoscience will have the greatest area, about 23,800 sq. ft. and will have offices and laboratories on all three floors. We will have 4 large instructional labs for geology and smaller ones for hydrology and geophysics. Along with a number of new research labs, this makes for an exciting future. We will share the building with Mining and Geological Engineering (10,500 sq. ft.) and Petroleum Engineering (about 5,700 sq. ft.), leaving about 20,000 sq. ft. for classrooms, corridors, utilities, etc.

The plans for the building are being drawn up by Leedshill-Herkenhoff, Inc., Albuquerque, under the direction of Ken Guthrie. The basic design criteria has been to construct the building on a 2 1/2 foot module. This allows flexibility in planning laboratories and will allow for easy reconfiguration in the future. The offices have been arranged around the perimeter of the building to provide natural light, whereas the laboratories for the most part have been placed in the interior of the building.

I expect MSEC III to be a model for future campus buildings. It has new innovative energy saving devices. The lighting is high efficiency, low wattage with motion-sensors which will turn lights on and off. Ventilation air will be continuously circulated throughout the building, controlled in various zones by a small microprocessor which will adjust the volume of air in order to control the temperature.

All former Geoscience students should be able to sense the effect the new building will have on the department. Rather than being spread across campus (i.e., Weir, Cramer, Eaton and Workman), we will be united into a coherent group. This should improve communications and lead to better co-operation amongst faculty and students.

At this time the outlook for funds to provide new equipment for the building is poor. The budget for the building includes only monies for basic furnishings, with little or no money left over for equipment needs. Any contributions to a MSEC III equipment fund will be gratefully received.

(submitted by Philip Kyle, Building Committee Chairman)

Geoscience Department Equipment Needs - We in the Geoscience Department are very excited about the construction of our new home in the next phase of the Mineral Science and Engineering building. Over the years we have updated our laboratory equipment whenever possible, but the fact is that much of this equipment is not up to date and in some cases its useful life is over.

One of the most critical needs has been met in the last few days. We have had as a top priority the replacement of the student, petrographic microscopes. At present there are five different brands of microscopes, some of which would be familiar to many of you who graduated from Tech in the last 40 years. Many of the scopes are now in poor repair from years of hard use and many are missing various accessories. The administration has just made \$81,000 available from equipment bond monies for the purchase of new teaching scopes. This amount will make it possible to purchase in excess of 20 new scopes, some of which will be equipped for reflected light microscopy. The department has recently supported the purchase of minerals and models as aids for Mineralogy and about four years ago we purchased 11 binocular microscopes that are used primarily for viewing samples in Paleontology, Petroleum Geology and Carbonate Petrology. The Bond issue that made this possible is now expired and future needs will have to be met from other resources.

Laboratory exercises are constantly evolving and new equipment is needed to prepare our students for the latest developments in the science. This equipment is needed for two areas: 1) in teaching labs intended for the general use by undergraduate and graduate students; and 2) in research labs intended for student thesis and faculty research. The quality of our old microscopes is typical of much of our current laboratory teaching equipment and teaching aids. Teaching demonstration aids (maps, models, other visual aids) and equipment are needed for geochemistry, geology, geophysics, hydrology (see John Wilson's comments in the Faculty Notes section of this newsletter). Geophysics needs a 12-channel seismic recorder for Exploration Geophysics. Geology needs 6 new binocular scopes to meet enrollment demands in Paleontology, Petroleum Geology and Carbonate petrology lab sections.

The department has a pressing need for basic, sample preparation equipment. We need (for staff and students) good equipment to prepare rock samples collected as part of research efforts. To date, the New Mexico Bureau of Mines and Mineral Resources has graciously allowed us to use their equipment, but that equipment will not be available to us after the move. We hope in the new building to have new labs for sawing, crushing, splitting, and polishing rocks. Specifically we would like several new rock saws, a jaw crusher, a swing mill, and thin section cutting and polishing equipment.

As you consider a donation to Tech, consider supporting the equipment needs of the department.

(Submitted by Andrew Campbell)

Categories for Giving - The Department has identified several areas that are in special need of support. As Andrew Campbell, John Wilson and Philip Kyle have noted elsewhere in this newsletter, we really need your help in obtaining and upgrading teaching laboratory equipment. To help those of you who contribute to the Geoscience Department, these special categories are designated below:

teaching lab equipment
research lab equipment
Geoscience general fund

undergraduate scholarships
graduate research
travel

Gifts to the Department - In response to our request for contributions to the Department in last year's newsletter, the alumni and companies listed below contributed directly to the department from October '84 through July '85. Donations ranged from \$5.00 to \$500.00. A very sincere thank you to each of you. If your employer will match gifts to educational institutions, by all means notify them of your intent to contribute. Your generosity will help maintain high quality teaching and research in the Geoscience Department at New Mexico Tech.

Atlantic Richfield Foundation¹
Warren T. Bennet
Linda C. Bockoven
Teri Dannenberg
Larry G. Eaton
Exxon Education Foundation²
FMC Foundation³
John C. Halepaska

Dan Hartmann
Saeed Kamal
Dennis W. Melichar
Phillips Petroleum/Denver⁴
Phillips Petroleum Foundation⁵
William R. Tafoya
Daniel P. Wieder

¹ match of Eaton donation; ² match of Bockoven donation; ³ match of J. Cappa (8/84) donation; ⁴ equipment donated; ⁵ match of N. Biles (9/84) donation.

1985 Economic Geology Field Trip to Norway, 10-28 June 1985 - While in Norway, David Norman, together with Tom Segalstad (Mineralogisk-Geologisk Museum), organized a two week field trip to visit ore deposits in Norway and Sweden. Tom Segalstad led the trip and the University of Oslo provided a van for only the cost of gasoline and oil. In return, Norman will organize and lead a field excursion for Norwegian graduate students in the next year or so.

The seven students on the excursion prepared for the trip by attending a 2 credit seminar organized by Andrew Campbell, who also accompanied them to Norway. Living expenses were kept to a minimum by staying in camping cabins which rented from \$10 to \$30 per day and slept from 4 to 6. There was not much beer drinking because of the high prices of alcoholic beverages in Norway, but the bakeries proved irresistible and most finished the trip about 5 kg heavier resulting from the daily consumption of cream-filled pastries. All arrived in Oslo a few days before the start of the excursion and after the trip finished in northern Norway, made their way to Oslo by various combinations of bus, train, and steamship transport for several more days of sightseeing.

The first week the excursion concentrated on the geology and mineral deposits of the Oslo paleorift; the principal deposits visited were the Fen carbonatite, Kongsberg Ag mines, Gittrevann Mo deposit, and the Fe-P-Ti bearing jacupirangite intrusive near Larvik. The second week the excursion headed north and visited 3 sediment-hosted massive sulfide mines, the Rana Fe mine, and the Laisvall Pb-Zn, sandstone-hosted, Mississippi Valley-type deposit in Sweden. The arctic circle was crossed four times that week and the trip ended in Mo-i-Rana, 30 km south of the arctic circle where that night a meal of medallions of reindeer was specially ordered at the best restaurant in

town. Tours were excellent; they were given by geologists, which included the exploration staff at 3 of the mines. In all cases meals were provided after the mine tour.

In addition to the spectacular scenery, a number of historic and other attractions were visited. These included a Viking church, medieval stave churches and medieval country inns which are still being used, the spiral tunnel at Drammen, and the world's largest troll (who of course had seen the sun and turned into stone).

Each year there is an economic geology field excursion; tentatively there will be an international trip every other year. Alumni are welcome to join these excursions. Details of excursions planned for the next two years are given in the 1986 Economic Geology Field Excursion section.

1986 Economic Geology Field Excursion - In mid-May, a one week trip to Nevada is planned to visit gold deposits. MSc students from the Royal School of Mines, Imperial College, London, will accompany the group. Dr. Andrew Rankin from RSM will be at NMIMT this spring and summer and will help organize the trip. The following year (1987) Rankin will help organize a trip for NMIMT students in southern Spain and France.

Alumni are welcome to join both this year's trip and the one to Spain. Please contact David Norman (505) 835-5404, for more details.

Fluid Inclusion Users School, 10-13 July 1986 - Andrew Rankin (Royal School of Mines, Imperial College, London - a member of the editorial board of *Mineralium Deposita*) and Tom Shepherd (British Geological Survey - who designed the Linkam fluid inclusion stage) have given fluid inclusion courses in several countries. Their book, *Practical Guide to Fluid Inclusion Studies* (Chapman and Hall, 1985), resulted from this effort. They will offer their course for the first time in North America at NM Tech, assisted by Dave Norman and Andy Campbell. The course will consist of lectures, laboratory exercises, and demonstrations including all aspects of fluid inclusion studies from sample selection and preparation to analysis of fluid inclusion components. Case histories illustrating the use of fluid inclusions in petrogenetic and ore genetic studies and in mineral and oil exploration will be given.

The cost will be \$450.00, which will include board and room. Attendance is limited to 16. For details, contact David Norman at (505) 835-5404.

Microscope Donated to Department - Richard C. Matuszeski ('44 & '61) a New Mexico Tech Regent in the '50's and for a time an analytical chemist with the Bureau of Mines passed away this year. Richard's wife, Eleanor, has donated his binocular microscope to the department as a memorial.

Sigma Gamma Epsilon, Delta Upsilon Chapter - Sigma Gamma Epsilon, (SGE), the National Honor Society for the Earth Sciences, has been a part of the NMIMT earth science community for 5 years. At Tech, membership in the society may include undergraduate and graduate majors in Environmental Science/Engineering, Geochemistry, Geological Engineering, Geology, Geophysics, Hydrology, Metallurgy, Mining Engineering, and Petroleum Engineering. To be eligible for membership the student must have completed 12 hrs. of course work in the earth sciences, with at least a B average in their major.

On October 3, the society's initiation ceremony was held in the Waldo Mine for the first time, with a tour of the mine conducted afterwards by Dr. George Griswold, Chairman of the Mining and Geological Engineering Departments. The initiation of 12 new members in that setting was truly

spectacular. Later there was a reception for the new members, back in Socorro. We had a good mix of both old and new members which made for a great time.

Although Sigma Gamma Epsilon is an honorary, the local chapter also acts as a service organization to the earth science and Tech communities, and is involved in several campus activities. At 49er's this fall, the Chapter sponsored a booth and, of course, sold our award winning T-shirts. Throughout the year, SGE also sells, or rents, various learning aids such as: mineral ID kits, grain-size charts, Silva compasses, and Geologic Time Scale charts. Funds raised by these projects support the Chapter's twice monthly Geolunch Film Series, and we are currently accumulating funds to support an undergraduate scholarship to be awarded to qualified earth science students at Tech.

Dr. Dave Johnson, SGE Faculty coordinator, is planning day field trips for Chapter members to view geology of the Socorro and neighboring areas.

(Submitted by Barbara Kickham, SGE Secretary)

49ers' - Geoscience Field Trip - Those of you who attended 49ers' in 1984 know that there was a well attended field trip on Sunday morning that was conducted by members of the department with the assistance of Bruce Black, a consulting geologist from Farmington, New Mexico. We spent the morning examining the structural styles in Paleozoic and Mesozoic sediments across the Rio from Socorro. The Institute seems quite interested in developing the "Homecoming" aspects of 49ers, and for its part, the Geoscience department is interested in providing this field trip on an annual basis so that visiting alumni can spend a little time getting reacquainted in a field setting. We encourage you to return anytime for a visit, but especially at 49ers. If you do, inquire about the field trip.

FACULTY NOTES

George Austin, Deputy Director NMBMMR and Adjunct Associate Professor of Geology - George continues to work principally on administration within the Bureau, but also in various aspects of research, teaching in the department, and committee work at Tech. "I taught a course on industrial minerals for eight students at Tech in the spring of 1985. It was a good experience to bring me up to date in many areas and I also think the students enjoyed it. Besides work in the classroom, we spent quite a bit of time looking at various industrial minerals deposits and processing plants around New Mexico.

My interest in industrial minerals carries over into research areas and I have published articles on adobe as adobe material. In 1986, I plan to spend six months on a sabbatical at the Illinois Geological Survey in Champaign-Urbana, working on interactions between hazardous materials and the clay liners at disposal sites and also I want to look into the problem of computerization of map-making.

My other recent activities at Tech have been on the Institute Space Utilization Campus Planning Committee which endeavors to keep the Institute Senate up to date on current and long-range plans for the campus.

My other professional activities have been principally in the area of the industrial minerals division of the Society of Mining Engineers - AIME and I am currently the field trip chairman for the 1985 fall meeting in Albuquerque. I am also the general chairman for the Clay Mineral Society Meeting which will be held here in Socorro in October of 1987."

Christina Lochman Balk, Professor Emeritus of Geology - This year I have reviewed two more papers and during September wrote a paper on the Stratigraphy and Fossils of the Paleozoic of New Mexico for the Sigma Xi Centennial publication. Although I tried, I could not compress it to the required 2,000 words. When I looked into the information I was pleased to see that in the past 33 years since I have been here, a lot more has been learned about the Geology of New Mexico. Did get some of my Ordovician, Silurian and Lower Cambrian reprints sorted out and sent to young researchers in those areas. Have been working all year on sorting teaching reprints and also some Cambrian material to distribute but have not accomplished that yet. Hope to finish before end of year. Still reading geology literature and following changing ideas in plate tectonics. We had a big fruit year so several months of summer were shot working on apricots, peaches, cherries, and later, grapes.

Lynn Brandvold, Senior Chemist, NMBMMR and Adjunct Associate Professor of Geochemistry - Born and raised in Fargo, North Dakota, B.S. and M.S. in Chemistry from North Dakota State University.

Currently serving as Post-Chairman of the Rio Grande Section of the Society for Applied Spectroscopy and as President of the New Mexico Tech Chapter of Sigma Xi. Member of the New Mexico Water Quality Control Commission for the last 11 years.

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

Current research includes analysis of trace metals in coal and determination of coal fractures with which these metals are associated.

Other interests include husband, two children, home, yard, garden, racketball, and recorder playing.

Ron Broadhead, Petroleum Geologist, NMBMMR and Adjunct Assistant Professor of Geology - My main push in the last year has been continuation of my analysis of the petroleum geology of the Tucumcari Basin in northeast New Mexico. The Tucumcari Basin is not productive in oil and gas but several exploratory wells have been drilled in the last five years which have encountered promising shows of gas and oil in Pennsylvanian sands at depths of approximately 7,000 ft. I have also been evaluating the petroleum resource potential of five counties in northwest New Mexico: Valencia, Cibola, McKinley, San Juan, and Rio Arriba; this evaluation is part of a larger project that the Bureau is doing for the U.S. Bureau of Land Management. Other Bureau staff members are evaluating the potential for occurrence of other mineral and fuel commodities in those five counties.

I am continuing to monitor oil and gas drilling in New Mexico. I have recently been designated a member of the House of Delegates of the American Associate of Petroleum Geologists. The fall 1985 semester sees me teaching Geology 460 (Petroleum Geology) at Tech.

Recent publications concern the petroleum geology of the Santa Rosa Sandstone (Triassic) in northeast New Mexico, oil and gas exploratory wells drilled in New Mexico, and sources of CO₂ gas for enhanced oil recovery in the Permian Basin. Last December I talked on petroleum exploration targets in New Mexico at the Annual Meeting of the Interstate Oil Compact Commission.

Andrew R. Campbell, Assistant Professor of Geology - This past year has been busy for me both at school and at home. On the research front my time has been consumed by my stable isotope laboratory which I am in the process of constructing. This lab is centered around a mass spectrometer donated to me

by the U.S.G.S. The only catch was that I had to pick it up in Reston, VA, and drive it back to Socorro in a rented truck. With financial help from the Office of Academic Affairs and the Research and Development Division, I have been rebuilding the mass spectrometer and I hope to have it running some time this winter. When this facility is completed we will be able to analyze for stable isotopes (oxygen, hydrogen, carbon, and sulfur) in geologic materials. There are several scientists on campus who hope to use the lab to further our research efforts in ore deposits, petrology, and hydrology.

My other research interest, fluid inclusion analysis, has also had a good year. Together with graduate student Sylveen Robinson, I have been looking at fluid inclusions in opaque minerals using an infrared microscope. Most of our work has been on samples of wolframite from various localities around the world.

My teaching responsibilities include Mineralogy, Ore Deposits, and Stable Isotope Geochemistry. This past summer I lead a group of students on a field trip to Norway where we met up with Dr. Dave Norman, who was on sabbatical in Oslo. From Dave and his colleagues in Oslo we got a tremendous tour of many Norwegian ore deposits. We all returned with new ideas and pleasant memories of the midnight sun.

Within the geoscience department I have some new responsibilities. I am now the Graduate Coordinator for Geology and Geochemistry. This job includes organizing graduate admissions and advising students until they are assigned to a research advisor.

At home, my wife Kathryn and I have had our first child, a daughter named Alison, who keeps my evenings hopping. I hope that all of you have had as good a year as I.

Charles E. Chapin, Senior Geologist NMBMMR and Adjuncts Professor of Geology -
I am an Adjunct Professor in the Geoscience Department who does mainly research in tectonics, volcanology, and economic geology. I usually teach a course each year in either volcanology or regional tectonics of the western United States. I have worked for the New Mexico Bureau of Mines and Mineral Resources for the past 15 years; before that I was full time in the Geoscience Department for 5 years and was chairman for 2 years. During these 20 years at Tech I have directed nearly 40 graduate theses. Current thesis projects are: Steve Cather (Ph.D.), University of Texas at Austin, A sedimentological study of volcanoclastic rocks in the Spears Formation, northeastern Mogollon-Datil volcanic field, New Mexico; Bill McIntosh (Ph.D.), New Mexico Tech, Correlation of ash flow tuffs in the Mogollon-Datil volcanic field using ⁴⁰Ar/³⁹Ar dating and paleomagnetism; Charles Hammond (M.S.), New Mexico Tech, A structural study of the Comanche fault zone along the west side of the Albuquerque Basin; Tina Behr (M.S.), New Mexico Tech, Diagenesis of volcanoclastic rocks in the Popotosa Formation near Socorro; Pascal Gabezas (Ph.D.), University of Brest, France, Regional tectonics along the boundary of the Colorado Plateau and Mogollon-Datil volcanic field; and Richard Harrison (Ph.D.), New Mexico Tech, Geology and ore genesis of the Chloride mining district Sierra County, New Mexico.

During the 1985-86 academic year, I will be touring the United States and Canada as a participant in the AAPG Distinguished Lecture Series. The subject of my lecture is "Two-stage Laramide Orogeny in the Southwestern United States: Tectonics and Sedimentation". I will also be presenting papers on "Extensional History of the Rio Grande Rift" -- Sixth International Symposium on Basement Tectonics, Santa Fe, Sept. 16-20, 1985; "Potassium Metasomatism of Volcanic and Sedimentary Rocks in Rift Basins, Calderas, and Detachment Terranes" -- Conference on Heat and Detachment in Crustal Extension, Sedona,

Arizona, Oct. 10-12, 1985; "Potassium Metasomatism of Volcanic Rocks in the Southwestern United States: Economic Implications" -- Symposium on Frontiers in Geology and Ore Deposits of Arizona and the Southwest, Tucson, Mar. 20-21, 1986. Two manuscripts recently accepted for publication are: "Axial Basins of the northern and central Rio Grande Rift" -- to appear in a volume on Sedimentary Cover of the North American Craton, Decade of North American Geology Series; and "Stress History and Tectonic Development of the Rio Grande Rift" to appear in a special issue of Journal of Geophysical Research devoted to the Rio Grande rift. All in all, it has been, and will be, a pretty strenuous year!

Kent C. Condie, Professor of Geochemistry - Last year was an exciting year in terms of research. We have a lot of grad students working on Precambrian studies. In terms of our work in the Southwest U.S., we continue work in southeast Arizona and central Colorado. In addition, I have a student doing a detailed geochemical study of the Precambrian section in Hembrillo Canyon on the White Sands Missile Range in New Mexico. Our geochemical results strongly point towards arc regimes in the Southwest between 1800 and 1650 m.y. ago. At least one major arc collision is recorded at 1750 m.y. along the Wyoming Shear Zone near Laramie, Wyoming. Bimodal volcanism, which typifies these arc regimes, continues to puzzle us--why should it be so common in the Proterozoic yet uncommon in the Phanerozoic? Our results thus far indicate that most of Southwest and Central North America was accreted as new crust between 1750 and 1400 m.y.

In addition to our Southwest studies, we are wrapping up our work in India involving the studies of the origin of charnockites. Phil Allen finished his Ph.D. in May (a new record for length of time to complete a thesis?). Our studies in southern India have shown that granulite facies metamorphism does not change the bulk composition of rocks and only at very high pressures (+8 kb) are some elements lost (viz., Rb, Cs, U, Th, Pb). Although I would like to continue studies in India, the geo-bureaucratic problems are just too much to face any longer. This last summer we began a major geochemical project sponsored by the NSF in south Africa. Two graduate students (Clay Crow and Dave Wronckiewicz) and I spent June in the Transvaal doing field work and contacting mining companies. Dave and Clay stayed on the rest of the summer collecting samples. We intend to focus our efforts on the Kaapvaal succession and examine changes in composition of basalts and clastic sediments from 3000 to 1800 m.y. ago. This should provide some important results on the evolution of the crust and mantle during this period of time. Perhaps, we were lucky to finish our work in South Africa considering the racial unrest this summer. I feared a phone call from the NSF any moment telling us to pullout. Luckily, however, we have shipped nearly 1000 samples at Tech to keep us busy for a few years. The U.S. press plays up the negative aspects of racial problems in South Africa. Over the 10 years or so that I have been working there, I've seen significant changes progressing towards giving the blacks equal rights. Hopefully, this progress will continue more rapidly to avoid major violence.

During this last year I have presented talks on various aspects of Precambrian Crustal evolution at Carleton College (in Minnesota), Tech, the European Union of Geosciences (in Strasbourg, France), the Proterozoic Fold Belts Conference (Darwin, Australia), the International Dyke Conference (Toronto, Canada), the International Basement Tectonics Symposium (Santa Fe, New Mexico), and a Precambrian Workshop (Flagstaff, Arizona).

On the home front, we have sent Linda off to college (the phone rarely rings now). We now have both Tami and Linda at Brigham Young University.

Tami recently changed her major to film arts and Linda is majoring in cheerleading and boys (hopefully changing to an established subject). Nathan (age 13) continues to enjoy white water rafting with me. This year we took two trips: the Tech trip on the Green River and a private trip on the San Juan. Both were great even though we capsized two of the small paddle boats on the Green.

Gerardo W. Gross, Professor of Geophysics - During the fall semester of 1984 I taught Geology 302 (Geomorphology) and Geophysics/Hydrology 527 (Quantitative Geomorphology), and during the spring semester 1985, Geophysics 446 (Electrical Methods in Geophysical Prospecting) and Hydrology 412 (Surface Water Hydrology).

An analysis of geophysical well logs of the Pecos Slope has been completed. This study has mapped a number of continuous groundwater zones within the Yeso Formation. Much of the water is highly saline (>10,000 ppm) but zones of better quality have also been characterized on the basis of well log analysis.

Research on the electrical properties of ice has focused on molecular and ionic attachment kinetics at the ice/water interface. This is a topic of both fundamental interest from the standpoint of chemical physics, and of importance in applied fields such as metallurgy and biophysics. Bridge measurements of equivalent circuits and improved computer analysis methods are being used to increase accuracy and precision in our ongoing research of the dielectric relaxation spectrum of ice.

Lawrence H. Jaksha, Adjunct Associate Professor of Geophysics - I am a geophysicist with the U.S. Geological Survey and have been stationed in Socorro for the last 3 years. My research interests are focused on the crustal structure and seismicity of the Rio Grande rift. Most of my work is done in cooperation with the Geoscience Department at Tech. In particular, NMT and the USGS operate a 10 element seismic network near Socorro with most of the routine work being done by Tech students. This arrangement affords the students direct participation in data collection, data analysis, and (under supervision of a professional staff) interpretation of results.

My wife Mary, our 3 children, and I raise goats, sheep, and grapes on a small farm east of the Rio Grande. In our spare time (which is very nearly zero) we enjoy amateur archeology, movies and reading.

David B. Johnson, Associate Professor of Geology - In November, I presented 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.

The year saw completion of the first phase of work in the Big Hatchet Mountains in SW New Mexico. Lee Wilkening finished his master's research on conodonts of the Mississippian-Pennsylvanian boundary. Jim Rice has defended his master's thesis and I've signed off on it, but I have yet to hear that the Graduate Office has received it (Jim). A French masters student, Bertrand Gramont, is working on upper Pennsylvanian strata on the west (slope) side of the Big Hatches. Bertrand is a climber, so he affords me (vicarious) access to strata that I would not otherwise be able to collect. One of the main lessons we've learned is that conodont faunas on the east (shelf) side are not as diverse or abundant as we might hope. Some of the mid-continent models for environmental control of taxa seem to apply here as well.

Teaching duties haven't changed much. The second semester of the introductory geology course (now numbered Geol. 102) still attracts (or is it captures) more than 100 students. Paleontology enrollment is up from last year, but interest in carbonate petrology is off some, I guess because of the continued lethargy in the petroleum industry. Since I don't feel the pressure to teach carbonates so frequently, I'm offering my conodont biostratigraphy course more often in an effort to generate more interest in conodonts among the students here at Tech.

One of the more enjoyable projects this year was related to the media. The British Broadcasting Corporation is filming "The Making of a Continent II" for airing both in Britain and in the U.S. on Public Television stations. A film crew led by the producer for the show, Ned Kelly, visited New Mexico in mid-August to film several aspects of our magnificent geology. Kelly asked me to serve as the geological consultant for that part of the project. I'll admit to a certain amount of consternation on learning that the entire Permian Reef Complex will receive about 3 minutes and 15 seconds of air time. I feel hard pressed to introduce the topic in the 2-day field trip I run there for my carbonate petrology class.

John S. Knapp, Jr., Assistant Professor of Geophysics - Having just started Fall Semester 1985, I am the Geoscience Department's newest faculty member.

My Ph.D., received in 1982 from the University of Washington, involved the tectonic interpretation of earthquakes at the northern termination of the San Andreas fault in California. Prior to completing my Ph.D. I was on the faculty at the University of Wisconsin, River Falls, where I taught everything from oceanography to structural geology with some geophysics thrown in. Since 1982 until just recently, I worked in the geophysical technical development section of Phillips Petroleum Co. At Phillips I was involved in developing and enhancing 2-D seismic imaging and modeling procedures as well as a vertical seismic profile processing system. Eventually I found the requirement of looking at great geology only in terms of hydrocarbon exploration too confining and decided to return to the academic way of life.

My primary teaching responsibilities at Tech will be to develop our applied geophysics curriculum. Consequently, I will be teaching two new graduate courses in reflection seismology: one, being taught this year, on seismic processing techniques, and the other on the interpretation of reflection seismic profiles. I eventually hope to teach special seminar courses on vertical seismic profile techniques and modeling and migration.

My immediate research interests include developing a procedure for remapping vertical seismic profile data into a form analogous to conventional 2-D seismic data and imaging of 3-D seismic data using 2-D methods. Also I am helping Al Sanford convert our seismic observatory to digital recording by working on developing an interactive digital analysis system on a PDP 11 minicomputer. In the more distant future, I hope to get a seismic processing system that is being donated to Tech by Phillips Petroleum up and running so we can do some more detailed work with the COCORP data.

Philip R. Kyle, Associate Professor of Geology - Another year has passed in a blinding flash; it seems like only yesterday I was introducing myself in the first Alumni Newsletter.

The year was truly an exciting, busy, and extremely productive one for me. I made two trips to Antarctica, firstly for a few days in October and then later in November for an extended eight week period. After 13 years of surveillance of Mt. Erebus, the 3794 m high southernmost active volcano in Antarctica, decided to do its thing. Starting 13 September 1984, it was

rocked by a series of large strombolian eruptions that sent surface waves over 1400 km to the South Pole station. Observers 70 km away saw glowing bombs erupted over 600 meters above the crater. On another occasion people were able to hear the explosions from a distance of 37 km. The larger than normal eruptions continued until December, when they declined slightly in number and size. In order to assess the activity and to check a possible reported volcanic eruption plume seen on a weather satellite image, I made a quick 12 day trip halfway across the world. The trip would have been shorter if bad weather had not trapped me in Antarctica for 5 days. Within two hours of landing on the ice at McMurdo Station, I was aboard a helicopter to visit the summit of Mt. Erebus. I found volcanic bombs the size of a semi (10 m long) up to 1.5 km from the crater. The anorthoclase phonolite lava lake, which had once been a unique feature of Erebus was gone. A small smoldering crater was left. After returning for three weeks to finish off classes, give exams, and grade papers, it was back south again. This time my expedition consisted of nine people, including three current graduate students at NMIMT. Much of my Austral summer field season was spent running the International Mt. Erebus Seismic Study (IMESS). We erected a new hut on the summit area of Mt. Erebus from which to observe the renewed activity. In addition, we fired a number of large explosions (up to 700 lbs of high explosive) to calibrate the existing seismic network. While I basically sat in McMurdo and pushed paper and organised, others around me had fun collecting mantle xenoliths, measuring the SO₂ emission rates from Erebus, mapping volcanic rocks and exploring using skidoos and sleds.

The year was noteworthy because I finally saw the completion of M.S. theses by Mark Noll and Eric Bigelow. Nelia Dunbar completed an independent study and is now moving ahead with her Ph.D. Anne Wright and Jim Moore continue to plug away. Several other students (W. David Johnson and Dave Pettigrew) disappeared without completing their theses. Ah, where are you fellows, send me some reading.

Over the past summer I presented a paper and was coauthor of 3 others at the spring AGU meeting in Baltimore. Along with two students from University of Texas at Arlington, we analyzed over 100 samples from the Bandelier tuff for major and trace elements. Watch for AGU abstracts. In addition, we just finished REE analyses by INAA on 70 samples. In June I got to see the world of big physics when I spent a week at Brookhaven National Lab, Long Island, New York, attending a "Workshop on Trace Element Geochemistry with Particle and Photon Beam." We got to play around on the \$200 million National Synchrotron Light Source doing microbeam x-ray fluorescence analyses. The instrument is only now being developed but shows a wonderful potential for microbeam (1-10 micron) analyses of a wide variety of elements down to the ppm range.

In two months, I am off to Antarctica again. Stay tuned, same place next year.

Laurence H. Lattman, President of Institute and Professor of Geology - As most of you who follow alumni affairs are aware Tech's President, since July 1983, is a geoscientist. The president is mostly occupied with the affairs of the Institute, however, for the past two years he has taught the first semester of our introductory Principles of Geology offering with John MacMillan. Laurence Lattman received a Bachelor of Chemical Engineering degree from City College of New York and the M.S. and Ph.D. in geology from the University of Cincinnati. After working 4 1/2 years for Gulf Oil Corporation he joined the faculty of Penn State University in 1957 and remained there until 1970. From 1970-75, he was chairman of the geology department at the University of Utah,

where he was dean of the College of Mines and Mineral Industries for eight years and for five years was also dean of the College of Engineering.

He is the author or coauthor of forty papers and two books dealing with aerial photographs and satellite imagery in petroleum and mineral exploration, geomorphic process and fracture analysis. He has served extensively as consultant to the U.S. and foreign companies and government agencies in exploration and was Fulbright Professor at Moscow State University in 1975.

John R. MacMillan, Associate Professor of Geology - Since the last publication in October 1984 of the Alumni Newsletter I have gotten busier on research by writing and submitting an abstract which was accepted, writing the manuscript and drafting figures, submitting the manuscript (only one week after the April Fool's Day deadline (with permission), presenting alone the thirty minute talk on April 30, at National Institute for Petroleum and Energy Research (NIPER) Reservoir Characterization Technical Conference in Dallas, TX, revising the manuscript in response to editorial review, and having it accepted for publication by Academic Press. This paper by MacMillan, J.R. and A.L. Gutjahr (will be 1986) "Geological Controls on Spatial Variability for one-dimensional arrays of Porosity and Permeability Normal to Layering" was the second professional talk by Mac within six days. The first talk (abstract to be published in NM Geology) was on "Paleocurrent and Facies Analysis of the Abo Formation, Zuni Mountains, NM" at the NMGS Spring Meeting (where Mac was the transparency projectionist in the morning but not afternoon slide projectionist when the bulb blew immediately before and during Mac's talk). I have also written several grant proposals during the last year, one of which on "Effects of Weathering on Rock Composition in a Coal-bearing Sequence" is funded, another is not and no word yet on two others.

I am now the undergraduate Geology Program Coordinator and am no longer chairing, but am a member of, the Geology/Geochemistry Graduate Admissions Committee. I again offered a one week geology summer minicourse to high school students -- a recruitment tool -- and six out of eighteen students who took the 1984 minicourse did apply to, were accepted, and came to NM Tech for their undergraduate degree.

I am teaching like mad in the Fall '85 semester (1/2 of Geol 101 with Larry Lattman and lab supervision for it), Geol 321 Introduction to Petrology, teaching and lab TA'ing separate undergraduate and graduate level Sed. Pet. and 1/3 with Dave Johnson graduate Depositional Systems and Basin Analysis with the intention of going on sabbatical in the Spring. The sabbatical will be at Amherst College, Amherst, MA, to reoccupy the flume there and gather new data on the difference between settling velocities of particles in turbulent water versus still water, without artificial enhancement of the turbulence in the naturally turbulent flowing flume water.

David I. Norman, Associate Professor of Geochemistry - David Norman spent the 1984-5 academic year at the Mineralogisk-Geologisk Museum, Oslo, Norway (a part of the University of Oslo) funded by grants from NSF and the Norwegian Marshall Fund. His research concerned the evolution of ore depositing fluids from granites. Granites studied included those in Norway and Cameroon associated with Au mineralization, granites in New Mexico, Texas, and Cameroon associated with Sn mineralization, and the Drammen granite in Norway which bears Mo mineralization. He did field work in Cameroon and Norway, visited numerous universities in Europe, and spent a week in the pyrite belt (massive sulfide district) in the south of Spain.

The Norman family lived in an apartment on the outskirts of Oslo. Anna, age 4, attended a Norwegian children's day school (barnapark) and Kirsten, age 6, a kindergarten (barnahagen). By Christmas they had learned the language and by spring were speaking like natives. On May 18, they had a son, Paul Eric, who was born with no complications. In late summer, they returned to Socorro, happy to be back in the USA but sad to end the year in Norway which passed all too quickly. Dave will be returning to Norway in the summers of 1986 and 1987 for field work and tentative plans are for the family to join him at least one of those years.

Fred M. Phillips, Assistant Professor of Hydrology - The past year has involved a lot of traveling. The period from Christmas to the beginning of Spring Semester was spent in Antarctica. I was there to collect water and salt samples from the Dry Valleys in Victoria Land. The samples will be analyzed for ^{36}Cl in order to determine the cycling of salts in the Dry Valley hydrologic system. In addition, I also visited Washington, D.C., Reno, Lake Havasu City, and Chicago for conferences, and Rochester for ^{36}Cl analysis.

Closer to Tech, investigations of the bomb- ^{36}Cl pulse in New Mexico soils have yielded some surprises with regard to groundwater recharge processes. Water transport in the vapor phase seems to be much larger than we expected.

On the home front, we have a new member of the family, Geoffrey, born October 1, 1984. He has now learned to crawl well enough to wreak havoc in the house. He seems to crawl faster than we can keep up, but otherwise we're all doing fine.

Allan R. Sanford, Professor of Geophysics - I will start on a personal note. A most pleasant event for Alice and me this summer was the marriage of Colleen in an outdoor ceremony at Turtle Bay on the Tech campus. She and her husband are graduate students in the biology program at Northern Arizona State University. Our son Rob completed his MS degree in microbiology at Colorado State University this spring and is now employed by a biotech firm in Seattle.

My students and I continue studies on the local seismicity with the purpose of determining the structure and understanding the mechanism of tectonic and magmatic processes within the Rio Grande rift. In a detailed study of first motions for earthquakes in a swarm located within 28 km of Socorro, Steve Jarpe (MS '84) has found evidence suggesting simultaneous shear along, and opening of, existing normal faults. A tentative working hypothesis is that the opening of the faults is caused by injection of magma.

Jon Ake (MS '84) who entered the Ph.D. program last fall, has started a detailed study of P-reflections from the mid-crustal magma body. Unlike the stronger and more commonly recorded S-reflection, this phase penetrates into the magma body and thus contains information on its internal structures. Jon is tackling this problem using techniques and procedures similar to those applied in the petroleum industry.

Paul Singer (MS '85), another new enrollee in the Ph.D. graduate program, is pursuing a crustal study of the Rio Grande rift in the Socorro area using the time-term method. This is a continuation and refinement of an earlier study by Doug Carlson (MS '83).

Some may be interested in knowing that we had another magnitude 4.0 earthquake in the Socorro area on August 16 of this year. This time the epicenter was only 10 km from Tech (rather than 28 km for the previous magnitude 4.0 event on March 2, 1983) and it got nearly everyone's attention.

John William Schlue, Associate Professor of Geophysics - Our attempts to record long-period surface waves across the Rio Grande rift continue. We (Tech and LANL personnel) deployed our instruments several times this past year, and were actually able to record something a few times. (We missed one good opportunity when we couldn't reach one of our stations because of a blizzard, which at least sounds better than "equipment failure".) I've been doing some 2-D finite-element modeling on our Ridge-32, trying to fit the data we have obtained with some realistic models of the rift. I hope to present some of my better results at the AGU meeting in San Francisco this December.

You may know that the ARCO Foundation gave the geophysics group \$10,000 towards the purchase of the Ridge (total cost \$19,000). This past year, the Foundation contributed \$11,250 to upgrade the Ridge, which we used to add another 2 Mbytes of RAM. I am now routinely running finite-element models of the rift that require approximately 16 Mbytes; if it had been possible to run these on the DEC (and it wasn't and isn't), I couldn't have afforded it, as each model requires about 30 runs, and each run takes about 45 minutes.

In addition to the Ridge, a generous donation by Phillips Petroleum/Denver (made possible by Jeff Fischer, MS '77) got us a PDP-1134 with tape drive, two digitizing tablets, a DEC-Writer III, and two disk drives. We currently have the DEC-Writer hooked up to the Ridge to act as a printer; the PDP and peripherals will be used to help provide on-line digital data acquisition from the short-period network.

Committee assignments currently include chairing the Department's Ph.D. Exam Committee and putting in my 2 cents worth on the Senate's Research Committee (currently helping to lay the groundwork for finding a successor to Marx Brook, RD&D director) and Computer Advisory Committee.

William J. Stone, Hydrogeologist NMBMMR and Adjunct Associate Professor of Geology - Just marked my 11th year at the Bureau. As a follow-up to sabbatical research in Australia, (published 1985, Jour. Hydrology, v. 76) have worked on recharge to the Ogallala aquifer on the High Plains of east central New Mexico (1985 NMGS Guidebook article). Continuing to work in San Juan Basin, mainly on water problems associated with coal mining. Did recharge study of a potential coal mine area north of Quemado and am doing an expanded Phase II recharge study at Navajo Mine, which permits evaluation of the chloride mass-balance approach to recharge in reclaimed areas. Also directing and supporting research by Brian McGurk (Hydrology MS student) on hydrogeology and potential pit inflow in the prospective mine area north of Quemado.

Last summer I taught a Directed Study on Hydrogeology of Coal and Coal Mines (2 Hydrology MS students). Still interested in geologic controls of hydrologic phenomena and teach Geology 504 (Hydrogeology) on demand.

In September, I traveled to Europe for the International Association of Hydrogeologists Congress in Cambridge and then the International Mine Water Congress in Granada, where I gave a paper entitled "Assessing impact of surface mining on recharge." In October I will give a paper on "Determining recharge in coal surface mining areas" at a meeting of the American Society for Surface Mining and Reclamation, Denver. Also have had a minicourse on "A simple approach to determining recharge in surface coal mines" approved for presentation at the Symposium on Surface Mining, Hydrology, Sedimentology, and Reclamation, in Lexington, Kentucky (December).

We moved to a small farm in Belen last year. As busy with, but enjoying, the new country life.

John L. Wilson, Professor of Hydrology - I've now been at Tech for a year and a half. With Allan Gutjahr of Tech's Math Department I've reestablished the funded research program in stochastic groundwater hydrology originally founded by Lynn Gelhar. We have three projects in this field. First is a small DOE project concerned with the model validation of a stochastic finite element flow code developed by Lloyd Townley and I at MIT and INTERA. This code, called CERT, is primarily used in groundwater studies of high level radioactive waste sites, including New Mexico's WIPP. A second project, funded through the State Water Resources Research Institute and the U.S.G.S., is concerned with automatic history matching (the so-called inverse problem) under conditions of uncertainty. It also examines the role of uncertainty in groundwater management decisions in New Mexico basins. We're working in the Mimbres basin near Columbus, New Mexico. DOE has provided a half million dollars to fund the third project. Allan and I are now examining the effects of reservoir heterogeneity on enhanced oil recovery. Naturally, Tech's Petroleum Recovery Research Center (PRRC) is involved. Our excellent reputation in stochastic groundwater flow played a large role in this award. We believe that it may blossom into additional contracts through the PRRC with petroleum companies, for lab and field testing, and with our geologists, for field studies of outcrops.

I've started another research area here at Tech, which is a spin-off of consulting work I've done and some of Dan Stephens' work. Oil and gasoline spills, and the improper disposal of organic hazardous wastes are common sources of liquid organics in the subsurface. Using our own Geophysical Research Center funds we've seeded a study of liquid organic behavior, with emphasis on capillary trapping. With the help of Norm Morrow of the PRRC we've already presented several papers, describing trapping mechanisms and examining the efficacy of hydraulically based aquifer remediation schemes. EPA and several petrochemical companies are interested in this work, and its extension including biological mechanisms. We are hopeful that this work, the first of its kind in hydrology, will be soon funded by outside grants and contracts.

My final comment will be directed toward our infamous Hydrology 411 lab. The equipment for this basic lab in groundwater hydrology has deteriorated over the years, while the 411 population has grown. I taught almost sixty students in this course last year. With funding from the Department for personnel (thanks Dan!), and from State Equipment Bond money, we have designed and constructed a whole new series of experiments. The physical experiments include water balance models for confined and phreatic aquifers, flow in pipelines, flow metering devices, numerous Darcy columns with both homogeneous and heterogeneous consolidated bead and sand packs, tracer studies, and Hele Shaw models. We also are improving our electrical analogs and computer simulation portions of the lab. Although much has been done we are not yet finished. If you have any suggestions for new laboratory experiments, using physical models, analogs or computer simulation, please contact me by mail. Financial or equipment contributions to the laboratory are very welcome.

Additional News Item:

The Mahdi Hantush Endowment, which Tech set up last year to honor the founder of our Hydrology Program, has received a contribution of \$50,000 from the University of Kuwait, matched by \$50,000 from the State of New Mexico. The endowment will be used to support graduate students in hydrology, particularly those from Kuwait.

Donald L. Wolberg, Paleontologist, NMBMMR and Adjunct Associate Professor of Geology - This past year has been the most hectic year since I came to the Bureau in 1978. Field, laboratory, and publishing activities increased as did Tech, State, and professional responsibilities. I now serve on an assortment of committees: the NMIMT Employee Benefits Committee, NMIMT Research Committee, Museum Committee, one MS and one PhD committee, and one tenure committee. Elsewhere, I am Chairman of the Society of Vertebrate Paleontology Governmental Liason Committee, a member of the National Academy of Sciences Paleontology Committee studying regulations related to collecting and collections, a new Technical Editor for the Journal of Paleontology, co-chair of a state-US Bureau of Land Management Committee that developed a cooperative program for paleontology in New Mexico, and Registration Chairman for the New Mexico Geological Society Fall Field Conference for 1985.

Several research projects, all tied to the Upper Cretaceous, continue and include work in the "Fossil Forest" study area, south of Farmington. Our Field Paleontology course seems to continue to attract secondary school teachers who are prepared to put up with miserable field conditions in the San Juan basin and the dinosaurs, mammals, sharks keep accumulating in our collections. The Field Paleontology course has led to the development of a Laboratory Methods in Paleontology course that had to be offered four times this summer! I continue to offer directed studies, courses for upper class and graduate students, and students actually turn up.

We're also keeping after the Cretaceous-Tertiary catastrophe "problem" as seen in the Raton Basin. Recently, Noye Johnson (Dartmouth College), Danny Bobrow, and I resampled strata near Raton for paleomagnetism and platinum group chemistry, continuing work Mike Payne, Adrian Hunt, and I initiated several years ago.

Rick Lozinsky and I continue to prowl the Elephant Butte area and the McRae Formation for fossils. Rick's UNM thesis-related studies led to the discovery of extremely significant dinosaur fossils that reawakened interest in the McRae.

We continue to look at selachians (sharks, skates, and rays) from several localities in New Mexico. Bruce Baker (MS, 1982) first brought me shark teeth he collected in his thesis area in the Joyita Hills. Since then, we have been trying to make stratigraphic and paleobiogeographic sense of the distribution of Cretaceous sharks on both sides of the epicontinental seaway. Cooperation has been forthcoming from the University of Kansas, Field Museum of Natural History, University of Alberta, Iowa Geological Survey, University of Minnesota, Black Hills Institute of Geologic Research and others.

Finally, we continue to work with Art Harris, University of Texas - El Paso, on a spectacular Pleistocene cave fauna from extreme southern New Mexico. Art has graciously asked me to describe the fauna with him.

In early August, I, John Pojeta (USGS and Smithsonian Institution), Sterling Brogan (Utah International, Inc.) and Peter Larson (President, Black Hills Institute of Geological Research) met with Charles Hobbs, Special Assistant to the President Reagan for Policy Development. This White House meeting dealt with government regulations related to Paleontology.

RECENT DEGREES

M.S. Independent Study In Geochemistry

Thomas Joseph Smith - Ore and Clay Mineralogy of Selected Sandstone Uranium Deposits of the Henry Mountains Mining District, Utah. December 1983; Advisor: Austin.

Ph.D. Specialty In Geochemistry

Philip Allen - Geochemistry of Amphibolite - Granulite Facies Transition in Central South India. May 1985; Advisor: Condie.

Robert William Smith - Aqueous Chemistry of Molybdenum at Elevated Temperature and Pressure with Application to Stock Work Molybdenum Deposits. December 1984; Advisor: Popp.

M.S. Theses In Geology

Eric A. Bigelow - Techniques of Volatile Analysis in Volcanic Glass by Quadrupole Mass Spectrometry and Application to Mount Erebus, Antarctica. June 1984; Advisor: Kyle.

Mark Richard Bowie - Geology of the Dripping Springs Chabazite and Related Zeolite Deposits, Southeast Arizona and Southwest New Mexico. May 1985; Advisor: MacMillan.

Lee Allan Brouillard - Geology of the Northeastern Gallinas Mountains, Socorro County, New Mexico. December 1984; Advisor: Chapin.

Adrian Hunt - Stratigraphy, sedimentology, taphonomy and magnetostratigraphy of the Fossil Forest area, San Juan County, New Mexico. May 1984; Advisors: Johnson/Wolberg.

John Jenkins - Geology and Geochemistry of the Jones Camp Magnetite Deposits. July 1985; Advisor: Smith.

Laura Lee Kedzie - High-Precision $^{40}\text{Ar}/^{39}\text{Ar}$ Dating of Major Ash-Flow Tuff. November 1984; Advisor: Chapin.

John Curtis McKallip, Jr. - Geology of a Shallow Steamflood Project in Guadalupe County, New Mexico. December 1984; Advisor: MacMillan.

Mark R. Noll - Geochemistry and Petrogenesis of the Alkaline Lavas and their Associated Xenoliths, Mount Overlord, Northern Victoria Land, Antarctica. July 1984; Advisor: Kyle.

John D. Purson - A Geochemical Examination of Sediments and Their Source Rocks in McKinley County, New Mexico. September 1985; Advisor: Popp.

Lee Wilkening - Conodont Biostratigraphy Near the Mississippian/Pennsylvanian Boundary in the New Well Peak Section, Big Hatchet Mountains, Hidalgo County, New Mexico. August 1984; Advisor: Johnson.

M.S. Independent Study In Geology

Nelia Dunbar - Investigation of volatiles in rhyolitic magma chambers. August 1985; Advisor: Kyle.

Erling Terry Jensen - Geology and Depositional Environments of the Mesaverde Group in the Capitan Coal Field, Lincoln County, New Mexico. January 1984; Advisor: MacMillan.

Praphass Wichagul - A Petrographic Comparison Between Some Subbituminous Coals from the Navajo Mine and some Natural Coking Coals from the York Canyon Mine. November 1983; Advisor: Kuellmer.

M.S. Independent Study In Geophysics

Gunars Berzins - Assessment of Gravity Anomalies over Mine Tunnels. July 1985; Advisor: Sanford.

Paul J. Singer - An Analysis of the Average Crustal Velocity of the Albuquerque Basin Using Rayleigh Waves. May 1985; Advisor: Schlue.

M.S. Thesis In Hydrology

Paul H. Clement - Thermally Stimulated discharge currents in ice. September 1983; Advisor: Gross.

M.S. Independent Study In Hydrology

Amy Childers - Hydrology and Geology of the Yeso in the Roswell Basin as determined from well logs. August 1985; Advisor: Gross.

Douglas L. Heath - Flood and Recharge Relationships of the Lower Rio Puerco, New Mexico. May 1984; Advisor: Gross.

Robert G. Knowlton, Jr. - A Field Study and Numerical Simulation of Natural Ground Water Recharge. December 1984; Advisor: Stephens.

Kevin Lambert - The Effects of CO₂ Flooding on Constant Head Borehole Infiltration Test. April 1984; Advisor: Stephens

Lori K. Payne - Radioactive Waste Storage with a Layered Wick System. December 1984; Advisor: Khaleel.

Leslie Ann Peeters - An Isotopic Investigation of the Tertiary Units in the San Juan Basin, New Mexico. December 1984; Advisor: Phillips.

Mark Austin Person - Assessment of Long-Term Salinity Variations in an Irrigated Stream-Aquifer System. May 1984; Advisor: Khaleel.

Alison C. Simcox - Hydrology and Evolution of the Upper Rio Penasco Drainage. August 1983; Advisor: Gross.

Charles P. Spaulding - An Evaluation of Analytical Methods to Estimate Drawdowns and Stream Depletions by Wells. May 1985; Advisor: Khaleel

Michael Kevin Tansey - An Integrated Isotopic/Physical Approved to a Numerical Model of Groundwater Flow. December 1984; Advisor: Phillips.

ALUMNI NEWS

The news included below is, in most cases, dated by as much as 9 months. In the future we may send a letter to alumni soliciting up-to-date information about your activities just before putting this thing together so that we can avoid this problem. Don't wait for that letter to let us know about things that might be of interest to your colleagues and friends. Address items to: Tectonics Editor, Department of Geoscience, New Mexico Tech, Socorro, NM 87801.

Moid Uddin Ahmed (M.S., Hydrology '61) - Professor of Hydrology & Chairman of Department of Geological Sciences, Ohio University.

Rodney M. Armstrong (B.S., Geophysics '67) - President ARMA Geophysical Company, Casper, Wyoming.

Mark Stephen Bloom (B.S., Geology '68; M.S., Geology '72) - Is Associate Professor of Economic Geology/Geochemistry at Monash University, Victoria Australia.

Patrick Butler (M.S., Geology '64) - Staff Member, National Organization for Women, Washington, D.C.

James Allan Cappa (M.S., Geology '75) - Senior Geologist, FMC Corporation, Denver, Colorado.

Joseph C. Cepeda (M.S., Geology '72) - Assoc. Professor of Geology, West Texas State University, Canyon, Texas.

Richard M. Chamberlain (B.S., Geology '67; M.S., Geology '74) - Economic Geologist, New Mexico Bureau of Mines and Mineral Resources, Socorro, New Mexico.

James R. Doty (B.S., Geophysics '50) - Chief Geophysicist, Occidental Eastern Inc., Guangzhou, China.

Paul Thomas Farquhar (M.S., Geology '76) - Sales engineer, NOWSCO Services, Denver Colorado.

Michael A. Graham (B.S., Geophysics '73) - Staff Geophysicist North Alaska Exploration, Mobil Oil Corp.

James M. Gromer (B.S., Geology '68; M.S., Geology '75) - Senior Geologist, CER Corp., Las Vegas, Nevada.

S.A. Hines (M.S., Geology '76) - Sr. Exploration geologist with Africa Exploration Department, Phillips Petroleum Company, London, U.K.

Saeed Kamal, (M.S., Geophysics '68) - Senior Geophysicist, Sulpetro Ltd., Calgary, Alberta, Canada. Since graduating from Tech I remained in oil and gas exploration business. Worked as geophysicist in different parts of the world including Pakistan, Algeria, Brazil and Canada. Hope to Visit Socorro with my family during the summer of 1986.

David M. Lipkowitz (B.S., Geology '78) - Stope engineer, Energy Fuels Nuclear Inc., Fredonia, Arizona. I am presently employed conducting a ring drilling and blasting program for uranium ore for Energy Fuels. We are mining in Permian age breccia pipes in the "Arizona strip" region north of the Grand Canyon.

Lisa Littlefield (B.S., Geology '84) - This summer (1984), immediately following commencement, I was teaching assistant at Tech's geology field camp. I want to say hello to Sylveen Robinson, Mike Knoper and Ann Wright, all fellow teaching assistants who survived a rather large group of grumbling students. As Antonio Pimental said, Utah was 'maaarvelous' despite the accumulated dirt from four days of traveling. On our trip we studied the sedimentary formations of the Canyonlands area and the Uncompahgre Uplift along the Utah and Colorado border.

On a more personal note, I am currently employed by Integrated Drilling and Logging in Houston, Texas. The president of the company is Mr. Daniel Boone ('52), an alumnus of NMIMT, who holds a B.S. in petroleum engineering. I am catching samples and training as a mud logging engineer in south-central Texas. I miss the desert of Socorro because the oil wells I am stationed at are generally located in rice fields.

Preston L. Nielsen (B.S., Geology '66; M.S., Geology '69) - Exploration Geologist, Cotter Corporation, Moab, Utah.

Paul R. O'Neill (B.S., Physics/Geophysics '73) - Senior Staff Geologist, Santa Fe Minerals, Dallas, Texas.

Kathy (Muller) Ogle (M.S., Hydrology '82) - Hydrologist, State of Wyoming, Dept. of Environmental Quality, Cheyenne, Wyoming.

J. Michael Palin (M.S., Geology '84) - Continuing his doctoral studies in economic geology at Yale University. Rumor has it that Mike passed his candidacy exam, and on the first try. How's the hyper dog, Mike?

Mark R. Palumbo (M.S., Hydrology '83) - Hydrologist, Greenhorn & O'Hara, Inc., Denver, Colorado.

Alastair M. Reid (B.S., Geology '62) - Independent Consulting Geologist, Midland, Texas. Dr. Reid has led carbonate field trips to Belize, C.A. in the last two years.

Stephen K. Reynolds (B.S., Geology '78) - Graduate Student in Geology at the University of Texas at Arlington.

Rusty Riese (B.S., Geology '73) - Geologist, Offshore Operations, Arco Exploration Company, Houston, Texas. Moved from Anaconda to Arco 9/84.

Charlotte Rowe (B.S., Geophysics '81) - Worked 2 years in Dallas for GSI as 3-D seismologist in oil exploration. Currently pursuing an M.S. in geophysics at Univ. Alaska, Fairbanks. Have been TA for exploration geophysics program for 3 semesters, am research assistant in volcanology. Thesis is delineation of seismic velocity structure of Mt Erebus, Antarctica. Am still pursuing my music on the side, in recital/opera workshops, occasional full program. Rowe writes that she and her advisor, Dr. Kienle, planned to head for Antarctica

last Nov. 10 by way of Hawaii and New Zealand. "We'll stay until sometime in

early January. It's a cooperative project w/ the Japanese. Our overall coordinator is none other than - ta daa! - Phil Kyle. Just one big, happy family, yes?"

"I hope to finish my M.S. by December 1985. I'll be busy using teleseisms for a first rough estimate of Erebus' velocity structure, then I will do some iterative computer modeling until I can actually locate the explosions we will be setting off and recording this "summer" (Nov-Jan). I'll also fiddle with some synthetic earthquakes to see what my structure and our seismic network does to them. Then I have several hundred real, volcanogenic earthquakes to re-locate with my new model. Phew! ... If you ever see Jim Rice, would you kindly (or, better yet, not so kindly) encourage him to drop me a line?"

William A. Schell (B.S., Geology '73) - Senior Electronics Engineer, Motorola Semiconductor Products, Scottsdale, Arizona.

Raymond M. Stateham (B.S., Geology '57) - Supervisor, Ground Stabilization Group, U.S. Bureau of Mines, sen (B.S., Geology '84) - Geological Consultant (O&G Exploration), Cornett Oil Inc., Needville, Texas.

Wupao Ting (M.S., Geology '84) - Lecturer, Dept. of Geology, Zhejiang University, Hangzhou, The Peoples Republic of China.

Theresia Anna Ward (M.S., Geology '81) - Left Gulf Oil in 1982 to move to London. Just finished contract project with petroleum consulting firm and now out on Houston streets looking for permanent job. Any Tech alumnus in Houston with any good leads? Where are my contemporaries (i.e. S.K., S.R., W.S., B.F.)? Drop me a line (2101 Brun St. Apt. 1 Houston, TX 77019 as of the winter 84-85).

Maryann Wasiolek (M.S., Hydrology '81) - Is a water resource specialist with the office of the New Mexico State Engineer in Santa Fe.

Thomas W. Weisbecker (B.S., Geology '74) - Exploration Supervisor, Mobil Oil Corp., Houston, Texas.

Daniel P. Wieder (M.S., Geophysics '81) - Staff Geophysicist, Phillips Petroleum Co., Bartlesville, Oklahoma.

William H. Wilkinson (B.S., Geology '70; M.S., Chemistry '76) - I am an advanced geologist with Duval's Southwestern Exploration Group. My primary responsibilities are precious metal exploration in CA, AZ, and NM. I am married to Pamela Kuchenbuch Wilkinson. Pam is an industrial minerals geologist with Duval.

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Please send us news of yourself to share with other Geoscience department graduates.

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