

# MACKAY SCHOOL OF MINES

Reminiscences on the Growth of a College

by

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1974-1975

## ILLUSTRATIONS

Frontispiece: Clarence H. Mackay  
Mrs. John W. Mackay

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Thank you.

E. R. Larson



CLARENCE H. MACKAY, 1874-1938



MRS. JOHN W. (MARIE LOUISE) MACKAY, 1844-1928

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The history of the Mackay School of Mines is very largely the history of the University of Nevada. For years the School of Mines students were a major segment of the University population; for example, in 1894, there were 130 students in the University, 30 of them being in the School of Mines. Now, with a student body of 310, the School of Mines is only a small part of the total population of 5,000. Where did it all start—what happened? I'll try to fill in the story from 25 years' perspective on the School of Mines faculty.

### The Early Years

The constitution of the State of Nevada, as adopted in 1864, calls for a State University with instruction in Agriculture, Mechanic Arts, and Mining. The original Morrill Act of 1862, which made grants of public lands to State universities, calls for instruction in Agriculture and Mechanic Arts, but Nevada was allowed to substitute Mining for the Mechanic Arts, because of the dominant role of mining in the State at the time of its entrance into the Union.

Doten's History of the University of Nevada (1924) tells in detail the various steps which were taken between the adoption of the State constitution in 1864 and the establishment of the University in Elko in 1874—without a Mining Department.

Finally the power of the purse forced a decision. An appendix to the journal of the 11th Session of the Legislature 1883 says that the University must maintain a Mining Department or pay \$1.25 an acre to the Government for the 9,000 acres of the land it had received under the Morrill Act. Fortunately, instruction in mining had already begun. Regent Day, in accordance with the instructions of the Board of Regents, had hired J. E. Gignoux (Gee-noo), a recent graduate of Freiburg School of Mines (Germany), to teach classes in Assaying and Mining Engineering, beginning



JULES E. GIGNOUX, E.M., 1882-1884\*  
Professor of Assaying, Mining, and Metallurgy  
University of Nevada, Elko

in September of 1882. Instruction actually started on October 4th as no money had been appropriated and the Mining Department was first maintained by the general fund. This seems to be a recurring crisis, as the State Legislature had, as late as 1905, made no noticeable contribution for support of the School of Mines. I note from the records that Professor Gignoux received \$1,000 for the period October 1 to December 31, 1882. The estimate for the next biennium was \$4,000 salary and \$600 for incidentals: chemicals, coal (for assay furnaces) etc. This was a generous salary for that time considering the pay scale of 70 years later when an Assistant Professor received \$3,500 a year. Professor Gignoux taught for a two-

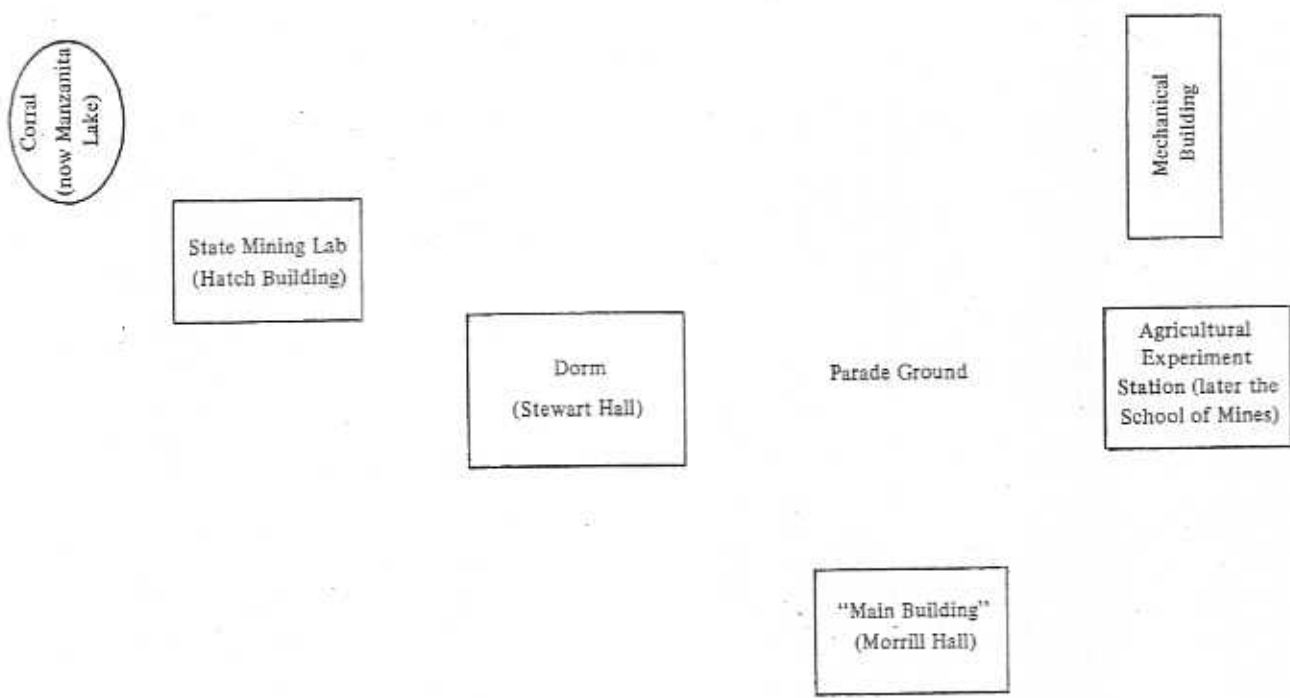
\*Dates after faculty names indicate period of University service.

year period and then turned to private consulting. He was well known in the Reno area, and was active in the mining industry until his death in 1914.

This first instruction in Mining and Metallurgy was given while the University was located in Elko, Nevada, where it was first established. The move to Reno was made in 1886. Quoting from Professor Harris's history of the College of Engineering, "On March 31, 1886, the University of Nevada at Reno started instruction with a staff of two men—J. W. McCammon, Principal of Preparatory Department, and



ROBERT D. JACKSON, Ph.B., 1888–1899  
First Director, School of Mines, University of  
Nevada, Reno, 1888–1899  
Professor of Mathematics, Mechanic Arts,  
Mining, and Metallurgy



Plan of University of Nevada campus, 1894.

A. H. Willis to teach assaying and mining engineering.” Professor Willis was here only one year. In 1887 LeRoy D. Brown took office as President of the University. The faculty was comprised of President Brown and Miss Hannah Clapp who gave instruction to 50 students. Soon a School of Mechanic Arts and Mines was added, and in 1888 Robert D. Jackson began giving instruction in Mathematics, Mechanic Arts, Mining, and Metallurgy—the beginning of the School of Mines. The year before that, Prof. Walter Miller had started teaching Natural Science and Geology. Professor Miller stayed at the University until 1900 but finished as Professor of Anatomy and Physiology.

The housing of the School of Mines was varied in the early days on the “Hill.” At first, all instruction had to be in Main (Morrill Hall). In 1890 the State Mining Building (later called the Hatch Building) was constructed and housed the State Lab (later the Mining Analytical Lab). A map of the campus in 1894 shows that it was truly a rugged beginning.

Unfortunately, Professor Jackson’s teaching was frequently interrupted by his private interests in mining and he was asked to retire by the Board of Regents in 1899. This conflict between University and private work in the mining industry has frequently been the cause of stress within the School of Mines.



GEORGE J. YOUNG, B.S., 1900–1913  
Second Director, School of Mines, 1900–1908  
First Director, Mackay School of Mines  
Director, State Mining Laboratory, 1902–1913  
Professor of Mining and Metallurgy



GEORGE D. LOUDERBACK, Ph.D., 1900–1906  
Founded Department of Geology and Mineralogy  
Professor of Chemistry, Physics, Geology, and  
Mineralogy

Jackson's place was taken by Professor George Young in 1900 as Assistant Professor of Mining and Metallurgy. Professor Young stayed with the School of Mines until 1913 so that during his tenure, the Mackay School of Mines was born. Also in 1900, Dr. George Louderback, a graduate of the University of California, came to teach courses in Chemistry and Physics. After one semester he was invited to establish courses in Geology and Mineralogy and thus started the Geology Department. In 1906 he returned to the University of California where he taught until his retirement in 1941. I had the pleasure of meeting Professor Louderback in about 1952. He reminisced about the early days of the University of Nevada, and the pile of rocks and minerals which were to be the basis of his courses in Geology and Mineralogy.

I note that in the 1902 University catalog the mineralogy and rock collection was to be put in shape so that the public could make use of it. Obviously these things proceeded slowly then, as they do even now. For several years we had a pile

of rocks in the corner of Room 200, as I recall, which was the result of some sort of clean-up or rearrangement project in which scattered specimens were gathered together. Though I didn't teach Physical Geology too often, I can remember digging through the pile for a particular specimen during the lecture, mumbling "it's in here somewhere."

Dr. Louderback, who was always interested in student and faculty organizations, started the Crucible Club, now the John Mackay Club, which is still active in the School of Mines though somewhat splintered into special groups.

Dr. Louderback's place was taken by W. S. Tangier Smith, who joined the University in 1906 and served until 1913. Dr. Smith, who received his Ph.D. from the University of California in 1890, had studied under Joseph LeConte and Andrew Lawson and later acted as Assistant to N. H. Darton on the U. S. Geological Survey. Suffice it to say that his and Darton's temperaments were not compatible. He quit the Survey and joined the faculty at the University of Nevada in 1906. From 1907 to 1912 he was professor and head of the Department of Geology and Mineralogy, but resigned in 1913 for reasons of health.

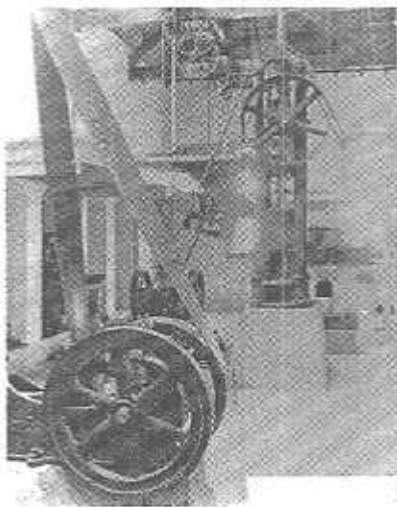
Subsequent to his retirement he had farms and ranches in California but continued his interest in geology; his last geologic paper appeared in 1943. Dr. Smith died in 1962, at the age of 93, making his one of the longer periods of pending death known.

Like many later men, Professor Smith has never really left the School. In my office are his books, class records, University catalogs, which I have used in preparing this history.

## The Beginning of the Mackay School of Mines

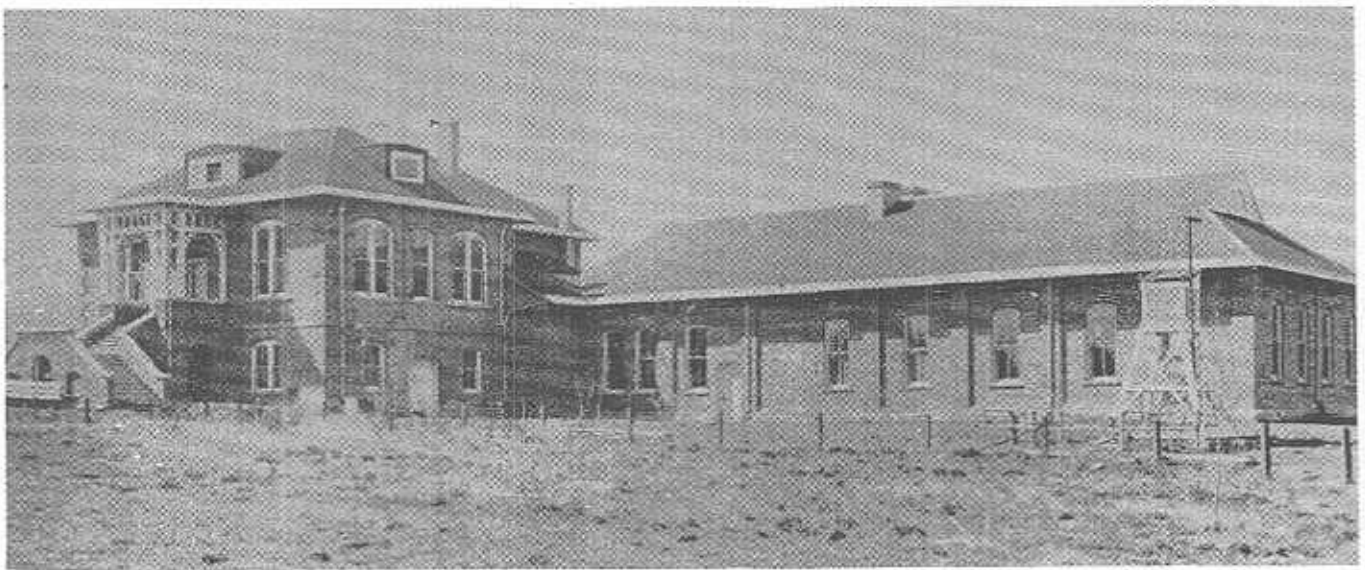
1905, 1906, and 1907 were red letter years for the School of Mines. In 1905 the legislature gave the first substantial appropriation for the equipment of the Mining Department. The gift of a complete new Mining building to the University in 1906 by Clarence H. Mackay in memory of his father insured a proper home for the School.

The history of the School of Mines over the years has been rather typical of most schools. When the first instruction in mining was given in Elko by Professor



Above: view of campus from the east, circa 1906. Buildings from left to right: Stewart Hall, Mining Building with extension for assaying lab, Chemistry Building, and Engineering Building. Left: laboratory in old Mining Building.

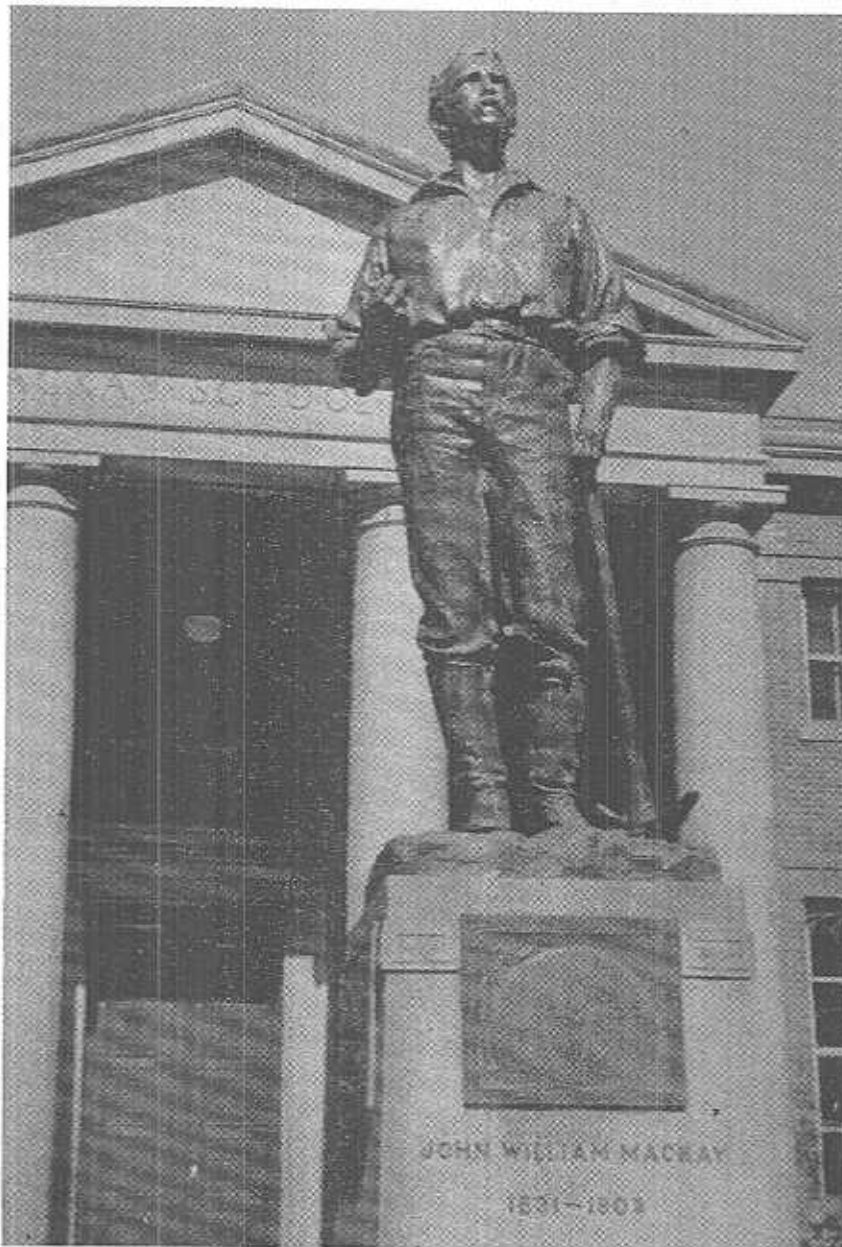
Below: Mining Building (former Agricultural Experiment Station, modified after fire destroyed mansard roof which matched Morrill, Hatch, and Stewart Halls), 1906.



Gignoux in 1882 there was no thought of divisions of the University (which was really a sort of high school) into Colleges or anything so sophisticated. When the University moved to Reno in 1875, and Professor Jackson began instruction, there was still no subdivision of the University into Colleges. The courses offered were preparatory for college work including those in Mining and Metallurgy. When Professors Louderback and Young arrived in 1900, there were separate schools of Mechanic Arts and Mining Engineering. These were, of course, the beginnings of the Mackay School of Mines and the College of Engineering. There were 17 mining students at that time.

The 15th annual register for 1902 lists a College of Applied Science made up of the School of Mines and Schools of Civil and Mechanical Engineering. Again there was no College of Engineering, no College of Mines, and no Dean. The possibilities of administration had not yet been recognized. The University register for 1905 and 1906 speaks of a College of Engineering with a School of Mines and Schools of Civil and Mechanical Engineering. Still they had not discovered the Dean; but I do see that there was an Academic Committee and an Administrative Committee, so things were off to a good start. A 1907 announcement on an "Engineering Education" speaks of Mining Engineering, Mechanical Engineering, Civil Engineering and first uses the name Mackay School of Mines in anticipation of the gift of the building by the Mackay family. The register of the University for the year 1907-1908 lists the College of Engineering which contains the School of Mines, School of Mechanical Engineering, and School of Civil Engineering. We see that at that time all of the engineering curricula had a common first year, a practice which was maintained until after the arrival of Dean Scheid and the creation of the Mackay School of Mines as a separate college in 1951.

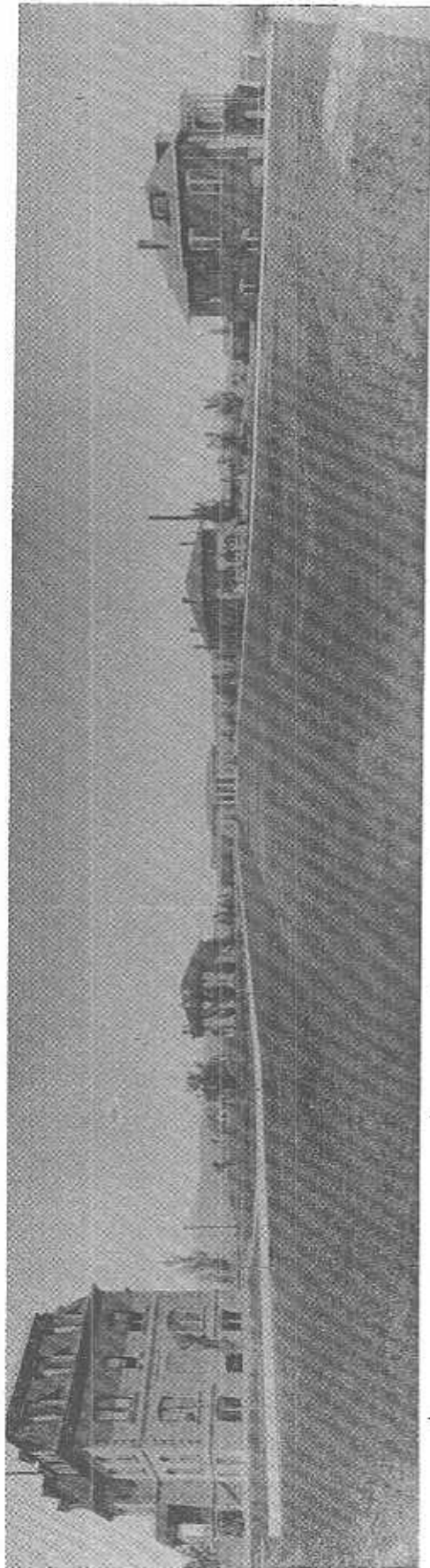
For years the Mining and Metallurgy Departments had been housed in the old Hatch Building which was in the southwest corner of the quadrangle in the position of the present Clark Administration building (at that time the Geology and Mineralogy courses were housed in the old experiment station, in the southeast corner of the quadrangle where the Mackay Science Hall now stands). When the Clark Library was built, the Hatch Building was moved to the present site of the Fine Arts Building--by one man and a team of horses, so I'm told. Of course in 1908 with the opening of the Mackay School of Mines Building, this situation was changed.



The statue of John W. Mackay, one of the Comstock's great bonanza kings, stands before the Mackay School of Mines on the main campus quadrangle at the University of Nevada, Reno. Created by famed sculptor, Gutzon Borglum, the statue was unveiled at the dedication of the Mackay School of Mines Building on June 10, 1908.

The new Mackay School of Mines Building, designed by Stanford White of McKim, Mead and White, the leading architects of the day, was constructed at the north end of the old parade ground. In front of the building stood the statue of John Mackay by Gutzon Borglum.

Professor Lintz has found an interesting story relative to the Mackay School of Mines and its inception. Gutzon Borglum, who is famous for his faces of the Presi-



STEWART HALL

LINCOLN HALL

CHEMISTRY  
BUILDING

OLD  
GYM

MACKAY  
SCHOOL  
OF MINES

ENGINEERING  
BUILDING AND  
POWER PLANT

OLD MINING BUILDING,  
LATER PHYSICS BUILDING

Panorama of the University of Nevada campus, 1910.

dents on Mt. Rushmore, was commissioned by Clarence Mackay and his mother, Marie Louise Mackay, to sculpt a statue of John Mackay. There was a question as to the proper location for the statue, involving a long dispute whether it should be in Carson City, or in Reno at the University. It was finally decided by Mr. Borglum, after a visit, that the proper location was at the University in front of the School of Mines building. As the building then on the site of the present one was a particularly unattractive iron shed used by the Mining Department, Mr. Mackay decided that a proper background for the statue was needed. The statue and the School of Mines Building were finally dedicated at the graduation ceremonies on June 10, 1908.

During the reign of President Stout, 1952-57, John Mackay became the target of many paint jobs. At that time one of the Reno newspapers declared that the painting of Mackay statue was a traditional thing, a fact which was unknown to the MSM faculty. The new "tradition" was eagerly taken up by the students who made periodic attacks, generally around Mackay Day. From time to time, John has been almost all the colors of the rainbow. For a while the School of Mines students tried to discourage the invading hordes with barbed wire entanglements, backed up by fire hoses and shotguns, (loaded with blanks or rock salt, they claimed), usually with only moderate success. What generally happened was that after the students' guard was down, a couple of days after Mackay Day or some other expected target date, John would be christened. I'm afraid that these paint jobs used to enrage me. I recall on occasion summarily dismissing the class, refusing to talk to the students. Since then I have become older and calmer and my blood pressure has stayed at a more reasonable level. Also, the novelty seems to have worn off.

It was Clarence Mackay's fond hope that this would become the outstanding School of Mines in the country. To achieve this end, he supported the School almost single-handedly until the Great Depression, when the Mackay fortune crumbled away.

The former position of the School of Mines in the University hierarchy was rather peculiar. It was listed consistently as a portion of the College of Engineering, but the Director of the School of Mines reported directly to the President of the University. As mentioned before, the salaries of the School of Mines faculty were paid by the Mackay family and evidently the principal support was obtained from

them. You might say that the School of Mines was independent of the University of Nevada or, at least, rather tenuously attached. Professor Carpenter, later Director of the School of Mines, states in a brief history that he would sign the requisitions for the use of Mackay family money. Whether or not they had to be further endorsed by the President of the University, is not clear; in any case, it was certainly a rubber stamp job on his part.

Though it was a model of excellence at the time of its construction, the Mackay School of Mines Building, originally designed for approximately 40 students, soon became too small, and modifications and additions had to be made. In 1926, Clarence Mackay donated another \$100,000 for modernization of the School.

This second Mackay bequest was used to add a second floor to the northern wings of the building. Originally the building was U shaped with two stories in the front part but only a single level in what is now the lower part of the Museum and the metallurgy laboratory. Addition of a second floor to the rear of the building and the addition of rooms closing the original courtyard area approximately doubled the available floor space. If you look on the second floor of the School of Mines Building, you can still see the windows in the interior walls which formerly looked to the outside; the modification of the metallurgy department facilities, the assay room, the decking over of an old mill area, and the construction of the library stacks in the area formerly occupied by the metallurgical chemistry laboratory, are changes made over the last 20 years. Perhaps most significant, the men's room, originally on the first floor was relocated in a newly excavated basement area. (The possibility of women in the School at that time wasn't even considered—besides there were facilities across the campus.)

The present population of the School of Mines is more than 300, and it is hoped that we will increase to approximately 500. It is obvious that more room is needed. The laboratory facilities, admirable as they were in 1908 and even as remodeled in 1926 and again in 1953, are no longer adequate either for the student population or for the hardware required in modern laboratories.

Construction of the Scrugham Engineering-Mines Building in 1963 allowed the Department of Geology to expand into a portion of that building which was designed for the Nevada Bureau of Mines and State Mining Analytical Laboratory.

Unfortunately, limited funds at the time of construction demanded that a wing of the Scrugham building which would have been used for teaching be deleted. But, there is still room for that wing. Also, the Bureau of Mines portion was designed so that another story could be added.

Unfortunately, at this time the Mackay School of Mines Building, weakened by repeated earthquakes over the years, is slated for removal. I learned from conversations with Professor Walter Palmer, that the Mackay family knew that the School of Mines Building would someday have to be replaced; their only wish was that the facade would be preserved. I understand the University Master Plan or Mega-Plan envisions the transfer of the School of Mines Building to a position on the Eastern side of the quadrangle rather than its location at the "head of the table."

## The Middle Years

Francis Church Lincoln, with degrees from M.I.T. and the New Mexico School of Mines, a Columbia University Ph.D., and a Boston accent, joined the faculty of the School of Mines as Director in 1914, a position which he retained until 1923. Dr. Lincoln replaced Dr. Young who had seen the School of Mines through its early years, and was the first Director of the School. Dr. Lincoln's background was largely academic, having been at New Mexico, Montana, and Illinois before coming to Nevada. He was much interested in the history of mining in Nevada and assembled a volume on "Mining Districts and Mineral Resources of Nevada" published in 1923, an excellent source of material relative to the older mining districts.

Lincoln was succeeded as director in 1924 by John A. Fulton who had graduated from the School of Mines in 1898. Director Fulton served in that capacity until his death in 1939.

Walter S. Palmer, B.S. University of Nevada, 1905, E.M. Columbia, 1907, had joined the faculty in 1910 and was the Metallurgy Department. (His brother, Stanley G. Palmer was Professor of Electrical Engineering and Dean of the College of Engineering when I came to the University.)

When W. S. Tangier Smith retired in 1913, his place as Dept. Chairman was taken by J. Claude Jones who had first come to Nevada in 1909. "Geology Jones"



FRANCIS CHURCH LINCOLN, Ph.D., 1914–1923  
Second Director, Mackay School of Mines,  
1914–1923  
Director, State Mining Laboratory, 1914–1923  
Professor of Mining and Metallurgy

is still remembered by the older people in Reno. He was Geology personified. Professor Jones was one of those teachers whose enthusiasm is contagious. He first established the Jones-Gianella-Larson filing system in Room 201, Mackay School of Mines. This is a stratigraphic filing system with the oldest items on the bottom of the growing pile—it still works.

Professor Gianella used to tell stories about Professor Jones and his complete devotion to Geology. One time he was taking a visiting fireman (Professor Blackwelder of Stanford, I believe) out to look at Pyramid Lake. As they drove



J. CLAUDE JONES, Ph.D., 1909–1932  
Chairman, Department of Geology, 1913–1932  
Professor of Geology and Mineralogy



VINCENT P. GIANELLA, Ph.D., 1923–1952  
Chairman, Department of Geology, 1932–1952  
Professor of Geology and Metallurgy



WALTER S. PALMER, E.M., 1910–1952  
Director, State Mining Analytical Laboratory,  
1924–1952  
Chairman, Department of Metallurgy,  
1914–1952  
Professor of Mining and Metallurgy

down the Truckee Canyon toward Wadsworth, Professor Jones was expounding on the course of the river. As usual he was waving his arms and not watching the road. He hooked a fender on one of the few guard posts on the river side, stopped, got out, still talking; pushed the fender back into position with his foot,



JOHN A. FULTON, E.M., 1924-1939  
Third Director, Mackay School of Mines,  
1924-1939  
Director, Nevada Bureau of Mines, 1929-1939  
Professor of Mining and Metallurgy

still talking; got back into the car, still talking and drove off to Pyramid. Professor Blackwelder never took his eyes off the road again that day and missed most of the geology.

In the early days of the School of Mines, men were giants in terms of the work load that they carried, the number of courses they were expected to teach. Professors Young and Smith carried the entire load of courses for the School of Mines. This amounted to about 12 courses per man, with Professor Young handling the Mining and Metallurgy and Professor Smith handling the Geology and Mineralogy.

I can only say in our own defense that the day of the "universal" man is pretty well over; modern techniques are causing more and more specialization, to the point that people within the School have difficulty communicating any but the more general ideas. So far the School of Mines has been able to maintain a pretty well-balanced curriculum, at the same time offering some opportunity for specialization.

It is interesting to note the development of the curricula within the Mackay School of Mines over the years. Of course when Professor Jackson began teaching here in 1888 there were only courses in Mining and Metallurgy. Professor Louderback, as I have said, is the one who started the Department of Geology and Mineralogy, which title still stands on the door of my office; it is only after World War II that it became the Department of Geology and Geography and we expect that Geography will soon become a separate department. The 1902 University register shows a college of Applied Science, School of Mining and Metallurgy as well as schools of Mechanical and Civil Engineering. Courses in Mines and Mining Material were taken in the last years. In the junior year were Surveying, Assaying, Metallurgy, Mathematics, Geology, Physics, and the inevitable Military Drill. In the senior year the courses included Mining, Metallurgy, Mechanics, Spanish, and Military, as well as a course called Historical and Determinative Geology. The mining courses in the senior year included prospecting, development, drainage, ventilation, blasting, mining machinery, mining laws, and field trips to mines were required. These basics have not changed much over the years.

The Metallurgy courses in the early days of the School were concerned with gold, silver, copper, lead and zinc, and fire assaying. The Metallurgy Department was established in 1927 and by 1930, additional courses were offered in Engineering Metallurgy, Ferrous Metallurgy, Metallography, and Electrometallurgy. These offerings were little changed by 1950—only Physical Metallurgy and Hydrometallurgy having been added. The specialized studies of hardness, physical structure of metals, and X-ray studies are almost all that were added since my arrival.

As early as 1902 it was apparent that it was possible to take what we call a major in Geology under the College of Arts and Science, even though the Geology Department was in the School of Mines. Students in the College of Arts and Science would take 17 credits in Geology, while those in the School of Mines would frequently be required to take additional Geology credits as well as other courses

required in the School of Mines curricula. This situation came to a head in the 1940's when there was a strong move to have the Geology Department separated from the School of Mines and attached to the College of Arts and Science. This move was headed by Professor Wheeler who is now at the University of Washington. A compromise was finally effected--the Geology Department was established as a separate department within the College of Engineering and was no longer formally a portion of the Mackay School of Mines though physically housed there. This anomalous situation was resolved at a later date when the College of Mines was created in 1951 and Vernon Scheid was hired as the first Dean.

According to the 1905-1906 catalog, the School of Mines offerings had expanded greatly. I note that a field geology course was offered on Saturdays. A typical field trip in those days was to get on a flatcar and make a trip to the Comstock where the mines were still active. Professor Payne came up with the story of a typical field trip in the early days in which the students assembled on a Virginia-Truckee Railroad flatcar in their derby hats with a keg of beer and proceeded to Virginia City via Carson. We are still making field trips to the Comstock, and I can recall when I first came we had a Saturday field geology class somewhat like this (no beer or derbies); one of the favorite spots was in the railroad cuts of the Virginia-Truckee Railroad near Carson City where we could see the mineralization in that area, as well as the Comstock where Professor Gianella would expound.

Though the Geology Department had long been considered a portion of the School of Mines it was not until 1947 that a separate curriculum in Geological Engineering was offered. Over this long interval the Geology Department had been active as a service department in the School of Mines and also offered majors and minors to students in the College of Arts and Science.

Field work has long been an important part of the instruction in the School. From the field trips to mines specified in the 1902 catalog there has been an expanding emphasis on first-hand observations in all departments--particularly Geology.

In the 1926-27 catalog we see listed Geol 70, Geomethods, and Geol 71, Summer Field Work for 2 or more weeks, taught by Professor Jones. In 1930 the same course was taught by Jones and Gianella--credit to be arranged.



S. FRANK HUNT Developer of copper claims in Mountain City, Nevada. One of the major benefactors of the Mackay School of Mines, Hunt established the fund which has provided Mackay students with field trips and vehicles for four decades.

In 1935, S. F. Hunt, who had developed the copper deposits at Mountain City, Nevada established the Hunt Fund by a generous donation of mining company stock to be followed by later donations of money and equipment.

In about 1937 the staff of the field camp included Professors Gianella, Carpenter, and Wheeler, and Mr. Pennebaker, later with Consolidated Copper Co. in Ely.

In 1938 the Hunt Foundation paid for a 12-week (4 credit) field course. In 1939-41, Professors Gianella, Wheeler, and Carpenter, each emphasizing his specialty, ran an 8-week (4 credit) course again paid for by the Foundation.

In 1949, the course was back to 6 weeks. The Hunt Foundation paid for transportation, but students were charged \$75 tuition and \$90 for board.

In 1950 I began a long association with Summer Field Geology. Burt Scull and I ran a camp for 22 students (complete with a cook who was "drying out") at the College of Agriculture's Knoll Creek Station near Contact, Nevada. After that, I ran a much smaller camp, generally about 8 students, near Eureka, Nevada for the next 16 years.

In recent years the group has become larger and I partly stepped out of the picture—sharing the camp first with Professor Hibbard then abandoning it for a couple of years. Now we are returning to multiple instructors, each emphasizing his own specialty.

With a rising student population the size of the camp is generally about 18. We have a cook, female students (they lend class), and it is a high-price (\$375 tuition) operation.

The summer students have usually been geologists, for whom the 6-week course is required, but we do have geophysicists and occasionally mining engineers.

Since the establishment of the Mackay School of Mines as a separate college at the University, the subjects offered have been increased. We not only offer Mining Engineering, Metallurgical Engineering, Geological Engineering, but also have a degree in "straight" Geology; we offer work in Geochemistry, Hydrogeology, Seismology, as well as Geography. The latter was first offered after World War II and has probably been the fastest growing division in the College of Mines, though most Geography students have been from the College of Arts and Science.

We started out with one man in Geography who taught all four courses. At the present time there are three regular staff members as well as Adjunct Professors who offer single courses.

In the Spring of 1949, I had been teaching at the Missouri School of Mines at Rolla for a couple of years and heard that there was an opportunity at the

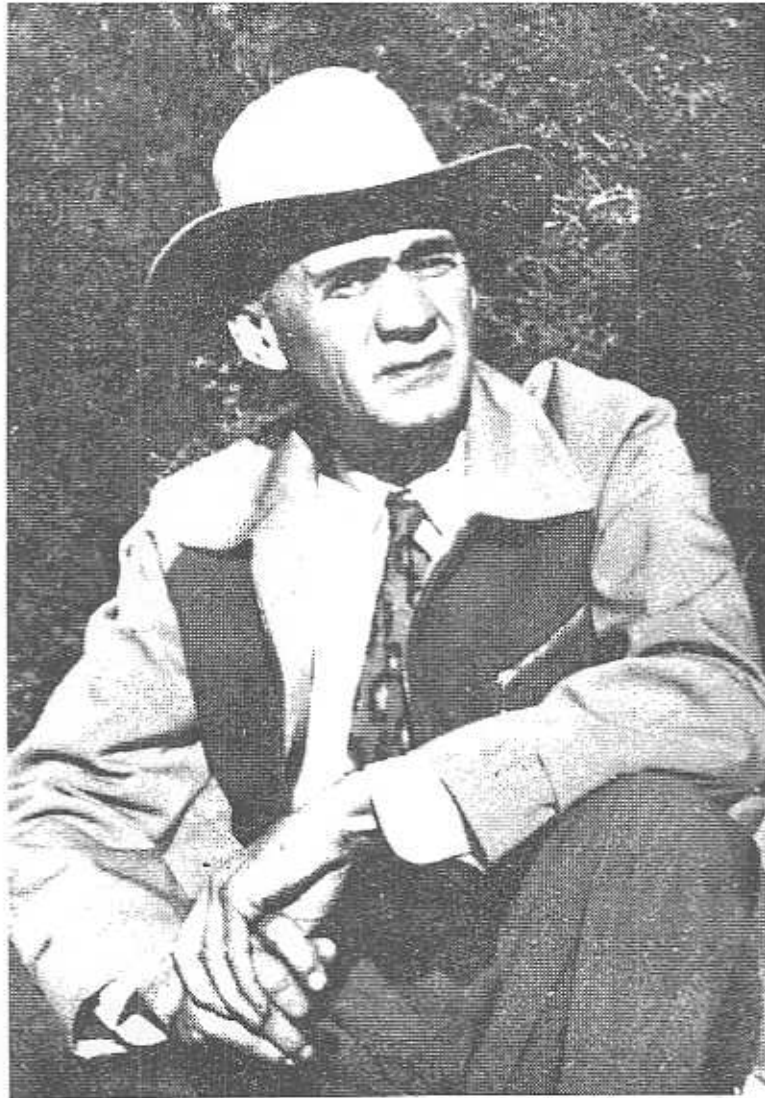
Mackay School of Mines. Bob Smith, a classmate at Columbia, had graduated from the Mackay School of Mines in 1942. He talked about Vince Gianella, the Bank Club in downtown Reno with the silver dollars set in the sidewalk, Pyramid Lake, the deserts, and the mountains. It was obviously the place to be. After some delay, arrangements were concluded and after the arrival of the latest member of the family we headed West in a 1935 Ford, with most of our possessions. (It turned out that I was involved in the more or less characteristic game of musical chairs played within the geological fraternity. Dr. Grawe, who was Chairman of the Department at Rolla had taught at the Mackay School of Mines for two years in the later 1920's.)

As I recall, we camped out on alternate nights on our way West, mostly to save money. But the last night before arriving in Reno, we went for broke and stayed in a motel at Lovelock. The next morning we arrived in Reno and met Professor Gianella near Mackay's statue. I guess that that was the time I dropped the anchor. Reno was a sort of place that I liked; the people were pleasant, the geology was great, the weather was fine, and we saw no reason to go any further.

I suppose that you could characterize my stay here at the School of Mines as swing shift—that is, the transition between the older members of the staff who had been there for many years, and the newer people, some of whom are still on the faculty, but had not yet arrived. In 1949, there were about 100 students, a total teaching staff of 7, and one man worked for the Bureau of Mines. Most of the professors were veterans of many years at Mackay and were almost all Mackay graduates.

At that time the School of Mines was still a portion of the College of Engineering. Professor Carpenter was Director of the School and Chairman of the Mining Department. He had graduated from the School of Mines in 1907, and had been an instructor here in 1910 and 1911. After that he worked at Tonopah where he eventually became manager of the West End Mill. In 1923-24 he had taught at the South Dakota School of Mines. With this experience he returned to Mackay in 1926 and was appointed Director of the School in 1939 at the time of John Fulton's death, a position he held until his retirement in 1951.

My impression of Jay Carpenter was of a man always in a hurry. He lived on University Terrace and could be seen scuttling to the University or back home.



JAY A. CARPENTER, E.M., D.Sc., 1908–1911,  
1926–1951  
Fourth Director, Mackay School of Mines,  
1939–1951  
Director, Nevada Bureau of Mines, 1939–1951  
Professor of Mining Engineering

Other members of the faculty were Professor Smyth and Bert Couch. Couch was a man of many facets; he taught Mining Accounting, and was the librarian as well as secretary for the School of Mines. I think that at times he was frustrated by Professor Carpenter's habit of taking newly typed letters and adding annotations between the lines, around the edges and on the back. The annotation of letters and books was a nervous habit of Professor Carpenter's. In many library books you will still find marginal notes in his rather distinctive minute handwriting.

Professor Smyth who had a split appointment between the Mining and Metallurgy Departments had graduated from the School of Mines in 1914 and was the first of our graduates to win the University's gold medal for scholastic excellence (the second was Charles Taylor, B.S. Mining, 1956). Smyth began teaching at the University in 1925 and retired in 1958.

During his undergraduate years Bill Smyth had played on the basketball team and had earned the nickname "Rocket," an indication of the always lively spirit I came to know.

Bill worked in most of the well-known mining camps in Nevada, Utah, and California after his graduation, including Goldfield, Tonopah, Candelaria, and Rochester. In addition to experience in mining, he had considerable experience in sociology, having been employed as a laundry truck driver for a time before beginning his teaching career. He was first employed in the State Analytical Laboratory and as an instructor in Metallurgy in 1925. Besides his courses in Mining and Metallurgy, Bill is remembered as a sympathetic advisor. He would devote much time to the willing, though delinquent, student and generally managed to get even the most difficult ones through to graduation.

The Smyths are currently residents of San Clemente, California.

Professor Walter S. Palmer, Mackay School of Mines, 1905, was the Chairman of the Metallurgy Department and the head of the State Analytical Laboratory. He was a Columbia man also, having received his Engineer of Mines degree in 1907 from the Columbia School of Mines. Professor Palmer who had lived in Reno almost his entire life remembered trying to photograph lynchings in Reno in the early portions of the century. His camera was not appreciated by the lynchers—the lynchees didn't care. To give you an idea of Reno in the late 1890's, Mrs. Palmer's friends and neighbors had always wondered why she had chosen to build a house way out in the country on the corner of Lake and State Streets. Professor Palmer, who is best remembered for his shrill voice (hence "Squeaky") and his habit of expressing his opinion of people at a distance, used to visit the School quite frequently subsequent to his retirement in 1952. He finally stopped the visits and died in 1972, having failed to achieve his aim of living to be 100. It was a pleasure to have known Walter Palmer. Besides an amazing knowledge of the minerals in

Nevada and adjacent California, he had a number of quick tests for various elements which I noted within the cover of my mineralogy texts. These rapid techniques are convenient but are not much used any more in view of the recent use of blackbox techniques in geology.

Besides Walter Palmer and Bill Smyth, Claude Hammond, who graduated from the Mackay School of Mines in 1933, was laboratory instructor and also the second man in the State Analytical Laboratory. Claude remembered when Ollie Grawe, my boss at Missouri, was teaching at the School of Mines. Ollie Grawe's thesis was on conodonts, so he could carry his whole collection in his vest pocket much to the disgust of the hard-rock people. Claude Hammond had been teaching at the School of Mines for only a couple of years, having worked for many years in industry after his graduation. He was an expert on cyanidation and had worked for many years at the Dayton Consolidated Mines in Silver City, as well as for the Kennecott Copper Company in McGill. Claude retired in 1967 and now lives in Palo Alto, California with one of his daughters.

The Geology Department was comprised of Professor Gianella and Burt Scull. "Prof" Gianella, who graduated in Electrical Engineering from the University of Oregon in 1910, went on to a career in geology and mining engineering before coming to the University of Nevada in 1923. He had earned an M.S. in Mining Engineering at the University of Nevada, and then a Ph.D. in Geology from Columbia University. There had been rapid change-overs in the Geology Department during the last several years, so that none of the people besides Professor Gianella had been there any great length of time.

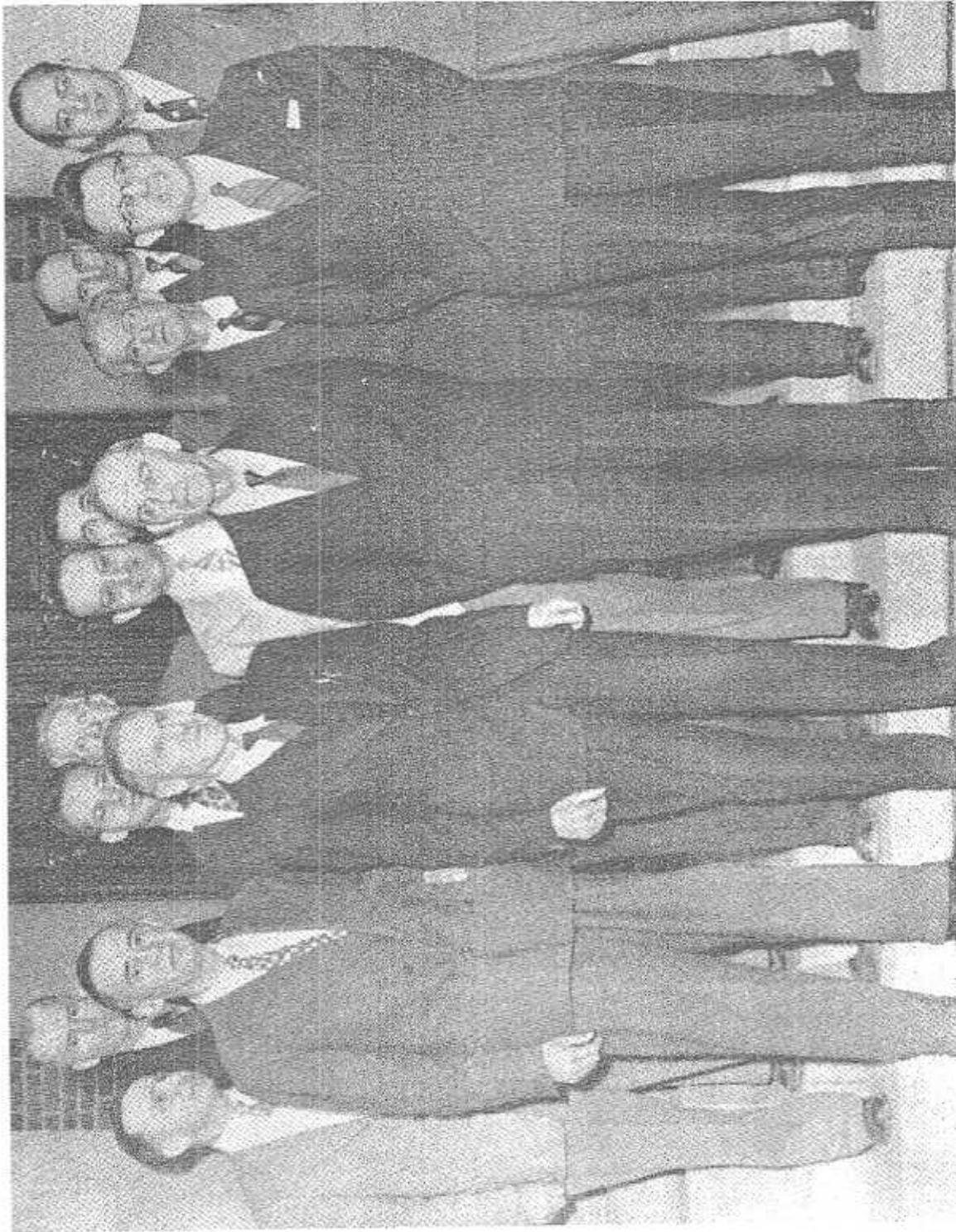
Professor Gianella, after retirement, stayed here in Reno for about 10 years and then moved to Auburn, California where he still lives. He has never lost his interest in Geology and frequently journeys to Reno for meetings of the local geological society. I can remember many good trips with Vince—talking about the geology of the area and the emigrant trails across the State, sharing various and sundry hunting expeditions, collecting beat up sheep shears in old line cabins, etc. etc.

When I arrived at the University of Nevada in 1949, the School was in the midst of a series of important changes which had begun after the Second World War. At that time the Geology Department which for years had been a portion of

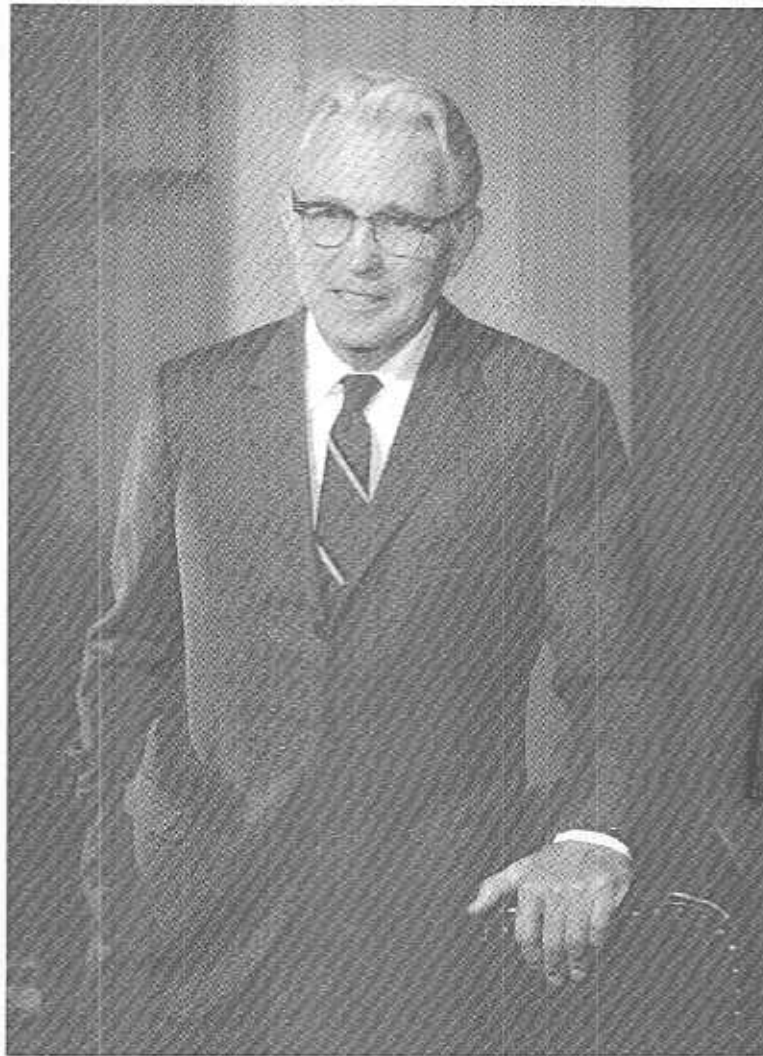
the School of Mines, was made an independent department within the College of Engineering. This was done largely at the insistence of Professor Wheeler (who had been there since 1935) ostensibly to allow a larger emphasis on the Arts and Science aspects of Geology. This arrangement lasted for about five or six years; then there was a major crisis within the Geology Department, and Professor Wheeler left for the University of Washington. Within the interval 1947 through 1950, there were rapid changes in the personnel of the Geology Department, but the other departments of the School of Mines were unaffected. The only change was the addition of Claude Hammond as a member of the Department of Metallurgy. As it had been for years, the personnel of the Mining Department was made up of Professor Smyth and Professor Carpenter who was, of course, Director of the School of Mines. In Metallurgy, Professor Hammond and Professor Palmer, along with Professor Smyth who had a dual appointment, took care of the courses in that field. Geography, which had begun under the auspices of military instruction during the War, was continued. In 1947 and 1948, John Thompson was in charge of the Geography courses. In 1948 and 1949 William Thompson taught both Geology and Geography. Harold Classen taught Geography here in the interval 1949-51. During that same interval Conrad Martin taught Mineralogy and some of the lower division courses. When last heard of, Martin had just returned from an extensive stay in Saudi Arabia where he was working with the U.S.G.S. In the Metallurgy Department, Dr. Swift was hired to teach Physical Metallurgy. Dr. Swift's rapport with the students was not always the best, and he was a common butt of practical jokes. At one time some generous person sent a pair of rusty jagged sheep shears as a Christmas present so that he could have a proper haircut.

## The Growing Years

1951 was a turning point in the history of the School of Mines. In that year Professor Carpenter retired as Director and Vernon Scheid came in as the first Dean of the School of Mines which at the same time was granted the status of a full College of the University rather than a division of the College of Engineering. This was an important step. At that time the Geology Department was returned to the fold in the School of Mines where it had started. Within the next two years a good portion of the present teaching staff had joined the School.



Faculty of the Mackay School of Mines, 1951. (Left to right, front) J. A. Carpenter, W. I. Smyth, W. S. Palmer, V. E. Scheidt; (rear) C. Martin, C. W. Hammond, B. J. Scull, B. F. Couch, V. Krall, R. E. Swift, V. P. Gianella, E. R. Larson, H. A. Classen.



VERNON E. SCHEID, Ph.D., 1951-1972  
First Dean, Mackay School of Mines, 1951-1972  
Director, Nevada Bureau of Mines (Nevada Bureau  
of Mines and Geology) and Nevada Mining  
Analytical Laboratory, 1951-1972  
Professor of Geology

In 1951, Professor Lintz was brought in to teach Paleontology which I had started in 1949. Parenthetically, there had been a course in Stratigraphic Paleontology taught prior to that by Professor Wheeler, the exact content of which is still somewhat of a mystery to me. We all awaited Professor Lintz's arrival more or less on tenterhooks as we heard that he had become involved in an automobile accident traveling from Baltimore where he had been working on his doctoral degree at Johns Hopkins. Finally he arrived on crutches in time for registration.



Faculty of the Mackay School of Mines, 1955. (Left to right, front) W. I. Smyth, V. E. Scheid, Mary Alvey (later Zadra), E. R. Larson, H. P. Nelson; (rear) C. W. Hammond, L. S. McGirk, D. B. Slemmons, E. W. Kersten, J. Lintz.

Professor Slemmons arrived also in 1951. He is still on the staff and has developed a national reputation for his work in petrology and seismology. Other additions to the staff in 1951 were Professor Kersten (Geography) and Professor Nelson (Mining).

In 1952 Professors Gianella and Palmer retired and Professors McGirk and Winston came as their replacements.

The same year Professor Butler came to the School of Mines to lead an AEC Project. After the end of the AEC contract, John stayed on as Professor of Metallurgy and was frequently Acting Dean of the College, in Dean Scheid's absence. Professor Butler had extensive experience in the Philippines and the East Indies prior to World War II at which time he was in the Philippines and was incarcerated in Santo Tomas prison in Manila where he stayed for approximately three years. He retired in 1969.

In 1959 and the early 1960's we saw another series of rapid changes in the School of Mines with the addition of new staff, new programs, and a general realignment of courses.

Professor Payne came as Professor of Mining in 1959 and for several years was Chairman of the Mining Department. Subsequent to 1963, he left the Mining Department and assumed his position of Professor of Geology which he still holds. This was a matter of musical chairs again. Professor McGirk had been largely concerned with the ore deposits courses, which is also Professor Payne's specialty. In 1963 McGirk suffered a paralytic stroke which forced his retirement. Professor Payne took over the instruction in ore deposits.

Another division of the School of Mines which began expanding in the 1950's was the Nevada Bureau of Mines--now the Nevada Bureau of Mines and Geology.

When I first came, the Bureau had one full-time employee, Vic Kral, and a Director (Professor Carpenter). Though it had been established in 1929, the Bureau struggled along with a minimal, generally part-time, staff and contributed little to the State. Bureau publications appeared as University of Nevada Bulletins.

The development of the Bureau to the present staff of more than 20 people is largely the result of Dean Scheid's determination to establish a small but excellent Bureau of Mines to serve the State by its assistance to the mineral industry and by its publications.



First Distinguished Visiting Professors, brought to the Mackay School of Mines by Dean Scheid, following notable careers at other institutions. Left, Dr. Walter H. Voskuil, Professor of Mineral Economics, 1960–1972. Right, Dr. Otto Haas, Professor of Geology and Paleontology, 1960–1971.



JOHN N. BUTLER, M.S., 1952–1969  
Acting Dean, July–December, 1968  
Chairman, Department of Mining,  
1969–1971  
Chairman, Department of Metallurgy,  
1966–1969  
Professor of Metallurgy



HARVE P. NELSON, Ph.D., 1951–  
1974  
Chairman, Department of Mining,  
1973–1974  
Professor of Mining

By hiring personnel who could serve a dual role, Dean Scheid was able to build both the Bureau and the academic staff. Over the years the capabilities of the Bureau have increased so that at the present time the specialities of its staff include mining, nonmetallic minerals, oil and gas, engineering geology, and geothermal studies. The reports of the Bureau are now sophisticated professional publications. The County Bulletin series, prepared in cooperation with the U.S. Geological Survey, contains modern geologic maps in which a high standard of excellence is maintained.

Starting as an almost forgotten stepchild of the School, the Bureau is now a separate division with its first separate Director, John H. Schilling, who has been with the Bureau as a mining geologist since 1960.

The tabulation (page 47) emphasizes the growth in development of the Bureau over the years.

Besides the Nevada Bureau of Mines and Geology, another service division of the School of Mines is the "State Lab" (Nevada Mining Analytical Laboratory) which was established by the State Legislature in 1895 to help the prospectors of Nevada by providing free analyses of their ore specimens.

Originally established as a separate agency with its own director, the Lab, too, has changed over the years. When I first came, Professor Palmer and Claude Hammond ran the Lab. At that time the Lab was in the Mines Building and was open 5½ days a week with someone in attendance to identify specimens and consult with prospectors. Identification was by visual inspection or a few simple blow-pipe or "spot" tests.

Fire assays for gold were an important part of the service. Before World War II as many as 20 fire assays a day would be made. The services are still offered, though the personal touch is lacking and the chemical analyses are more sophisticated. As a result, the staff has been enlarged and two full-time chemists are employed. Professors from the Chemical and Metallurgical Engineering Department are also associated with the Lab.

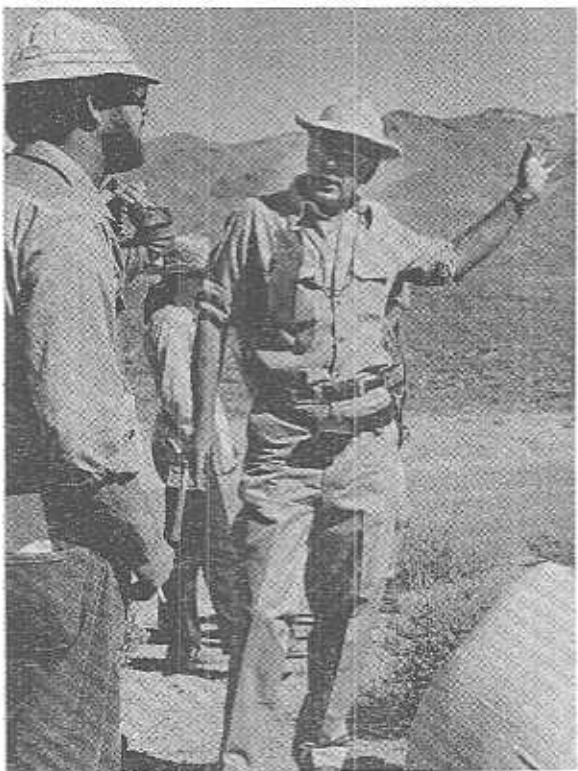
In 1959, the Geology Department had been authorized to offer the Ph.D. in Geology and Related Earth Sciences. The first earned Ph.D. at the University of Nevada was granted to Roger Morrison of the U.S. Geological Survey in 1964. Since the Hydrogeology program is primarily a graduate program, this ability to



**STANLEY E. JEROME, Ph.D., 1960-1965**  
Associate Director, Nevada Bureau of Mines  
and Nevada Mining Analytical Laboratory



**ROBERT C. HORTON, Geol. E., 1956-1967**  
Mining Engineer, Nevada Bureau of Mines,  
1956-1965  
Associate Director, Nevada Bureau of Mines  
and Nevada Mining Analytical Laboratory,  
1965-1967



**ARTHUR BAKER, III, Ph.D., 1967-**  
Dean, Mackay School of Mines, 1973-  
Acting Dean, Mackay School of Mines,  
1972-1973  
Associate Director, Nevada Bureau of  
Mines (Nevada Bureau of Mines and  
Geology) and Nevada Mining Analyt-  
ical Laboratory, 1967-1972  
Professor of Mining Geology

grant the Ph.D. was essential in order to accommodate this branch of study. Since its inception, the greatest number of Ph.D.'s granted by the School of Mines has been in the field of Hydrology and Hydrogeology under Professor Maxey. More recently, permission has been granted to offer the Ph.D. in Geophysics and also Geochemistry, and to date there have been several doctorates granted in Geophysics, primarily in the field of Seismology, which is Professor Ryall's specialty.

When I first came we had a single seismograph, an old Weichert type, which had been purchased prior to World War I, though it was not delivered until after that war. Professor Jones was much interested in Seismology and it was his duty to assemble the instrument when it arrived from Germany, complete with book of instructions, in German. Originally the seismograph was installed in the Mackay Museum, but a seismograph vault was later constructed in the basement of the Mackay School of Mines Building. After Professor Jones' death, Professor Gianella took over the duties of the seismographic station, and this was one of his great interests over the years. The old Weichert machine was not a particularly successful one for nearby earthquakes. If the motion of the earthquake was too strong, it would throw the needles from the machine and we would obtain no record. On one occasion when we obtained no record the result was indeed unfortunate. There had been a very strong earthquake in Assam in the Himalayas, so strong that it destroyed the instruments in India and even in places more distant. Because of the distance of Reno from India it was thought that we could achieve a very fine record, but the Gods were against us or something. On that weekend, the Weichert machine was inoperative for repairs; something had to be done to the clock which is an essential portion of a seismograph. At that time we also had three seismographs belonging to the University of California installed in the cellar of the Mackay Science Building and we thought we could certainly obtain the records from those. Unfortunately, that was the first day of the chukkar season and the young man whose duty it was to change the records on the seismograph thought that it was more important to go hunting--no records again. At the present time the University of Nevada has a net of 41 seismographs, which report the results via cable from the seismographs themselves to the center in the Scrugham Engineering-Mines Building where there is a whole battery of recording machines. Professor Ryall who is in charge of the Seismological Laboratory (now an independent unit) anticipates an

additional 20 seismographs as part of a cooperative program with the U.S.G.S.

When I arrived at the School of Mines in 1949, there was a small but evidently adequate Library located largely in the present reading room of the School of Mines Library. Books were housed here as well as in the basement of the building and in Room 202, the so-called Mackay Research Room. The reading room had been constructed at the time of the original building of the School of Mines. The Mackay Research Room was built to house the Johannes Walther Library which was purchased in the 1920's. Again the Mackay family furnished the money in order to make this modification of the building as well as to purchase the Walther Library. In later years, we had occasion to examine the Walther Collection in detail and found that rather than being Walther's main geologic library, it was a collection of separates, many of which were reprints of U.S. Geological Survey publications and therefore of lesser value than had originally been anticipated. I see by the records that we paid \$5,000 for the Walther Library and I seriously doubt whether it was worth the money. When I first arrived here my office was in the Mackay Research Room which I shared with three others. At the present time, the Research Room which housed the Library has been divided into smaller offices and is used by the Geographers.

It became apparent that if we were to engage in any research work, or continue expansions in the Mackay School of Mines, it would be necessary to have an adequate library facility. In order to accomplish this, plans were begun as early as 1951, to enlarge the School of Mines Library and find a more central place for the collection. The library material in the Reading Room was rather restrictive and limited. There was in Room 202 an almost complete collection of the California Bureau of Mines Bulletins. In the cellar of the School of Mines building was the material from the Walther Collection which includes, besides separates, a few bound volumes such as "Explorations in the Gobi Desert" by Sven Hedin. The problem of housing an expanded School of Mines Library was pressing, and various solutions were sought. Among others was housing the Library on the balcony of the Mackay School of Mines Museum. It soon became obvious that this was an area structurally unsuitable for the heavy weight of book stacks. Other ideas were tried and considered and finally the present Library stacks were constructed utilizing an area which had been occupied by a Chemistry Laboratory, behind the present Library

reading room. Using monies derived largely through the Atomic Energy Commission project, which was operating in the School of Mines at that time, the present Library stacks were constructed. This necessitated the emplacement of steel beams in the basement in order to support the weight of the books. After the stack space had been constructed, it was decided that a librarian should be employed, particularly since Mr. Couch the former librarian, had retired. Through his connections with Johns Hopkins University, Dean Scheid was able to hire Mary Alvy who had been geology librarian at Johns Hopkins. Mary came to us in 1952 and served for many years as the School of Mines librarian. At the time of her arrival, Mary was a maiden lady but in a few years the atmosphere of Reno convinced her that she should marry so that she soon became Mrs. Jack Zadra, her husband being with the U. S. Bureau of Mines here on the Reno Campus. We all remember Mary for her love of parties and for her spontaneous theatrical performances. She now lives in Florida.

The School of Mines Library has, of course, grown steadily over the years with the addition of new publications, either bound volumes or journals, in more and more fields: Chemical Engineering, Geography, and Paleontology, as well as in other fields of Mining, Geology, and Metallurgy. Once again the Mackay School of Mines Library has become too big for its britches, and we are desperately in need of larger accommodations. Many plans have been proposed over the last several years, but none of them seem to be satisfactory. The other day we received word that we will have to move into the basement of the University's main Gatchell Library within a few years in order to accommodate the material which is now housed in the School of Mines Library. There is always the constant debate as to whether the School of Mines Library should be included within the general Gatchell Library. To me, this is undesirable, as one of the major attractions of the School of Mines is having a Library in specialized subjects available to the students in the School of Mines Building.

In former years the graduate students in the School of Mines were issued a key to the Library. Within recent years, because of the loss of books, this privilege has been restricted. I think I can say without prejudice that the School of Mines Library is adequate in the fields of Geology, Mining, and Metallurgy. Perhaps not a great library and perhaps not adequate for the volume of use

which is made of it. At the present time we have only a single set of the Bulletins of the Geologic Society of America and the Paleontological Society. Because of the heavy use by students in connection with courses, it would be advisable to have at least two or possibly three sets of these publications. We do have a complete run of the U.S.G.S. publications as well as a complete run of such publications as the American Journal of Science and Journal of Geology. With the rising costs of books and journals, it becomes more and more difficult to keep up with the trend of literature, the volume of which increases by leaps and bounds, but I think that we can say without exaggeration that we have maintained at least an adequate library and hope with additional space and some more money to bring the new library to the level which we would like to see.

Traditionally the School of Mines Library has been open to use by the public. This practice is still followed though at times the results are disastrous. People who borrow books from the Library frequently neglect to return them in time or perhaps at all. However, the utilization by professional people in the mineral industry and geology is extensive, and this certainly should not be discontinued if at all possible.

The Mackay School of Mines continues to grow.

An active recruiting campaign has brought additional students to Chemical and Metallurgical Engineering, as well as to Mining Engineering. Only Geology has witnessed a decrease in student enrollment, and we hope this will be compensated for by a higher quality product; but we must institute a recruiting program here as well.

After 20 years of solid progress under Dean Scheid, which saw: the growth of the academic faculty and curriculum, the beginning of the Ph.D. program, the program of Distinguished Visiting Professors, the growth of the Nevada Bureau of Mines and Geology, the founding of the Nevada Oil and Gas Conservation Commission, and the establishment of a policy of reinvesting endowment funds, we must not lose our initiative.

With the retirement of Dean Scheid in 1972 and the appointment of Arthur Baker III to that position, we are beginning another phase in the School of Mines history—new staff, new objectives, and new approaches to old problems.

Mackay School of Mines Faculty

1974-1975



DR. ARTHUR BAKER, III, Dean

Chemical and Metallurgical Engineering



**FRANK W. BOWDISH, Ph.D., 1962–**  
Professor of Chemical Engineering  
Mineral Technologist, Nevada Mining  
Analytical Laboratory



**ROSS W. SMITH, Ph.D., 1968–**  
Chairman, Department of Chemical  
and Metallurgical Engineering,  
1969–  
Professor of Metallurgy



**JAMES L. HENDRIX, Ph.D., 1969–**  
Associate Professor of Chemical  
Engineering  
Associate Chemical Engineer, Nevada  
Mining Analytical Laboratory



**JOHN S. WINSTON, M.S., 1952–**  
Chairman, Department of Metallurgy,  
1956–1964  
Chairman, Department of Mining,  
1958–1962  
Professor of Metallurgy



**SALIM AKHTAR, Ph.D., 1969–**  
Associate Professor of Metallurgy  
Associate Metallurgist, Nevada  
Mining Analytical Laboratory



**EUGENE MILLER, Ph.D., 1973–**  
Professor of Chemical Engineering  
Research Associate

## Mining Engineering



**PIERRE MOUSSET-JONES, M.S., 1968—**  
Associate Professor of Mining  
Engineering



**YUNG SAM KIM, Ph.D., 1974—**  
Chairman, Department of Mining  
Engineering  
Professor of Mining Engineering



**HERBERT D. FINE, E.M., 1974—**  
Assistant Professor of Mining  
Engineering

## Geology



**E. R. LARSON, Ph.D., 1949—**  
Chairman, Department of Geology-  
Geography, 1952-1966  
Professor of Geology



**DAVID B. SLEMMONS, Ph.D., 1951—**  
Chairman, Department of Geology-  
Geography, 1966-1970  
Professor of Geology



**JOSEPH LINTZ, JR., Ph.D., 1951—**  
Professor of Geology

Geology (cont.)



**MALCOLM J. HIBBARD, Ph.D., 1962–**  
Chairman, Department of Geology-  
Geography, 1970–1975  
Professor of Geology



**ANTHONY L. PAYNE, Ph.D., 1959–**  
Chairman, Department of Mining  
Engineering, 1962–1968  
Professor of Mining Engineering,  
1959–1963  
Professor of Geology, 1963–



**JAMES R. FIRBY, Ph.D., 1966–**  
Assistant Dean, 1973–  
Assistant Professor of Geology



**LIANG-CHI HSU, Ph.D., 1969–**  
Associate Professor of Geology  
Associate Mineralogist, Nevada  
Bureau of Mines and Nevada  
Mining Analytical Laboratory

## Geography



**EARL W. KERSTEN, JR., Ph.D.,**  
1951—  
Professor of Geography



**JOHN G. HOUGHTON, Ph.D.,**  
1966—  
Assistant Professor of Geography



**TERRILL J. KRAMER, Ph.D.,**  
1968—  
Assistant Professor of Geography

## Geophysics



**JOHN W. ERWIN, M.S.,** 1964—  
Professor of Geophysics  
Geophysicist, Nevada Bureau of  
Mines and Geology

## Hydrology



**GEORGE B. MAXEY, Ph.D.,** 1961—  
Director, Center for Water Resources  
Research, Desert Research Insti-  
tute, 1967—  
Research Professor of Hydrology  
and Geology

## Seismology



**ALAN S. RYALL, JR., Ph.D.,** 1964—  
Director, Seismological Laboratory,  
1974—  
Professor of Seismology

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