Spring 2010

History of Petroleum Engineering at Montana Tech

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HISTORY OF PETROLEUM ENGINEERING AT MONTANA TECH

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Spring 2010

In January, 2010, the Petroleum Engineering department at Montana Tech moved into a new building, the Natural Resources Building, to start a new chapter in the history of the program on campus. Occupying a new building is a positive event, and it coincides with a surge of student enrollment which is prompted by industry needs and world energy demand. This time of new facilities and growing student numbers leads to the question of what the future has in store for the department. It also leads to reflection about where the department has been in the past. This history is a record and a story of that past.

The Beginnings

The Montana School of Mines was established by the State Legislature in 1895. The functions of the college were defined to have "for its object, instruction and education in chemistry, metallurgy, mineralogy, geology, mining, milling, engineering, mathematics, mechanics, drawing, (and) the laws of the US and the State in reference to mining…"[1] Reasonably interpreted this charge also included general education with adequate emphasis on English, history, and economics, as well as covering the fields of mineral processing, both metallic and non-metallic, while retaining the "engineering core" of the college curricula.[2]

In 1945, a committee of alumni, students, and faculty was formed to evaluate "that the time and energy of the student shall be utilized to the best possible advantage from the viewpoint of his ultimate usefulness to the mineral industry, and thereby of his own professional success in the long run."[3] The committee was instructed by college President Francis A. Thomson to study the existing curricula, courses, and methods of the college and to make recommendations as to how to improve and modernize instruction at Montana School of Mines best to serve the expected influx of returning servicemen and other students.

At that time the United States had just ended World War II, and the college was concerned about "reconversion" to a peacetime basis. Since 1943 the Montana School of Mines had participated in the V-12 Navy College Training Program which was instituted to provide college educated officers for the military services.[4] Between 1943 and 1946, over 125,000 men were enrolled at 131 colleges and universities throughout the US in the V-12 program. The program not only provided the military with officers during wartime, but also eased the concern of colleges who feared economic collapse as drafted students resulted in empty classrooms.

When the war and the V-12 Program ended, college President Thomson was concerned that it "…presented the opportunity - indeed the compulsion - for us to re-examine ourselves"[5] This effort culminated in the committee report "A Plan for the Future of Montana School of Mines", submitted in June,1946. In the report it was communicated that "It has also been urged upon us by both students and by petroleum engineers that we should offer additional work in the technology of oil and gas…" Actually the State Board of Education had authorized Montana School of Mines to

[1] Sec 878, Revised Codes of Montana
[2] "A Plan for the Future…", Montana School of Mines,1946
[3] "A Plan for the Future…", Montana School of Mines,1946
[4] "V-12: The Navy College Training Program", Carolyn Allison, USC NROTC.
[5] "A Plan for the Future…", Montana School of Mines,1946

establish a degree of Petroleum Engineering in 1926, but because of the relative adolescence of the petroleum industry in Montana at that time and the uncertain demand for graduates, a course of study was deferred.[6] The committee recommended "that a Department of Petroleum Engineering be established at the earliest possible date, [to] lead to the Degree of Bachelor of Science, Petroleum Engineering." It was also recommended that one petroleum engineering instructor be hired and that new equipment funds of $10,000 be budgeted for petroleum engineering.

Post-War Petroleum Order

"Gasoline rationing in the United States was lifted in August 1945, within [hours of the end of WW II]. And immediately, … was heard throughout the land, … 'Fill 'er up !' Gasoline sales in the United States were 42 percent higher in 1950 than they had been in 1945. Demand was exploding far beyond expectations. After price controls were lifted, price proved to be a powerful stimulus to exploration. New regions were brought into production in the United States and in Canada."[7]

"The United States is on the threshold of a profound chemical revolution", said the *New York Times* in 1948. The next ten years will see the rise of a massive new industry which will free us from dependence on foreign sources of oil. Gasoline will be produced from coal, air, and water."[8] The more realistic and widespread view in the oil industry was that synthetic fuels were, at best, on the horizon.

In the immediate postwar years, technology was opening new domestic frontiers for exploration and development. Much greater depth was attained in drilling, which increased production. Even more innovative was the development of offshore oil and gas production.[9]

Another alternative to imported oil … could be seen at night, along the endless highways of Texas, in the bright [gas flares] that shot up from the flat plains. It was natural gas, considered a useless, inconvenient by-product of oil production and thus burned off - since there was nothing else to do with it. Yet the country appeared to have huge reserves of gas, which could well substitute for oil … in residential heating and in industry.[10]

[6] "A Plan for the Future…", Montana School of Mines,1946
[7] "The Prize", Daniel Yergen, p. 409, Touchstone Books, 1992.
[8] "The Prize", Daniel Yergen, p. 428, Touchstone Books, 1992.
[9] "The Prize", Daniel Yergen, p. 429, Touchstone Books, 1992.
[10] "The Prize", Daniel Yergen, p. 429, Touchstone Books, 1992.

Establishment of Degree

Following the recommendations of the Planning Committee, the Montana School of Mines established a Petroleum Engineering Department in the 1947-1948 academic year.[11] Both a Bachelor's of Science and a Master's of Science degree were offered.

"The Future of Petroleum Engineering" was a speech given by John E. Blixt of Shelby, MT , a geologist with The Texas Company, who became the first department head for the new Petroleum Engineering Department. The speech was given at the annual Alumni Dinner of Montana School of Mines on June 4, 1947. Mr. Blixt proposed seven requirements for quality, high-caliber petroleum engineering students.

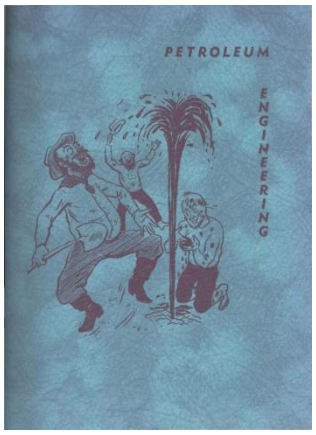
> *"First, he believed that it was critical that the graduate needed to know how to get along with people. Secondly, the graduate should have a good command of the English language in order to write intelligent reports and papers for his company. Third, he should have a sound training in physics. Fourth, since physical chemistry deals with the laws of gases and fluids, he should be adept in that field. Fifth, knowledge of stratigraphic geology is critical because oil, gas, and water are found in beds of sandstone and limestone. Sixth, if the graduate had goals or dreams of advancing to upper management, he needs a strong background in economics. Lastly, he should have a broad exposure to history, government, and the culture which has shaped him."*[12]

Basic coursework for the freshman and sophomore years was uniform with the other engineering degree programs. By the junior year, the student had to decide on a major curriculum, which, of course, included petroleum engineering. Recognizing the value of hands-on experience, students were required to work in the field for a period of two months prior to their senior year. Also required was attendance at the three week Geological Field Mapping course in the summer, along with an inspection trip during the last month of the junior year.

[11] MSM 47th college catalog
[12] "De Re Metallica", MSM, p. 7, 1947.

The first graduating class in Petroleum Engineering was the class of 1949, which included eight graduates:[13]

Dare Bibber Boulter
Hugh Donald Coyle
Alvin Emmett Ed
Bruce William Emerson
Gordon Earnest Irving
William Robert Kahla (with High Honors)
Gordon Duane Lanouette
Russell Carlyle Rockwell



Source: 1949 Magma

PETROLEUM ENGINEERING CURRICULUM
Source: 1947 Catalog

Science
Basic Coursework for Freshmen, Sophomore, and Junior Engineering Students

Engineering Mechanics
Basic Coursework for Freshmen, Sophomore, and Junior Engineering Students

Mathematics
Basic Coursework for Freshmen, Sophomore, and Junior Engineering Students

Communications and Liberal Studies
Basic Coursework for Freshmen, Sophomore, and Junior Engineering Students

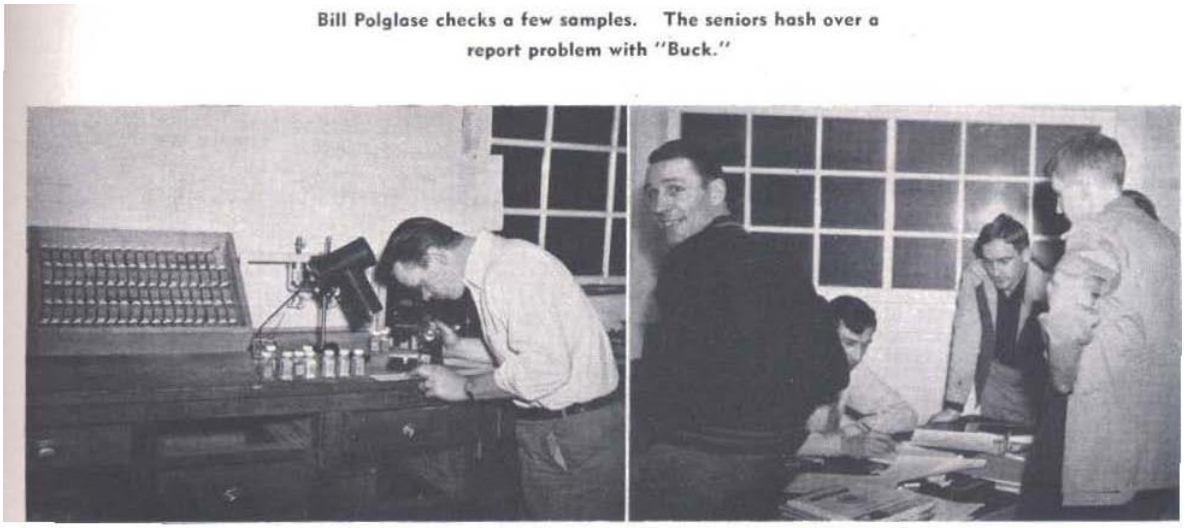
Petroleum Engineering
Introduction to Petroleum Industry
Standard Tool Drilling
Rotary Drilling
Natural Gas
Refining Processes
Production
Reservoir Studies
Production Engineering Problems

Geology
Field Geology (3 week Summer Class)

[13] "De Re Metallica", MSM, p. 9, June 8,1949.

The 1951-1952 catalog of the Montana School of Mines listed the work performed in the various petroleum engineering laboratories:

> "The drilling laboratory is equipped with field and lab mud testing apparatus. Complete well records including samples, cores, electric logs, and results of formation tests are available.
>
> "The gas measurement laboratory is equipped with orifice and positive-type meters, a pitot tube run, orifice test meters, gravity balance, dew point tester, and a gas calorimeter. The lab work is supplemented with visits to local gas company installations.
>
> " The reservoir laboratory consists of porosity, permeability, fluid content, and interstitial water determination on oil well cores".[14]



Bill Polglase checks a few samples. The seniors hash over a report problem with "Buck."

Bukvich and juniors preparing a sample of drilling mud.

Picture sources 1949 Magma

[14] MSM 1951-1952 college catalog.

The First Petroleum Building

By 1950 it was clear that oil was proving to be the favored fuel in the United States. All indications were that the petroleum industry would continue growing to meet this demand. In 1950 at Montana School of Mines plans were being made for a new building to house the Petroleum Engineering department. Up until that time the petroleum engineering labs were located in the west end of the Mill Building.

On October 16, 1953, the new Petroleum Mechanics Building officially opened on campus. It housed the Petroleum Engineering department, the Physics department, and the Applied Mechanics department. John Flugstad and Dean Elliot were the two petroleum engineering professors with offices in the new building.

Pictures: 1952-53

THE NEW PETROLEUM BUILDING

PETROLEUM ENGINEERING CURRICULUM
Source: 1957 - 1958 Catalog

Science
General Chemistry
Quantitative Chemistry Lab
Qualitative Chemistry Lab
Physics I & II
Physical Chemistry

Mathematics
Mathematical Alanysis I & II
Descriptive Geometry
Calculus I & II

Petroleum Engineering
Petroleum Engineering I & II
Petroleum Engineering III & IV
Petroleum Engineering V & VI
Petroleum Engineering V Lab
Chemistry & Refining of Petroleum

Engineering Mechanics
Technical Drawing
Engineering Mechanics
Fluid Mechanics
Applied Electricity
Strength of Materials
Strength of Materials Lab
Physical Thermodynamics
Instrumentation
Electives

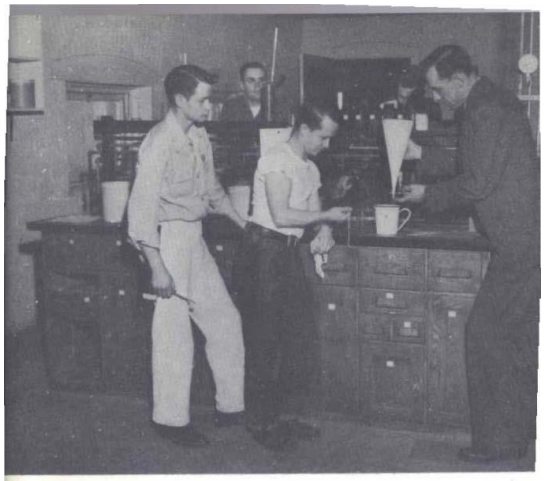
Communications and Liberal Studies
English Composition I & II
History of Civilization I & II
Technical Writing
Physical Education I & II
Economics I & II
Electives

Geology
Physical Geology
Historical Geology
Mineralogy
Structural Geology
Petroleum Geology
Field Geology (Summer Class)

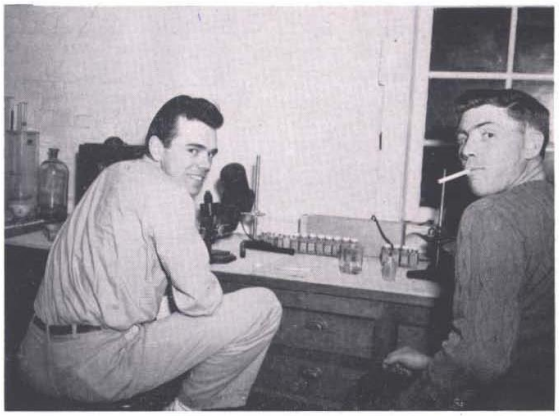
A rather unique feature of the new building was an open well that ran from the basement to the topmost floor, a distance of 45 feet. The purpose of the well was for the installation of fractionating columns and Lucite pipe columns which would allow students to study fluid flow under vertical well-like conditions.[15]

At the building dedication, John Blixt, former department head for Petroleum Engineering and current Senior Geologist for The Texas Company in Denver, addressed the college. Blixt spoke about the promising future of the oil and gas industry and that *"the creation of the Petroleum Engineering degree and having such a fine new facility for students and faculty could not have happened at a better time."*[16]

[15] "De Re Metallica", MSM, p. 2, October 1953.
[16] "De Re Metallica", MSM, p. 20, October 1953.



▲ THESE PETROLEUM ENGINEERING STUDENTS *are receiving instruction in the use funnel to measure the viscosity of oil-well drilling mud.*



Thielman and Dorlaque examining well samples under the microscope

Pictures 1951 Magma

The department continued to prosper, and in 1957 a new curriculum was adopted for Petroleum Engineering. In 1960, the college initiated a Placement Office to facilitate the visits of companies on campus for recruiting students to employment. During the first recruitment season, eight oil companies were on campus to conduct interviews.

In 1960 the *Journal of Petroleum Technology*, a publication of SPE of AIME, published an article that was addressed in the college newspaper, "The Amplifier. " "There was expected to be a shortage of Petroleum Engineers in the future and the competition between companies vying for the engineering graduates could be likened to bidding for professional football players."

In 1965 the Montana legislature changed the name of the college from Montana School of Mines, to Montana College of Mineral Science and Technology. The new name was adopted in order to reflect the broader selection of classes in mathematics, science, and liberal studies that were available to complement the engineering programs. The university system was interested in attracting a diversity of students wishing to pursue both engineering and non-engineering degrees.

PETROLEUM ENGINEERING CURRICULUM
Source: 1965 - 1967 Catalog

Science
- Inorganic Chemistry I and II
- Quantitative Chemistry Lab
- Qualitative Chemistry Lab
- Survey of Organic Chemistry
- General Physics
- Physics II & III (Summer classes)
- Physical Chemistry
- Physical Chemistry Lab

Mathematics
- Intermediate Algebra (Elective)
- Solid Geometry (Elective)
- Plane Trigonometry (Elective)
- Analytic Geometry & Calculus
- Calculus & Differential Equations

Petroleum Engineering
- Petroleum Explortion & Development
- Reservoir Engineering
- Petrology
- Elements of Geophysics

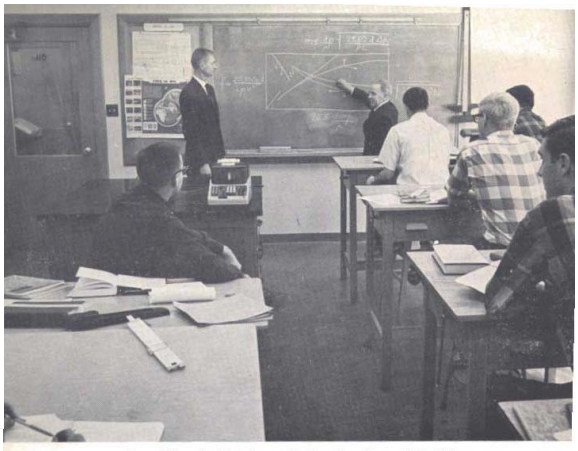
Engineering Mechanics
- Engineering Graphics I & II
- Engineering Mechanics
- Fluid Mechanics
- Mechanics of Materials
- Technical Electives

Communications and Liberal Studies
- English Composition
- English Composition & Literature
- History of Civilization
- Technical Report Writing
- Engineering Research and Reports
- Computer Orientation
- Physical Education
- Economics
- HSS Electives

Geology
- Physical Geology (Elective)
- Historical Geology (Elective)
- Mineralogy
- Stratigraphy
- Sedimentology
- Structural Geology
- Invertebrate Paleontology
- Metalliferous Economic Geology
- Nonmetallic Economic Geology
- Geomorphology
- Optical Mineralogy
- Petroleum Geology
- Field Geology (Summer Class)

PETROLEUM

THE PETROLEUM ENGINEER'S responsibilities are primarily in the production phases of the oil industry. This includes the drilling of oil wells and the selection of the proper rig for size and capacity, the choice and recommendation of oil and gas well completion practices and procedures and the interpretation of the results of geophysical exploration.



A problem in Petroleum Engineering is explained by Professor Warren and Hetherington.

Pictures 1965 & 1967

Petroleum Engineering Department Heads	1947 -1970

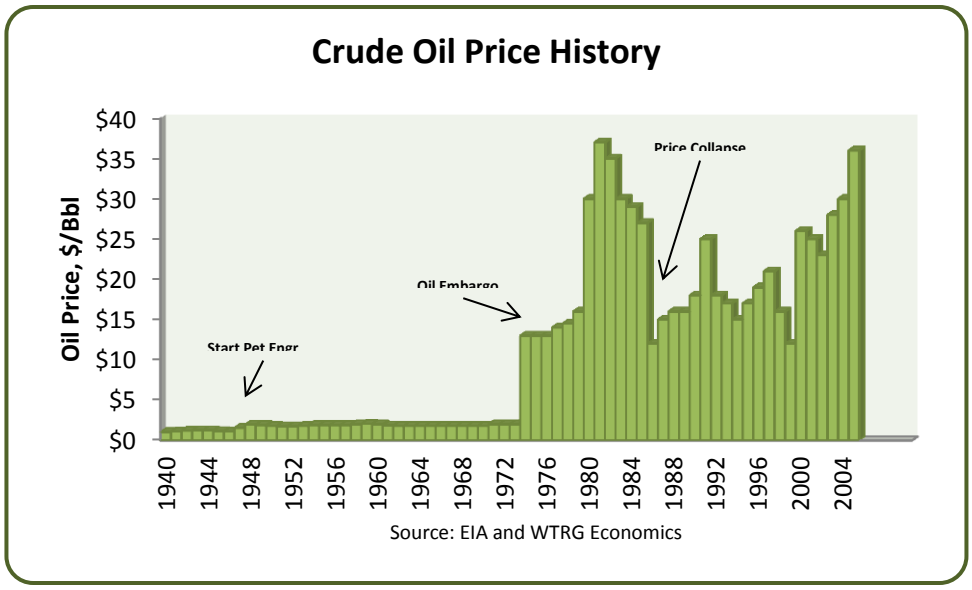
1947	John Blixt
1949	John Bukvic
1952	John Flugstad
1954	Doug Harnish
1963	Gustav Stolz
1966	Herb Warren
1969	Bill Halbert

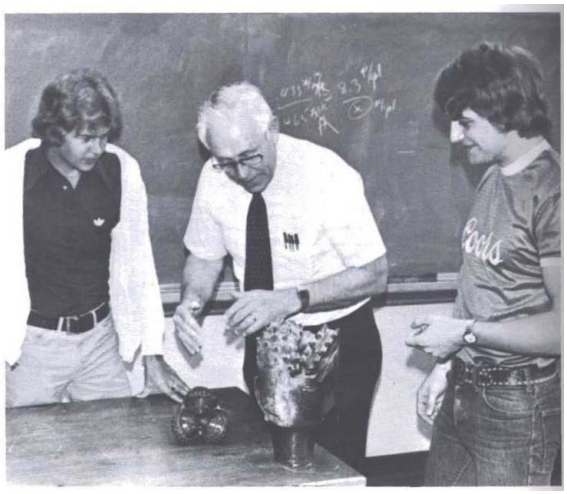
The Oil Price Surge

In late 1973, just after the outbreak of the Arab-Israeli October War, the Middle Eastern OPEC countries imposed an embargo of oil exports on the Western world countries.[17] The embargo, which included production cutbacks and restricted exports of oil, came at a time when oil was the lifeblood of the US and the demand for oil was surging. With the embargo, crude oil prices shot up from $5.40 per barrel to over $17.00 per barrel within a month.[18] American motorists saw gasoline prices rise by over 40% and the emergence of "gas lines" at filling stations as supplies became short. President Nixon called for a national goal "that by the end of this decade we will have developed the potential to meet our own energy needs without depending on any foreign energy source."[19]

The logical result of the increase of oil prices and a call for more energy development was a surge of activity in exploration and drilling. Oil companies also began increasing their recruiting of new petroleum engineers to manage the increased activity. The Petroleum Engineering department at Montana Tech started to see a rise of enrollment as more students sought to make careers in the burgeoning industry. At the same time the active drilling rig count and the market price of crude oil increased as well, fueling the demand for more graduates. This linkage between the world price of oil and the enrollment of students in petroleum engineering would continue to shape the size of the Petroleum Engineering Department into the future.

[17] "The Prize", Daniel Yergen, p. 588, Touchstone Books, 1992.
[18] "The Prize", Daniel Yergen, p. 615, Touchstone Books, 1992.
[19] "The Prize", Daniel Yergen, p. 617, Touchstone Books, 1992.





Conoco Oil Company Scholarship Recipients: Burt Todd, Dan Lindsey, Neil Heata-presentor, Mike Bolkovatz, and Dan Salee.

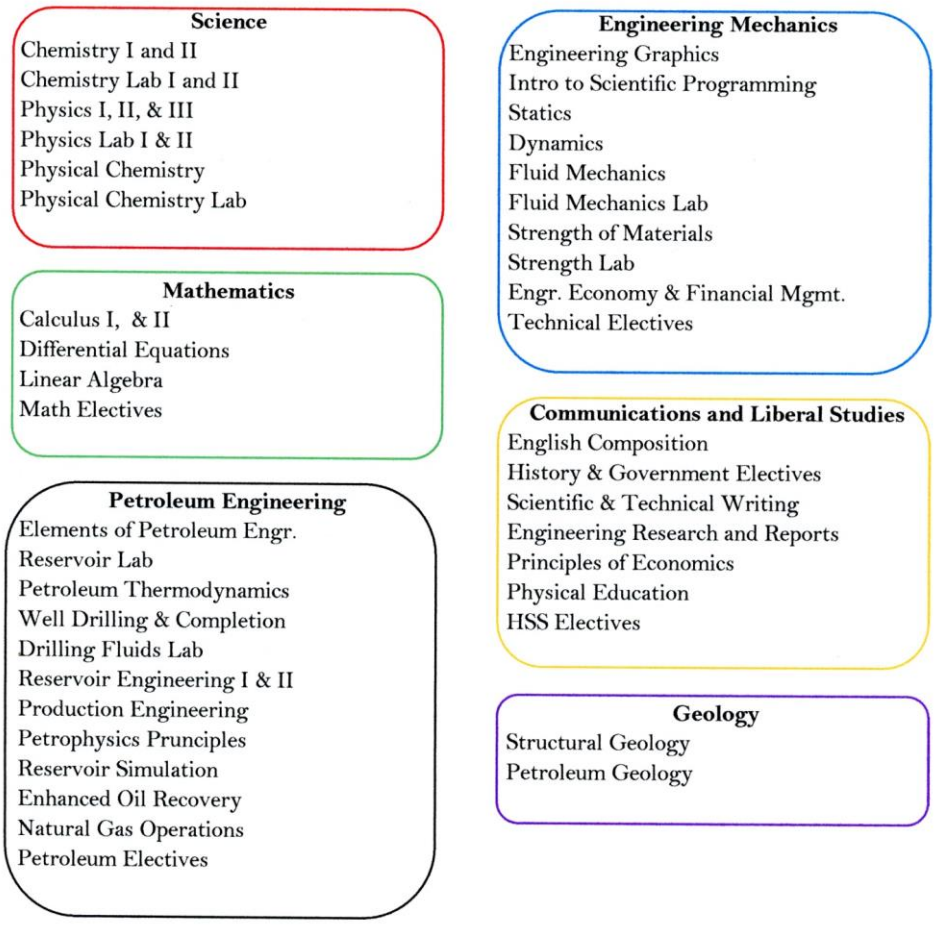
Pictures 1977 & 1978

From Boom to Bust

In March 1974 the oil embargo was ended, but the world had been altered as it had grown up in the post-WWII period.[20] Oil companies continued to pursue more development and the Petroleum Engineering department continued to turn out more graduates. As new oil supplies became available worldwide, the balance of supply shifted away from the Middle East OPEC countries to include other OPEC and non-OPEC countries. In late 1985, the OPEC group launched a policy of decreasing oil export prices to protect its share of the world oil market. Immediately the oil price collapsed from a high of $31.75 per barrel to $10.00 per barrel. The oil industry responded with quick and massive cuts in expenditures and activity.[21]

[20] "The Prize", Daniel Yergen, p. 632, Touchstone Books, 1992.
[21] "The Prize", Daniel Yergen, p. 750, Touchstone Books, 1992.

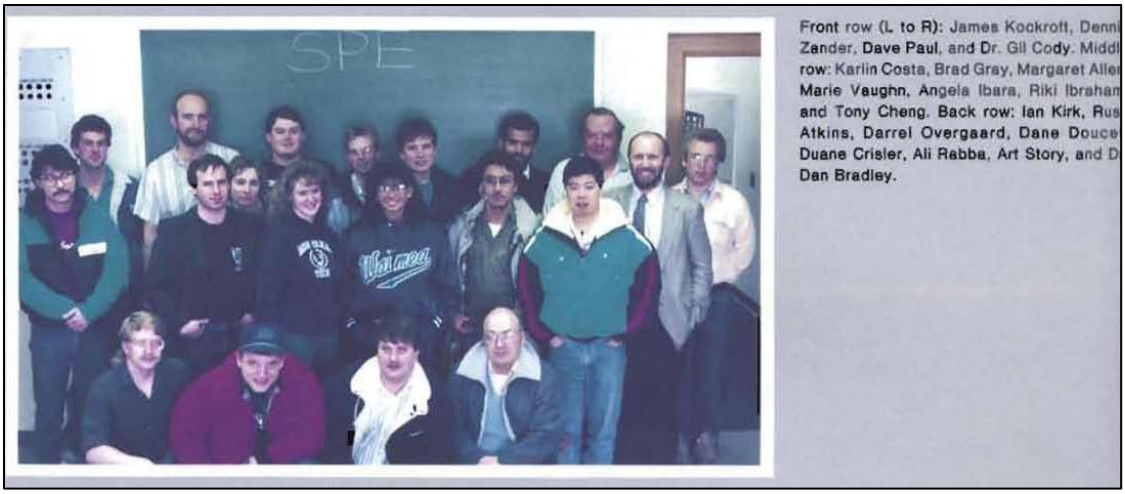
PETROLEUM ENGINEERING CURRICULUM
Source: 1984 - 1986 Catalog



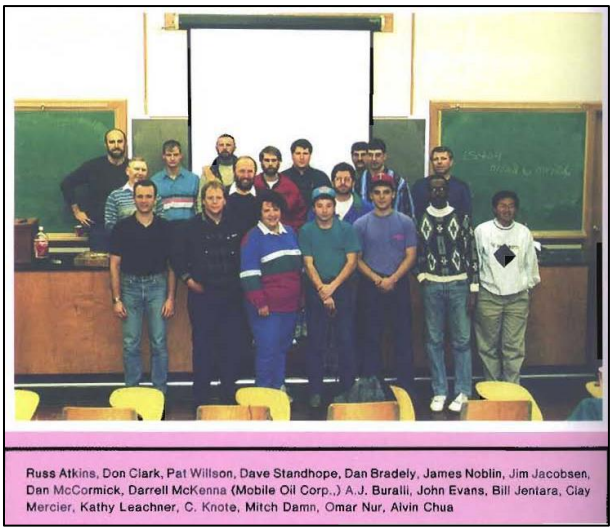
For the Petroleum Engineering students at Montana Tech, this meant a loss of job potential almost overnight. What seemed like an insatiable demand suddenly ended, and students were scrambling to find other employment.

Resumed Growth

Through the remainder of the 1980's and into the late - 1990's the Petroleum Engineering department was stable at an average enrollment level of about 100 students. Recruiters regularly visited the campus and jobs were available, but not in the numbers seen during the previous boom. In 1995 the Montana University System underwent a reorganization in order to improve economy of scale and financial prospects. As a result, the college became affiliated with the larger campus unit at Missoula, and was re-named Montana Tech of the University of Montana.



Picture 1991



Picture 1991

Petroleum Engineering Department Heads 1969 -2010

1969	Bill Halbert
1975	Robert Grace
1977	Jon Carlson
1980	Alan Griffith
1983	Gil Cady
1986	Herb Warren
1987	Dan Bradley
2000	Tarek Ahmed
2002	John Evans
2007	Leo Heath

PETROLEUM ENGINEERING CURRICULUM
Source: 1995 - 1997 Catalog

Science
Chemistry I and II
Chemistry Lab I and II
Physics I, II, & III
Physics Lab I & II
Physical Chemistry
Physical Chemistry Lab

Mathematics
Calculus I, & II
Differential Equations
Statistics
Linear Algebra

Petroleum Engineering
Elements of Petroleum Engr.
Reservoir Lab
Mapping Lab
Rock & Fluid Properties
Petroleum Thermodynamics
Well Drilling & Completion
Drilling Fluids Lab
Reservoir Engineering
Production Engineering
Well Logging
Reservoir Characterization
Reservoir Simulation
Enhanced Oil Recovery
Natural Gas Engineering
Engineering Design
2 Petroleum Electives

Engineering Mechanics
Problem Solving
Statics
Fluid Mechanics
Strength of Materials
Strength Lab
Electrical Circuits & Power
Engineering Economics
Technical Elective

Communications and Liberal Studies
English Composition
Technical Writing
Speech
Research & Report Writing
2 Humanities Electives
Principles of Economics
Social Science Elective

Geology
Physical Geology
Sedimentology

The Petroleum Engineering department has always received support from the oil industry and from alumni. In 1992 this support was further organized by department head Dan Bradley in forming the Petroleum Industry Advisory Board. The purpose of the board was to focus the interests and resources of petroleum industry professionals, primarily engineering alumni, to assist the Petroleum department. The board started with ten to twelve invited members and steadily grew over the years. The current membership is over thirty representatives, who meet on campus twice each year, in the fall and the spring, to advise the department. Members serve on various committees, such as Curriculum, Faculty, Recruiting, and Building committees, to offer assistance and support. The Petroleum department Industry Advisory Board is the largest and most active advisory board of any program on campus, and has been instrumental in supporting petroleum engineering faculty and facility advancement.

Slowly, as oil prices began to rise through the year 2000, graduate demand started also to rise and again the program enrollment responded. Growing student numbers were accompanied by growing interest in student organizations. During the 1980's and 1990's the Student Chapter of the Society of Petroleum Engineers (SPE) became increasingly active as a campus organization promoting technical outreach, service, and social involvement. The club initiated many successful activities such as the Annual Christmas Bazaar, and became co-host for the Annual Spring Petroleum Technical Symposium. The idea for a symposium was developed by Professor John Evans in 1995, as an event to bring petroleum professionals from around the Montana region together with petroleum engineering students. The symposium featured current technical topics presented by industry speakers, and was concluded with a golf tournament for student and industry teams. The Spring Petroleum Technical Symposium continues to bring industry professionals to the campus - 2010 will be its 15th year of regional networking.

Other student organizations have also become established in the Petroleum Engineering department. In 2005, the student chapter of the American Association of Drilling Engineers (AADE) became organized as another opportunity to attract the energy and service ability of petroleum engineering students.

Natural Resources Building

In 2001, Tom Dyk and Bill Madison, members of the Montana Tech Foundation Board of Directors and the Petroleum Department Industry Advisory Board, began a 3-year capital campaign to raise money for the renovation and modernization of the Petroleum Engineering Building. The first phase of the campaign was focused on raising funds from petroleum alumni and was augmented by the sale of land donated by Burlington Resources.[22]

In 2005, the Montana State Legislature approved the addition of a new building, later to be named the Natural Resources Building, to house the Petroleum Engineering Department and the Montana Bureau of Mines and Geology. The Legislature authorized an expenditure of $14.4 million for a 70,000 square-foot building and granted $9.0 million of state funds towards design and construction. The Butte Silver Bow state legislative delegation, especially representatives Jim Keane and John Sesso, was instrumental in securing this funding. Montana Tech was responsible for raising the remaining $5.4 million.[23]

[22] Personal communication from John Evans, 2010
[23] Personal communication from John Evans, 2010

From 2005 to 2009, John Evans, Leo Heath, Jerry Schuyler, Tom Dyk and members of the Montana Tech Foundation staff solicited funding from the oil and gas industry and from Montana Tech alumni. Eventually a total of $2.0 million in private funding was secured. Major corporate gifts were received from:

Burlington Resources	Halliburton Energy Services
St. Mary Land & Exploration	ConocoPhillips
Noble Energy	BakerHughes
Devon Energy	BP America
Marathon Oil Company	

Major individual gifts were received from six prominent Petroleum Engineering alumni families:

Tom and Mary Dyk	Bill and Cheryl Madison
Jerry and Julie Schuyler	Tom and Linda Bandy
Carl and Jenny Burgman	Ryan and Lisa Lance

Picture 2010

During the period from 2007 to 2009, the State Legislature granted an additional $5.2 million, and the Tech campus funded $1.2 million. An additional $600,000 was raised though Petroleum Engineering alumni in a contribution program called the “Council of 600”. In total, $18.3 million was raised from all sources.[24]

[24] Montana Tech Foundation, 2010

Due to inflation in the construction industry during the design phase, the size of the building was reduced from 70,000 to 56,000 square feet so that the estimated cost of the structure was within the amount of funds raised. The winning bid for construction of the building was $15.8 million, meaning that $2.5 million of project money remained at the completion of the bidding. This money will be used for the renovation of the old Petroleum Engineering Building into a building for the campus Nursing degree program.

Architectural plans were completed, and construction bids were solicited in late 2007. By spring 2008 construction began on St. Patrick's Day for the Natural Resources Building at the foot of Big Butte and overlooking the campus from the west.

Through 2008 and 2009 the construction was completed for the three story contemporary building with two "wings", the east wing for Petroleum Engineering and the west wing for the Bureau of Mines and Geology. The building was finished in December 2009, and moving of the department from the old Petroleum Building took place during the Christmas break to be ready for classes by January 13, 2010.

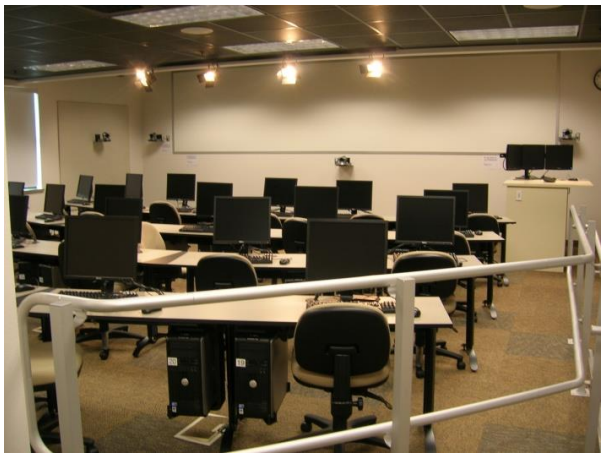
The features of the Petroleum Engineering floors were designed to provide needed classrooms and equipment, and to accommodate updated modern laboratories for both teaching and research, including:

- **Faculty and Department offices**
- **Graduate Student offices**
- **3 Lecture Halls and 2 Classrooms**
- **24 seat Distance Learning Classroom**
- **40 seat Computer Classroom**
- **Four Laboratories**
  - **Production and Natural Gas Lab**
  - **Reservoir Lab**
  - **Drilling Fluids Lab**
  - **Research Lab**
- **50 ft. Vertical 2-Phase Flow Loop**

The laboratory facilities of the Petroleum Engineering program are a vital part of the hands-on education philosophy practiced by the department. Students are provided a strong program of basics, from which they can build knowledge. These basics start in the labs, of which five lab classes are required. The Reservoir Lab starts with cutting of core samples which are then measured for porosity and permeability (both liquid and gas), saturated with reservoir fluids and measured again for relative perms and capillary pressures, and finally fluid properties are determined. The Mapping Lab utilizes the Surfer software to construct structure and isopach maps, vertical cross sections, and determine volumetric reserves from mapped parameters. The Drilling Fluids Lab works

on mixing various mud types then diagnosing properties and treating contaminants. The Production Lab measures the properties of cement mixtures and frac gel blends with various rheology equipment, and examines the behavior of two-phase flow (air & water) through vertical and horizontal piping as well as separator vessel design. The Natural Gas Lab experiments with gas heat content, specific gravity, gas component analysis, dew points, and flow measurement. Many of the principles are unchanged from the 1950's, but the labs are equipped with modern apparatus, and computers are located in all the laboratories for easy data recording and processing.

Pictures 2010



The new Natural Resources Building also includes a Research Lab which is designed with flexibility for a variety of possible projects. This research space will enhance the graduate master's program and will provide the faculty with a modern facility for advancing their research interests.

PETROLEUM ENGINEERING CURRICULUM
Source: 2010 - 2011 Catalog

Science
Chemistry I and II
Chemistry I Lab
Physics I, II, & III
Physics Lab

Mathematics
Calculus I, II, & III
Differential Equations
Statistics

Petroleum Engineering
Elements of Petroleum Engr.
Field Practices Trip
Reservoir Lab
Mapping Lab
Rock Properties
Fluid Prop. & Thermodynamics
Well Drilling
Drilling Fluids Lab
Reservoir Engineering
Production Engineering
Production Lab
Well Logging
Reservoir Characterization
Reservoir Simulation
Waterflooding and EOR
Natural Gas Engineering
Natural Gas Lab
Petroleum Project Evaluation
Engineering Design
2 Petroleum Electives

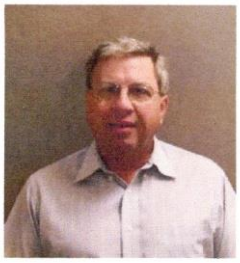
Engineering Mechanics
Problem Solving
Statics
Fluid Mechanics
Strength of Materials
Strength Lab
Engineering Economics
Thermodynamics
2 Technical Electives

Communications and Liberal Studies
College Writing & Composition
Technical Writing
Communications Seminar
2 Humanities Electives
Principles of Economics
Social Studies Elective

Geology
Physical Geology
Sedimentology
Subsurface Methods of Geology

Throughout the history of Petroleum Engineering at Montana Tech the professionals employed as members of the faculty have provided exceptional service. Their experience, dedication, and commitment to quality education have been the basis for the success of the Petroleum Engineering program. In the 1950's and 1960's the department was served by two to three professors. At peak enrollment in the 1980's the number had increased to five. At the present time the number of faculty is at 6 full time and 1 part time members. This written history is dedicated to those faculty from 1947 to 2010 who have worked to ensure that Montana Tech has always been a premier school for Petroleum Engineering.

Petroleum Engineering Faculty 2009-2010



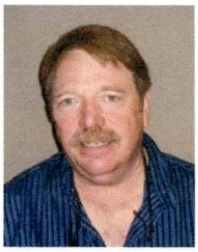
Leo Heath
Department Head
Assistant Professor
Well Drilling
Field Practices
Petr. Economics

Mary North-Abbott
Assistant Professor
Pet Engr. Elements
Field Practices
Reservoir Lab
Surface Facilities

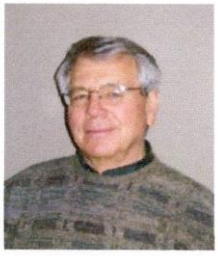
Dave Reichhardt
Assistant Profesor
Rock Properties
Well Logging
Res. Characterization
Mapping Lab
Field Practices

Dr. Burt Todd
Assistant Professor
Waterflooding & EOR
Production Engr.
Artificial Lift
Natural Gas
Senior Design

Dr. Susan Schrader
Assistant Professor
Fluid Thermody.
Reservoir Engr.
Res. Simulation
Thermal Recovery



John Getty
Lab Instructor/Director
Drilling Fluids Lab
Production Lab
Natural Gas Lab



John Evans
Associate Professor - Retired
Stimulation
Press. Transient Analy.

Lana Petersen
Administrative Assistant

The Future

The Natural Resource Building was finished just in time. As oil prices continue to increase in response to world demand, so, too, is the student enrollment continuing to grow in Petroleum Engineering. The Fall 2009 enrollment was at 338 total students in the program, and Fall 2010 applications appear likely to exceed that mark. Even with the larger classrooms and labs of the new building, the department is close to full capacity.

The faculty is at its largest size ever, with six full time and one part time professors, and a search is currently underway for a second lab instructor. Even at these levels the student-to-faculty ratio is over 50:1. The teaching business in the new Natural Resource Building is booming !

The history of Montana Tech Petroleum Engineering has followed the familiar cycles of the petroleum industry in response to world oil prices. Some years are up, and some years are down, yet the program continues a steady advancement to meet the needs of the industry for qualified and ready Petroleum Engineering graduates. Along with that achievement continues the steady support and performance of the department alumni and the support of the companies they work for in the worldwide petroleum industry. The Petroleum Engineering department cannot help but continue to be successful into the future.