Preface

In a scientific school of this character a major portion of the time is spent acquiring technical knowledge. For this reason, the social life, while mentioned, is not featured in this book, but is made subservient to the theoretical instruction and practical training of the course.

This pamphlet has been written by the class of 1909 for the purpose of presenting additional information regarding the environment of the students of the Montana State School of Mines and as an illustrative supplement of the catalogue.
BUTTE, the HOME of the MONTANA SCHOOL of MINES

BUTTE, the city of mines and mining, is today known the world over as the seat of the greatest mining enterprises ever developed within the limits of one industrial center. Located on the Pacific slope of the Rocky Mountains, in a section favored with delightful summers and mild, invigorating winters, Butte has grown from a typical western mining camp into a modern city of 60,000 inhabitants. It has modern business blocks, imposing public buildings, and handsome private residences offering all the comforts and conveniences of a metropolis.

The famous Anaconda hill, in the eastern part of the city, is known as the richest hill in the world. It is honeycombed by more than 50 miles of levels known as underground workings, from which a vast tonnage of copper ore is raised to the surface daily and transported to the surrounding reduction works. This hill, together with the adjoining properties, has produced within the last 25 years upwards of $500,000,000 in copper, silver and gold, and the district embracing these mines stands pre-eminent as the greatest copper producing section in America.

Such an enormous production necessarily implies the installation of large plants for mining, milling and smelting. The gigantic hoists, the hundreds of stacks, collecting the smoke from boilers which generate thousands of horse power, the compressor plants, reduction works, electric power stations, machine shops, ore bins, etc., bear witness to the ceaseless activity far below.
The enormous production of ore has given rise to the development of some of the largest and best equipped copper smelters in the world. Among these are the Washoe smelter at Anaconda, the Boston and Montana smelter at Great Falls, and the Butte Reduction Works at Butte. The Washoe smelter has a capacity for handling 10,000 tons of ore daily and is the largest smelter of its kind in the world. The Great Falls smelter has an electrolytic refining plant, the only one in the West. This smelter, under the able management of Mr. C. W. Goodale, has been one of the pioneers in solving the complicated metallurgical problems presented by the Butte copper ores. Within easy reach is also the East Helena smelter. This smelter is the property of the American Smelting & Refining Co. It treats chiefly lead and silver ores.

Such are the industrial developments within the city of Butte and adjoining districts, the environments of the Montana State School of Mines. Being brought daily into contact with the various phases of mining, milling and smelting, and with the men who are personally engaged in the different departments of these industries, the student cannot help absorbing considerable practical information which is a great advantage to him in subsequent practice. In this respect the opportunities offered the students are unsurpassed in this country. Virtually all of the mines and mining plants form a substantial part of the equipment of the school; the great mining companies as well as the smelter operators and individual miners give cordial assistance to the students in facilitating their studies. Moreover many of the students find remunerative employment in the various mines during vacation. The great practical advantage thus accruing to the student of the Montana School of Mines cannot be overestimated.
Montana State School of Mines Building.
FRANCIS CHURCH LINCOLN, S. B., E. M., A. M.
Professor of Geology and Mineralogy

THEODORE SIMONS, E. M., C. E.
Professor of Mining and Ore Dressing

FACULTY
MONTANA STATE SCHOOL OF MINES

GEORGE W. KNEISLY, B. S., A. M.,
Instructor in Geology and Mineralogy

ARTHUR E. ADAMI, E. M.
Instructor in Surveying and Drawing
OFFICERS

Class of
Nineteen Hundred
Nine

M. S. S. M.

Ira B. Peter
President

J. Clark Johnstone
Secretary

Emmett E. Malloy
Vice-President

Edward Kane
Treasurer
CLASS '09

William Brulo

Henry J. Weigenstein

Norman A. Stockett

Clyde C. Harlan

Kenneth P. Kirby
View of Chemical Laboratory.
Balance and Testing Room.
Grey Rock Mine
Field Surveying at Quigley

The Freshmen surveying trip of the class of 1909 consisted of six weeks of field work at Quigley, Montana. Quigley is a deserted mining camp, situated 12 miles south of Bonita, a station on the Northern Pacific Railroad, ninety miles from Butte.

The place is ideal for summer field work, being situated in a narrow valley, which is drained by Rock Creek. This stream is a typical mountain creek, averaging 50 feet in width and offering excellent recreation for the students when the day’s work in the field is completed.

The class was divided into squads of two students each and each squad assigned a transit, level, tapes and other apparatus necessary for the work. During the stay in the field the students were required to execute the various problems in surveying and prepare the necessary field notes, maps, profiles, etc., which were handed in every week to the professors in charge.

A building which had once been used as a church offered good sleeping quarters for the class, and board was obtained at a ranch house nearby at the reasonable rate of $5.00 per week.

The trip was thoroughly appreciated by all members of the class, both as a practical course and a rare outing.
Class of '09 at Quigley, Montana.

Prepared to Survey.
Morning's Start.

Leveling.
Mine Surveying

At the end of the Sophomore year, 1907, the class was given a six weeks' course in practical mine surveying. Permission was obtained from the Butte & Boston Consolidated Mining Company to survey the Ophir mine, located in Butte.

The course was carefully outlined by Professor Simons, who also directed the procedure by daily instruction. The work, which began June 10, 1907, consisted of a complete survey of the surface arrangement, showing all buildings, shafts, adits, etc., with their relative elevations; the establishment of a base-line and determination of its true bearing by solar and polaris observations; plumbing of the 500-foot vertical shaft by the two-wire system; complete survey of the underground workings, including shafts, levels, raises, winzes and stopes.

The actual surveying extended over a period of four weeks. The remaining two weeks were spent in preparing maps and sections, calculations of latitudes and departures of the underground surveys and making survey records, showing station numbers, horizontal and vertical angles, slope and horizontal distances, true bearings, latitudes and departures of all courses, the co-ordinate for all stations, north, south, east and west, of an assumed initial point; also the elevation of each station above an assumed datum plane, calculated from the vertical angles and slope distances and checked by actual levelling.

Surveys were checked by plotting and calculations, and allowable errors adjusted by approved methods. This work was done on each Saturday in order to keep all the notes checked as the work proceeded. The advantages of different systems of field notes were discussed and the students familiarized with the most practical methods of mine surveying.
Mine Surveying.
Metallurgical Excursions to Boston & Montana and Washoe Smelters

In many ways the visit of the class of 1909 to the Boston & Montana Smelter at Great Falls was the most interesting and instructive of the trips of 1908. For many it was the first visit to the power city and its large plant. After a visit to the office of Superintendent Wheeler and listening to an address upon the history and present working system of the smelter, a general tour of inspection of the plant was made. The following morning the class was divided into squads of three men each and the study of the different departments commenced. A day was spent by each squad in every department of the works, reports being made to the professor in charge in the evening.

One evening during the visit a game of basket ball was played between the class team and the team representing the Great Falls Athletic Association, the class team winning by a score of 20 to 19.

The officers and other employees of the smelter treated the members of the class royally and were always ready to answer questions and aid them in every way possible.

Remaining over Sunday upon returning from the Boston & Montana Smelter, the Class of 1909 left Butte March 25, 1908, to spend a period of five days studying the Washoe Smelter, located at Anaconda. The plant is the largest copper smelter in the world, its daily output being 500,000 pounds of copper.

Five full days were spent by every squad taking detailed notes upon the plant. The sections to be studied daily were as follows:

Section I. Sampling Mill and Concentrator.
Section II. McDougal Roasters, Reverberatories and Coke Jigs.
Section III. Blast Furnaces and Briquette Plant.
Section IV. Arsenic Plant, Laboratories and Slime Ponds.
Section V. Converters, Clay Mill, and Refining Furnaces.

This metallurgical trip, combined with that at Great Falls, was an exceedingly enjoyable one and will always be remembered by every member of the class as one of the most instructive features of his school career.
Boston & Montana Smelter, Great Falls.
Washoe Smelter, Anaconda.
Butte Reduction Works, Showing Highest Concrete Stack in the World.
Bulle Hill, the Richest Hill on Earth.
Summer Course in Geology

IN AUGUST and the early part of September, 1908, the Class of 1909, under the supervision of Professor Lincoln and Mr. Kirk, took a trip to Bridger Canyon and the Yellowstone National Park for the purpose of studying field geology.

The class went in true old Western style—cayuses and chuck wagon. With its horses of every size and color and its saddles of various makes and description, this outfit would certainly have opened the eyes of any tenderfoot.

The first week was spent in detailed study of the sedimentary formations at Bridger Canyon, about six miles from Bozeman. The class was divided into squads which were systematically assigned to different parts of the canyon on successive days. Briefly, the work consisted in examining all the exposures in Bridger Canyon; these were located with reference to fixed points and described from physiographical and lithological standpoints. Various sections of the adjacent mountains were constructed, hand specimens taken of each well-marked rock and fossils collected from different strata. In this manner, the members of each squad learned to interpret the geological phenomena under the guidance of their instructors and so obtained the maximum amount of benefit from their work.

Three and one-half days were spent in traveling from Bozeman to Gardiner, the northern entrance to the Yellowstone National Park. Camps were pitched at Mammoth Hot Springs, Norris Geyser Basin, "Old Faithful," Yellowstone Lake and Grand Canyon. From these places, the most important points of interest were readily accessible and could be studied to great advantage. The Park presents an unequalled field for the study of hot springs and geysers. The more generally accepted theories regarding hot springs, geysers, etc., were discussed and complete notes, sketches and photographs taken of the points of interest. The Grand Canyon was doubtless the most interesting place visited for the study of igneous rocks. A section was made of Mount Washburn, a dissected volcano and the highest peak within the Park.

The return trip was made by way of Riverside, the western portal of the Park, thence to Henry's Lake and down the Madison River. A day was spent at Virginia City, Montana, inspecting several mines in that vicinity. The following day the gold dredges at Ruby were visited. These dredges include several of the largest and best appointed in the world.

During our trip, one young engineer's horse was inclined to buck occasionally. This timid youth, mounted upon a jockey's saddle, rapped at death's door on several occasions. Once the vicious animal tried to toss the rider over a precipice into the Yellowstone River 600 feet below, and later attempted to throw him into "Old Faithful" Geyser in the presence of a multitude of the fair sex. Another member of the party, a tall, lanky youth, was astride a small, wiry cow pony, and his comical appearance is worthy of special mention. He resembled a reincarnation of Ichabod Crane.

The party arrived in Butte September 2d, after an absence of thirty-three days, and the consensus of opinion was that the trip was one of the most enjoyable of any taken during the course.
Mammoth Hot Springs.

Taking Data on Hot Springs.
Great Falls of the Yellowstone River.

Granite Boulder Near Grand Canyon
(Carried Miles by Glacier.)
Metallurgical Excursion to A. S. & R. Co. Smelter

During the latter part of April, 1909, the Senior class took their last metallurgical trip, which was a visit to the lead smelter of the American Smelting and Refining Company. This smelter is located six miles east of Helena and treats most of the lead ores in this state and a large amount from several of the adjoining states. The most approved methods of lead smelting are seen in operation here and afford an excellent opportunity for the student to become thoroughly familiar with the practice of today.

The class was under the direct instruction of President C. H. Bowman, who had previous to the excursion delivered a complete and detailed description of the plant and its operation. Thus the class was prepared to investigate every feature of importance about the smelter.

Five days were consumed in studying the smelter, complete sketches and notes being taken of the lead blast furnaces, reverberatory roasting and smelting, the bag-house process, system of flues, etc. Mr. Frank Smith, superintendent of the American Smelting and Refining Co., extended to the class every favor possible while they were studying the works.

Aside from the smelter study, several trips of much interest and importance were taken by the class. A day was spent at the Canyon Ferry power plant, located on the Missouri River, 18 miles from Helena.

Power transmission, which is one of the subjects studied during the last semester, was well illustrated upon this excursion and many practical points of value and importance acquired. The cyanide plant and mine of the Spring Hill Mining Company, four miles from Helena, were also visited. In the evenings the students were exceedingly well entertained and in all spent a most profitable and enjoyable time in Helena during their six days' stay.
East Helena Smelter.
The Sketch Club

The Sketch Club consists of the faculty of the Montana State School of Mines and the Senior Class. Its purpose is to give the students an opportunity of observing the practical application of the various theories studied at the School. Thus by combining the two, they become well versed with the subject in hand. Sketch Club day, which is Friday, is eagerly looked forward to by the students.

The excursions are taken to the various mines to see the surface equipment and the methods of mine timbering, ore haulage, etc. Sketches are made of the important features. The smelters and concentrators are also inspected, as well as power plants, gold dredges, pump stations, foundries, machine shops, etc. In this manner the students become well acquainted with the modern methods of mining and metallurgical practise, which are of paramount importance to them.

On all of these trips the students are accompanied by one or more members of the faculty, who explain the work and point out the items of interest. The members of the Sketch Club cannot fail to recognize the excellent treatment accorded them on these excursions by the management of the various plants.
West Stewart Mine.
Speculator Mine.
Gallows Frame and Hoist, Anaconda Mine.

Leonard Hoist.
Underground Mine Pump.
A Modern Gold Dredge. (One of These Dredges Is Operated Within Four miles of School.)
Sub-Station Butte Electric and Power Company.
Athletics

Athletics at the School of Mines, although carried on under some difficulties in the past, due to a lack of a gymnasium, have nevertheless been an important adjunct to the school. At the last session of the Legislature, however, a bill was passed providing for a gymnasium for the school and as soon as the money is available this building, which is valued at $30,000.00, will be elaborately equipped with the necessary paraphernalia.

In baseball, the school has always had a very strong team. In 1907, the championship was awarded to the School of Mines, and last year the Mines and the Aggies tied for first honors; the Aggies winning the first game in Butte while the Mines won at Bozeman. Several other games were played with amateur teams of Butte, in which the school has never been defeated. This year a very good schedule has been arranged.
1908 School of Mines Baseball Team.
Football

The Mines have been well represented in the past among the institutions of the state by a very strong football team; last year being the banner year of all. In 1908, under the excellent coaching of Earle Rinehart, the championship of the state was awarded to the Miners after they had defeated both the University and Agricultural College. It is the aim of the Athletic Association next year to have as good if not a better team. Games have already been scheduled with teams outside of the state. The big event of the year will be the game with the University of Denver, champions of the Rocky Mountains; this game being scheduled for Dec. 4th.

**RECORD OF GAMES, 1908**

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**INTERCOLLEGIATE STANDING**

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1908 School of Mines Football Team
Basketball

Basketball is comparatively new to most of the students as the School was first represented by a team in 1908. Last year the team did not win the championship, but nevertheless gave a very good account of themselves considering the fact that only one of the team had ever played the game before. This year the boys showed a far greater knowledge of the game and carried off first honors in the Butte City League by winning every game. The League consisted of six teams and included some of the best players in the state.

The Intercollegiate State Championship was won by the Aggies after very closely contested games with the Miners. Next year the prospects are unusually bright, as in addition to having a first-class floor for practice at the new gymnasium, there is an abundance of seasoned material at the School.
1908 School of Mines Basketball Team.
Dancing Club

Visitors, as well as the young men who reside in Butte, are afforded an excellent opportunity to become acquainted with the younger set of Butte society. This is accomplished by an organization known as the School of Mines Dancing Club, which is supported by members of this School. A dance is given every second Friday during the entire school year. This enables strangers to become acquainted very readily.

Invitations are issued at the beginning of the School year, which entitle the holders to attend every dance during the entire season. Only those having these invitations are admitted, and in this way a most select attendance is always present. This brings the young men in contact with the most desirable class of people.

The club is controlled solely by the students, and efficient officers are elected by them. These officers, together with a committee composed of two members from each class, attend to all affairs.

The proceeds of the club go towards liquidating any debts which may be incurred by the Athletic Association. All dances are held in the Woman’s Club Building, which is an ideal dance hall. The patronesses consist of Butte’s foremost social leaders.
Woman’s Club Building.