UPPER CLASSMEN INSTRUCTED IN RESCUE WORK


Taking advantage of the course offered by the United States Bureau of Mines in rescue and first aid work, the upper class men have been receiving instructions along these lines for the past two weeks. These courses are directed by J. H. Govig, in charge of rescue car No. 9, now stationed in Butte, and W. J. Needham, instructor in first aid.

The classes are conducted at the Tramway mine rescue station, No. 2, of the Anaconda Copper Mining Company. Here the company, following the general trend in advancement of first aid and rescue work all the larger mining operators of the country, have built and equipped for the carrying out of mine rescue and first aid work. All necessary apparatus is kept here and facilities for their repair and upkeep have been provided. From this station as a base all of the mine rescue, fire fighting, and first aid work is carried on for the B. & M. group of mines.

Purpose of the Work.

The object of the Bureau of Mines in maintaining the rescue cars is primarily to give aid in the event of mine fires and other disasters, and to train miners in rescue and first aid work. The value of men trained in this capacity cannot be overestimated. The work is not only necessary in the event of a fire or disaster but is also the first step in making the men better and more efficient members of their community.

Outline of the Course.

The general outline of instruction is as follows:

The course occupies five afternoons, from 1 o'clock until 3 o'clock, is given over to the mine rescue work; the other, occupying the remaining time up to 4:30, is devoted to first aid work.

In a more detailed manner the course may be outlined as follows:

Monday afternoon—A study of the Paul oxygen breathing machine and its operation. The first aid work is a lecture on the subject of “Arterial

MID-SEASON REVIEW OF BASKETBALL

Under Adverse Training Conditions, Ore Diggers Have Hard Season.

The problem at the beginning of the basketball season was that of obtaining enough time for practice on the various floors around Butte that the boys had been used to. It is now just a question of whether we are going to have a new, modern gymnasium such as we have long been wishing we might have. It is now just a question of the time when work on the new structure will begin.

The plans have already been drawn by Max Van House, a Butte architect, and have been accepted by the state. In all probability bids for the construction work will be requested at an early date, so that work may begin as soon as the frost gets out of the ground.

The new gymnasium will be a brick edifice, conveniently arranged in every respect, and containing the largest basketball floor in Butte, with plenty of seating space for spectators. The lowest floor is to be given over to the basketball court. In addition, on one side there will be ample space for a band, and on the other space will be left for a choir. The School of Mines Glee Club is particularly fortunate this year in securing Mrs. Sullivan, who has been most successful in inaugurating and perfecting a well-balanced choir of 40 adults and 20 boys in St. John's Episcopal church. A study of piano, organ and harmony was made by Mrs. Sullivan under Andrew T. Webster, Buffalo, N.Y. A few years later she studied with Mary Wood Chase, Columbia School of Music, Chicago, Ill. During this time she was organist at the Church of Atonement, Chicago. After completing the Hollis Dunn course for school music under Stells A. Stark, Cornell university, she became supervisor of public school music, Coeur d'Alene, Idaho, which position she held for two years. Directing of glee clubs and choirs was later studied under Mr. Hughes of the Hughes club, Oakland, Cal. The club is working on several old numbers and expects to do "Hausley's Spring Song," "De Copper Moon," "Drink to Me Only With Thine Eyes," and "A College Medley.

FOOTBALL MEN AWARDED LETTERS

The executive committee of the A. S. S. M. met in January to award letters to the football squad. Upon the recommendation of Coach Charlie McAniffie the following men received the award: Havey, Quinn, Baier, Murphy, Ario, Johnson, Anderson, Walsh, McWilliams, Hofer, Dunn, Egberg, Van Horn, and Mayo.

Among the above, Havey has now received five letters in football and three in basketball, a splendid record. Johnson and Dunn have received three and two, respectively, in football and Walsh has received one in football and two in basketball. Quinn, captain-elect for next year's football squad, has received one in each.

MINES ASSURED OF NEW GYM

Plans Drawn Up and Approved. Work on New Building to Begin Early This Spring.

Will Be Most Up-to-Date Structure in State

Action last month by the State Board of Examiners in placing on sale the last of the 1920 bond issue for the University of Montana makes it a certainty that the School of Mines will have a new, modern gymnasium such as we have long been wishing we might have. It is now just a question of the time when work on the new structure will begin.

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DIRECTOR SECURED BY MINES GLEE CLUB

The School of Mines Glee Club is particularly fortunate this year in securing Mrs. J. Charles Sullivan as director.

Mrs. Sullivan needs no introduction to Butte, since she has been most successful in inaugurating and perfecting a well-balanced choir of 40 adults and 20 boys in St. John's Episcopal church. A study of piano, organ and harmony was made by Mrs. Sullivan under Andrew T. Webster, Buffalo, N.Y. A few years later she studied with Mary Wood Chase, Columbia School of Music, Chicago, Ill. During this time she was organist at the Church of Atonement, Chicago. After completing the Hollis Dunn course for school music under Stells A. Stark, Cornell university, she became supervisor of public school music, Coeur d'Alene, Idaho, which position she held for two years. Directing of glee clubs and choirs was later studied under Mr. Hughes of the Hughes club, Oakland, Cal. The club is working on several old numbers and expects to do "Hausley's Spring Song," "De Copper Moon," "Drink to Me Only With Thine Eyes," and "A College Medley.

SCOTT ANNOUNCES ORATORY CONTEST

Students Preparing for Final State Contests to Be Held at Butte in May.

A call for contestants in oratory has just been issued by Prof. W. T. Scott of the English department, and as a result a number of students are beginning the work of looking up subjects which they will use in the annual School of Mines contest to be held some time in April. The winner of the April contest will represent the Ore Diggers in the 1924 contest of the Montana State Intercollegiate Oratorical Association, to be held early in May at Bozeman under the direction of Montana State College.

Montana Mines has made a decided creditable showing in the state contests since the intercollegiate association was reorganized in 1922 at Helena. The School of Mines Glee Club is particularly fortunate this year in securing Mrs. Sullivan, who has been most successful in inaugurating and perfecting a well-balanced choir of 40 adults and 20 boys in St. John's Episcopal church. A study of piano, organ and harmony was made by Mrs. Sullivan under Andrew T. Webster, Buffalo, N.Y. A few years later she studied with Mary Wood Chase, Columbia School of Music, Chicago, Ill. During this time she was organist at the Church of Atonement, Chicago. After completing the Hollis Dunn course for school music under Stells A. Stark, Cornell university, she became supervisor of public school music, Coeur d' Alene, Idaho, which position she held for two years. Directing of glee clubs and choirs was later studied under Mr. Hughes of the Hughes club, Oakland, Cal. The club is working on several old numbers and expects to do "Hausley's Spring Song," "De Copper Moon," "Drink to Me Only With Thine Eyes," and "A College Medley.
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ABOUT THE POOL

With plans well under way for the new School of Mines gymnasium, a considerable amount of discussion has arisen as to the feasibility of installing a swimming pool. Upon first learning of such a discussion, the matter seemed of small importance and even bore evidence of being somewhat disregarded. Be that as it may, is a swimming pool in a modern gymnasium so well established that any arguments against the installation are bound to appear to have arisen from persons who failed to use even the slightest amount of logical reasoning?

For example, some of the reasons given for not having a pool in the gymnasium are: First, the enrollment of the school is not large enough to warrant a pool; second, the cost of upkeep would be too great; third, the two pools already exist in the city should be patronized by the students; fourth, the business men of the city do not favor the installation of the pool.

Consider the arguments for a moment. There are today over a hundred students at the Mines, all of whom would gladly welcome the healthful, exhilarating exercise to be gotten in a swimming pool. The school will grow, so that in future years a greater number will be benefited by the installation of the pool. There is no better means of securing an even distribution of physical training for the students than the pool. Swimming is a form of sport that everybody enjoys. One may partake of the exercise at his convenience; he need not be handicapped by the necessity of team regulation with fixed periods for training and practice. It is safe to say that the pool would never be idle.

The matter of upkeep has been investigated by competent persons and it has been found that the Mines is entirely within this range and therefore arguments against the pool on this account are not even worthy of consideration.

It is true that there are already two pools in the city. But is it necessary for students to go to the organizations in order to obtain use of these pools? And is it really advisable to walk down town covered with perspiration after a hard practice period that they may take advantage of a refreshing plunge? We might also suggest that the I. C. S. teaches mathematics and other engineering subjects; so is it right for the School of Mines to trespass upon their field? A large number of prominent business men of the city have been interviewed in regard to the matter. Not one was encountered who was not entirely in favor of the installation of the pool. Clearly, the argument is not based on facts.

All modern colleges are equipped with pools and it is rightfully considered the most important phase of a gymnasium. The gymnasium of today without a pool is undoubtedly lacking in an essential.

WITH THE CO-EDS

The five co-eds with Miss Childe- mer and Miss Arthur, co-eds of '26, chambered by Miss Russell, went to Anaconda to see the Mines play the Utah Aggies at the Daly gymnasium.

The co-eds are still here, although some of the proms tried hard to drive them out.

"Scott knows everything now," quoth Baier as he left an economics exam. "I just told him all I know."

College days are full of delights. But they can't compare with college nights.

Lemons seem to be the same everywhere you see them.—Scott.

The sentence, "A hog is a hog because a big hog tries to make a hog of himself," was corrected to, "A hog is a glutton who insists on gormandizing." Going some, we'll say.

Mayo—Does the moon affect the tide?

Van Horn (he knows)—No, merely the united.

Steadman—How did you get that puncture, Naughten?

Naughten—I ran over a chicken with pin feathers.

Prof. Scott—Someone please give me an example of a collective noun. Voice from the rear of the room, after a momentary pause—The landlord.

1st Student—Did you pass your algebra exam?

2nd Student—No, I didn't, but I was the highest one of those who flunked.

THE FRESHMEE PRAYER

I want to be a Senior, and with the Seniors stand, business men of the city, I won't be a president, I wouldn't be a king, I wouldn't be an emperor.

For all that wealth could bring, I wouldn't be an angel, to be a saint or a king, I want to be a Senior, and
never do a thing.

"Failed in chemistry, flunked in trig," We hope they have angels in heaven, I'd like to catch the guy that said That ignorance is bliss."

FRESHMEN NOTES

The final semester of the school year has at last begun after a most trying and terrifying week of examinations. The Freshman class has remained intact with the exception of a few who have fallen by the wayside.

Before we begin our new work let us give a toast in silence to our absent brethren.

The most surprising incident of the past month was knowledge of the marriage of "Jiggs" Van Horn, a prominent member of the Freshman class. The class as a whole takes this means of extending their best wishes and congratulations to Mr. and Mrs. Van Horn. "Jiggs" will continue his studies at the Mines. Ain't love grand?

The classmates of Albert Buckley will be sorry to learn that he has withdrawn from the School of Mines. He has completed his first semester's work and is now trying to pile up enough of the old zama to continue his work at the University of Washington.

Good luck, Al.

Fat Matlock, the boy wonder, seems somewhat depressed since his return from Bozeman. Cheer up, Fat. She will be home in a few months.

Jack Warren is a great little man. He earns his bread at night and he is Glee Club, handing a freshman a sample of the Toll of the Freshman class. As the class of '26.

The final semester of the School of Mines is at last, with a group of friends.

W. B.—Yep. The boys who have fallen by the wayside.

Another student has been added to the roll of the Freshman class. As yet his name is unknown, but he appears to be a good scout, so make yourself at home, stranger.

SOPHOMORE NOTES

H. W. Weddle, president of the Sophomore class, has left school and gone to the coast. Mr. Weddle was very well known, both in and out of school and will be greatly missed by a host of friends.

W. B. Tanner, who has been out of school on account of sickness for the past two weeks, is again with us.

Who Did It?

We have met a great many nervy gents, but we hand the nice, new egg poacher to the guy that invites a co-ed to the basketball game and tells her not to forget her student ticket.

Echoes of the Past.

What did you get in —— etc.
The Occurrence of Tin and Precious Metals in Butte

(Continuation from last month of a paper by Murl H. Gidel, presented to the Montana Society of Engineers at Butte, Montana.)

Occurrence of Precious Metals. Silver. In the veins immediately outside or contiguous to the zinc zone of the Butte district, silver minerals have been recognized in greater quantity than in the ores of the copper zone. But, in the most rich copper silver ore was mined from the upper levels of the copper mines, and specimens of bornite and glance have been found showing native silver along joints and cracks, in some cases occurring to considerable depth.

Native silver and cerargyrite or silver chloride have been found in the oxidized portions of Butte veins. Also, native silver occurs in leaf, wire and moss form along joints and cracks, and in vugs in the so-called secondary zone below the oxidized zone sometimes occurring as deep as 60 feet. These minerals, along with argentite, are secondary, this enrichment in the upper portions of many of the veins having been such as to make the mining of same profitable for depths of 100 to 200 or more feet.

The double or sulphantimonites and sulpharsenites of silver constitute the chief silver minerals occurring in the veins below the so-called secondarily enriched zone. The minerals of this type which have been recognized are pyrargyrite or black ruby silver, stephanite and polybasite, known to the miners as "brittle silver," and proustite or ruby silver. The first three minerals are combinations of silver, antimony and sulphur, and proustite contains silver, arsenic and sulphur, 2Ag,S,As,S. The intimate association of these minerals with galena, sphalerite, rhodochrosite, rhodnote, quartz and pyrite suggest them to be primary minerals, as does also the double chemical combination. They occur in the outer rim of the zinc zone, but no doubt are the same minerals which occur in greater quantity in the copper ores. The accumulation of antimony in the copper anode slimes suggests this, even allowing for the assumption that a small percentage of tetrahedrite exists in the copper veins, for the tetrahedrite when occasionally found always contains higher silver values than the other copper minerals.

The Butte copper ore contains about 0.6 of an ounce of silver for each per cent of copper present, or about 2 ounces per average ton of ore smelted. This appears small, but for the enormous tonnage of ore handled, the Butte district ranks first in the production of silver.

The mine run of zinc ore from Butte veins contains four to 30 ounces of silver per ton, which is recovered ultimately from slimes and precipitates accumulated from the treatment of zinc ores in Great Falls. The occurrence of tellurium and selenium in small quantity in the copper anode slimes also suggests a possible combination of silver and gold or both with these elements. Specimens of such have never been found in the Butte veins.

Gold. Native gold, like silver, is a secondary product and is usually deposited or concentrated in the oxidized zone through the agency of ferric and ferrous sulphates, ferric sulphate in the presence of chlorine being a solvent and the ferrous sulphate being a precipitant of gold. Gold is a constituent of high grade silver sulphide ores such as has been mined from the Goldsmith, Salvadore and Star West veins. These ores mined in the past contained up to one ounce of gold per 50 ounces of silver per ton.

In the copper veins, specimens showing native gold or bornite and glance have also been found well below the oxidized zone. No telluride specimens have been found in Butte, but it is quite likely, however, that the gold is associated with tellurium in the sulphide ores, tellurium being a constituent of anode slimes resulting from the refining of Butte copper. In the Butte copper ores gold occurs to the value of only 12 to 15 cents per ton of ore, or about three or four times the amount contained in sea water. However, from the large tonnage of ore smelted, the recovery of gold is quite an item in the resources of the producer.

Butte zinc ores are richer in gold than the copper ores and contain 40 to 80 cents in gold per ton.

Platinum and Palladium. The occurrence of relatively few molecules of platinum-palladium per ton in Butte ores gives no clue as to its mineral association. The origin of commercial platinum deposits in the world, chiefly placer, have been traced to basic or gabro-peridotite-serpentine rocks. At the Rambler mine in Wyoming, sperrylite or PtAs, was found in small quantity associated with covellite. This copper ore which occurs in a vein in granite assays from 0.6 to 1.4 ounces platinum per ton. The occurrence of much arsenic in the Butte copper ore suggests the presence of the traces of platinum to be possibly in the form of sperrylite. Palladium seems to be a natural associate of platinum, for in general it is a by-product of platinum refining. Brief of Electrolytic Refining of Copper. Since the milling and smelting...
the Ore Diggers let Commers of Mount St. Charles get away for seven field baskets from the sidelines and well out on the court.

The contest the following night with Intermountain Union was a decidedly rough exhibition from the very start that members of the Panther team were going to use their big advantage in weight at every opportunity and that the official would not call them closely for anything they attempted. In fact, the referee seemed to enjoy the football as much as did any of the spectators.

A brief summary of the games played during the past few weeks is given below.


Ricks college, of Rexburg, Idaho, exhibiting a surprisingly improved form over the night previous, evidenced matters with the Ore Diggers at the Butte high school gymnasium, January 10, with a victory of 25 to 13. Wednesday evening the Miners kept in front of the Gem Staters at all points of a fast performance, winning by a score of 17 to 12.

The contest, rough in places, brought out an almost complete reversion of form on each side. The Miners floor work was fast and their defense stiff, they were unable to find the Bozeman hoops.

Murphy, in the first half, registered the only field goal for the Mines, while Walsh and Havey are each credited with a free throw in the second half. Matlock and Havey played a great game at guarding. Coach Mc-Allister used all his substitutes in an attempt to start the scoring, but in the second half the Mines went without a field goal.

The Bobcats played a consistent game. Hartwig, center, led the scoring with five field baskets. Coggwell and Hartwig at all times guarded closely, thus preventing the Mines' men from scoring.

Bozeman, 23, Mines, 4.

On January 20 the Bobcats again defeated the Mines, 23 to 4, in a game of many slow periods. Though the Mines' floor work was fast and their defense, they were unable to find the Bozeman hoops.

Murphy, in the first half, registered the only field goal for the Mines, while Walsh and Havey are each credited with a free throw in the second half. Matlock and Havey played a great game at guarding. Coach Mc-Allister used all his substitutes in an attempt to start the scoring, but in the second half the Mines went without a field goal.

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Anacoda, 13, Mines, 12.

On January 15 the Mines basketball team journeyed to Anaconda to meet the Anaconda Independents. The game was featured by the brilliant floor work of the Mines' squad and the exceptional shooting of McDonald, Anaconda forward.

When the final whistle blew the score was tied at 12-all, so an extra five-minute period was necessary to determine the winner.

The extra period was fast and furious, but neither team was able to score from the field. With only two minutes to go, a foul was called on a Mines' man and Ahern made good the free throw, to give his team the point that won the game. The final score was, Mines, 12; Anaconda, 13.

Bozeman, 23, Mines, 11.

On January 19 and 20 the Ore Diggers played in Bozeman, meeting the 1928 championship of the Montana State College Bobcats. The Ramsey aggregation had in their lineup DeWald, Hartwig and Hatfield, sensational players from the previous year, and in addition Floyd Romney, Coggwell, Lynn and Cottam, new performers of real class.

The first night the Miners gave this star cast a strong battle, displaying a smooth passing and guarding game that brought out much favorable comment from the sideline critics. However, when it came to hitting the ring the advantage all lay with the Bobcats, who were able to connect often enough to run up a total of 23 to 12 in the two fast halves of play.

The four guards, Matlock and Havey for the Mines and Hatfield and Hartwig for the Bobcats, turned in exceptionally fine performances.

Mines, 22, Intermountain Union 12.

Thursday evening, January 31, the Ore Diggers ran up an easy 22 to 12 victory over the Panthers of Helena at the Butte high school gymnasium. The Mines' floor work was fast and well executed, as was their ability to keep the Panthers from holding the ball for any length of time. Because of the Panthers' weak guarding and their confusion in being unable to solve the Miners' fast team combination, the Ore Diggers were given many chances to try for field goals, but were unable to find the net in many of their tries. The Panthers at times seemed to promise stronger action, but then their throws at the basket were poorly executed and went wide.

Walsh and Havey starred for the Miners. Walsh counted six points on field goals, and Havey counted two field goals and three free throws for a total of seven points. For the Panthers, Ilman and Wilkins tied the scoring honors, each making four points on field goals.

Mount St. Charles 33, Mines, 17.

Saturday night, February 8, Mount St. Charles College won a fast game from the School of Mines in the college gymnasium by a score of 33 to 17. The Ore Diggers, although having many easy shots, seemed unable to find the net. However, Walsh, right forward, led the scoring for the Miners' by making three field goals and placing one free throw, for a total of seven points. The first period ended with a score of 19 to 6, favoring the Saints.

The game became more evenly matched with the start of the second half. The Miners began to hit the hoop and their guarding became more effective. The Saints gained 14 points during this half and the Mines 11. During this period the game became rough and fouls were numerous.

Mines 20, Intermountain Union 12.

Before a large crowd of fans, the Ore Diggers' quint defeated Intermountain Union the evening of February 9, by a score of 20 to 12. The contest, held in the Helena high school gymnasium, was hard fought, and because of innumerable fouls the game was slowed down at nearly all stages. A noticeable feature was the fact that nearly all scoring was made through long and spectacular tries at the basket.

Gene Havey, Mines right guard, showed prominently by slipping up from his guard position at different periods of the game and succeeded in placing four field goals. Matlock, left guard, also featured by making an exceptionally strong defense.
MINES ASSURED OF NEW GYMNASIUM

(Continued From Page 1.)

and being used as a general exercise room.

The entire second floor, with the exception of the rooms to either side of the entrance, is to be one large floor for general assembly for the students. The floor will also provide plenty of room. This floor will also be balcony, also fitted up as a general exercise room. By the time these are not in use. Bozeman, where he will have a chance to be outdoors and to store equipment and expenses paid to the state contest at Mount St. Charles.

The entire second floor with the exception of the rooms to either side of the entrance, is to be one large floor for general assembly for the students. The floor will also provide plenty of room. This floor will also be used as a place for storing equipment and expenses paid to the state contest at Mount St. Charles.

Walter Adams and Felix Cortez are members of the state association. Barrett, the winner, is now at Mount St. Charles. The winners of the state association will be balcony, also fitted up as a general exercise room. By the time these are not in use. Bozeman, where he will have a chance to be outdoors and to store equipment and expenses paid to the state contest at Mount St. Charles.

We Thought So.

Green—Working my way through college by writing.

Greener—What kind of writing?

Green—Writing home.

A dwarf sees farther than the giant when he has the giant's shoulder to boost up. Coleridge.

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Montana State School of Mines

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ALUMNI STATISTICS

Statistics sometimes are dry and not at all intriguing. Alumni, however, seem always to want to know what the rest of their number are doing. A tabulation of the roster of the alumni of the Montana School of Mines shows that 76% of our graduates have continued in mining or allied occupations, while 24% have entered upon other lines of endeavor. This is of peculiar interest. Only a few years ago 90% of our graduates were in fields akin to mining, while only 10% were employed otherwise.

Forty-eight per cent of our alumni are engaged in mining, 16% in metallurgy, 11% in civic, state and federal work, 1% in electricity, 6% in geology, and, as stated, 24% are in other lines.

There are 51% of engineers, teachers and chemical engineers. The fact that so many of our graduates are turning into other fields than mining, is manager in metalurgy, or geology?

PANNINGS

Walter Landwehr, 22, visited in Butte a few days last month. Walt is geologist for the Mascot Mining company, Hailey, Idaho.

Frank Cliff, '20, wrote in this month from Klamath Falls, Ore., where he is manager of the Woolworth store.

C. V. Wappel, '20, is with the American Smelting and Refining company at Augangeo, Mich., Mexico.

Hamilton Cooke, Jr., '20, has been in Montana and Idaho.

The home of the Robert J. Coles has been brightened by the arrival of a bouncing baby boy. Cole, '12, is geologist for W. A. Clark, Jr., and the Omi Mining company.

Teacher—Johnny, is pants a common noun, singular or plural?

Johnny—Uncommon; singular at one end, plural at the other.

NAUGHTEN IN THE LIMELIGHT

Safety first and first aid work as given by the United States Bureau of Mines is part of the training of every M. S. S. M. graduate. The value of this was well emphasized recently, as shown by the following extracts from the Seattle Post-Intelligencer and the Spokane Spokesman-Review of Sunday, January 13, 1924. James Naughten, is the hero of the story.

James Naughten, assistant superintendent of the Royal Development company, operating 42 miles north of Leavenworth, Wash., recently proved his loyalty to his employes by risking his life to save the feet of one of his men. Communication with the mine is possible only by traveling on foot. The nearest telephone is at the forest ranger's station 32 miles from the camp. Eight men left Leavenworth the 28th of December to pack a thousand pounds of fuse into the mine. By the time they had reached Rock Creek road the camp thermometer had dropped to 38 degrees below zero. There the men decided it would be best to try to make the mine, as the work depended upon getting the fuse.

A distance of 26 miles required 46 hours of solid marching. Ingram and a few minutes to eat at the various road camps. One man broke trail, then pulled the improvised sled, and one held the sled steady. At intervals they changed places. The four men were so far gone from the trip that they were unable to get out of the wagon at Leavenworth. They were in the hospital for several days. The main thing that counted was that they saved the mine. This was largely due to the fact that Jim had sufficient knowledge and experience to render first aid and to know that expert medical attention was required immediately.

The occurrence of tin and precious metals in Butte

(Continued From Page 3)

 operation results in a concentration of copper from ore to metal at a ratio of about 30 to 35, to 1, it is quite obvious that the less volatile elements, such as copper, gold, platinum and palladium will be carried more concentrated, the copper acting as a natural collecting agent of the precious metals. The precious metals found in other or less valuable impurities are removed from the blister or anode copper in the electrolytic refining plant at Butte, Montana.

Following is a typical analysis of the anode copper, which varies from time to time with the composition of the ores smelted:

- Copper 99.25%
- Arsenic 0.60%
- Antimony 0.052
- Nickel 0.050
- Lead 0.053
- Iron 0.058
- Silver 70 ounces per ton
- Gold 0.25 ounces per ton

The important by-product of the refining of copper is silver, for it is the silver which pays the re- refining operation a commercial possibility.

In the electrolytic refining of copper, there are three main steps:

A. Cathode copper.
B. Anode residues and slimes.
C. Impure electrolyte.

A. Following is a representative analysis of zinc anode refined electrolytic copper:

- Copper 99.94 to 99.99%
- Oxygen 0.02 to 0.05%
- Silver 0.001 to 0.003 oz.
- Gold 0.001 to 0.002 oz.
- Iron 0.001
- Nickel 0.015
- Antimony 0.005
- Lead 0.005
-68.4 ounces per ton
- 0.234%
- 0.22
- 0.27
- 0.234%
- 185 pounds, was picked to quite obvious that the less volatile

the sum of the metallic impurities is about 30 or 35, to 1, it is weighing 185 pounds, was picked to quite obvious that the less volatile

the anode slimes vary greatly in composition.

The electrolytic also accumulates impurities in solution which from the anode, the anode impurities sink to the bottom of the tank. The composition of the residue is complex and variable and contains silver, gold, copper, and less than two ounces silver per ton. These tanks are cleaned every 24 days, in which time five or six inches of mud is deposited. This mud is washed, filter-pressed, dried and sacked for shipment to the Kafirland copper works.

The anode slimes vary greatly in composition. The following analysis will give some idea of their content:

- Copper 41.23%
- Silver 12.010 ounces per ton
- Gold 0.234%
- Arsenic 0.848
- Antimony 0.005
- Selenium 1.46, tellurium 0.14, lead 0.26, bismuth 0.20, iron 0.18, nickel 0.02, nickel 0.27.

The electrolytic also accumulates impurities in solution which from the time to time must be removed. The purification of solution gives a slime containing copper and arsenic largely, and less than two ounces silver per ton. These are sent to the reverberatory furnaces.

(To be continued next month.)