

BURNING FOR YUKON GOLD

The Hidden World of Underground Placer Mining
in Alaska and the Klondike, 1898–1901

Yukon-Charley Rivers National Preserve



National Park Service

Edited and Notes by Chris Allan

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\$35,000 PAN OF GOLD DUST, ALASKA

6A-H524

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2022

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Front Cover: “Mucking Thawed Ground in a Drift on 16 Eldorado”—Miners in the Klondike excavate melted gravel to be lifted to the surface, ca. 1898. University of Washington Libraries, Special Collections, Asahel Curtis Photo Co. Collection (CUR1442).

Title Page Inset: Colorized postcard of Alaskan gold dust and nuggets worth \$35,000, ca. 1905. Courtesy of author.

Back Cover: Colorized postcard of fires set in a Klondike drift mine to melt frozen gravel, ca. 1899. The flat stones placed against the wood pile were intended to keep the wood in place and extend the thawing by holding heat. Dawson City Museum (1982.202.27).

Introduction

In the 1880s and 1890s, gold-seekers along tributaries of the Yukon River faced serious obstacles—they had to haul supplies long distances, the summer was vexingly short, and much of the gravel they needed to reach was locked in frozen ground. The last of these challenges limited many miners to working shallow creek gravels during the warm months, while much richer deposits lay deeper underground. Unlike hardrock mining, which extracts veins of precious metal from solid rock, *placer mining* is the practice of separating heavily eroded minerals from sand and gravel; but, miners in the Far North soon realized that the richest gold-bearing gravels, called a *paystreak*, lay just above bedrock and that digging to bedrock was fiendishly difficult.

Beginning in 1882, a few prospectors on the upper Yukon River began using bonfires to penetrate the gravels locked in permafrost, but the practice was not fully embraced until the 1886 Fortymile River gold discovery and the 1893 strike on Birch Creek in Alaska's interior. On April 25, 1897, a reporter for the *Sun and New York Press* was in Circle City, the boomtown near Birch Creek, and explained the approach that was making gold mining a year-round affair. Instead of spending winter in town, he wrote, at least two miners were trying the approach called “burning down”:

They got their claim opened up ready for work in the summer and when the winter came instead of going into Circle City to spend their time loafing around the dance-houses they stuck by their claim. They found that a big fire burning all night would thaw out a couple of inches of gravel. In the morning they would scrape away the remnants of the fire, lug their gravel into their cabin, and at night build another fire. They kept this up all winter, and when the ice went out in the spring they had a big pile of dirt ready to pan. They washed \$16,000 of dust out of that pile of dirt for their winter's work.

This fiery strategy soon spread to the Klondike goldfields, where thousands of people from around the world were rushing to claim their portion of an easy fortune. What they found was hard work and an environment that challenged them at every turn. The journalist Tappan Adney, in his book *Klondike Stampede*, described the scene when the atmosphere around the rich claims on Eldorado Creek took on a hellish appearance:

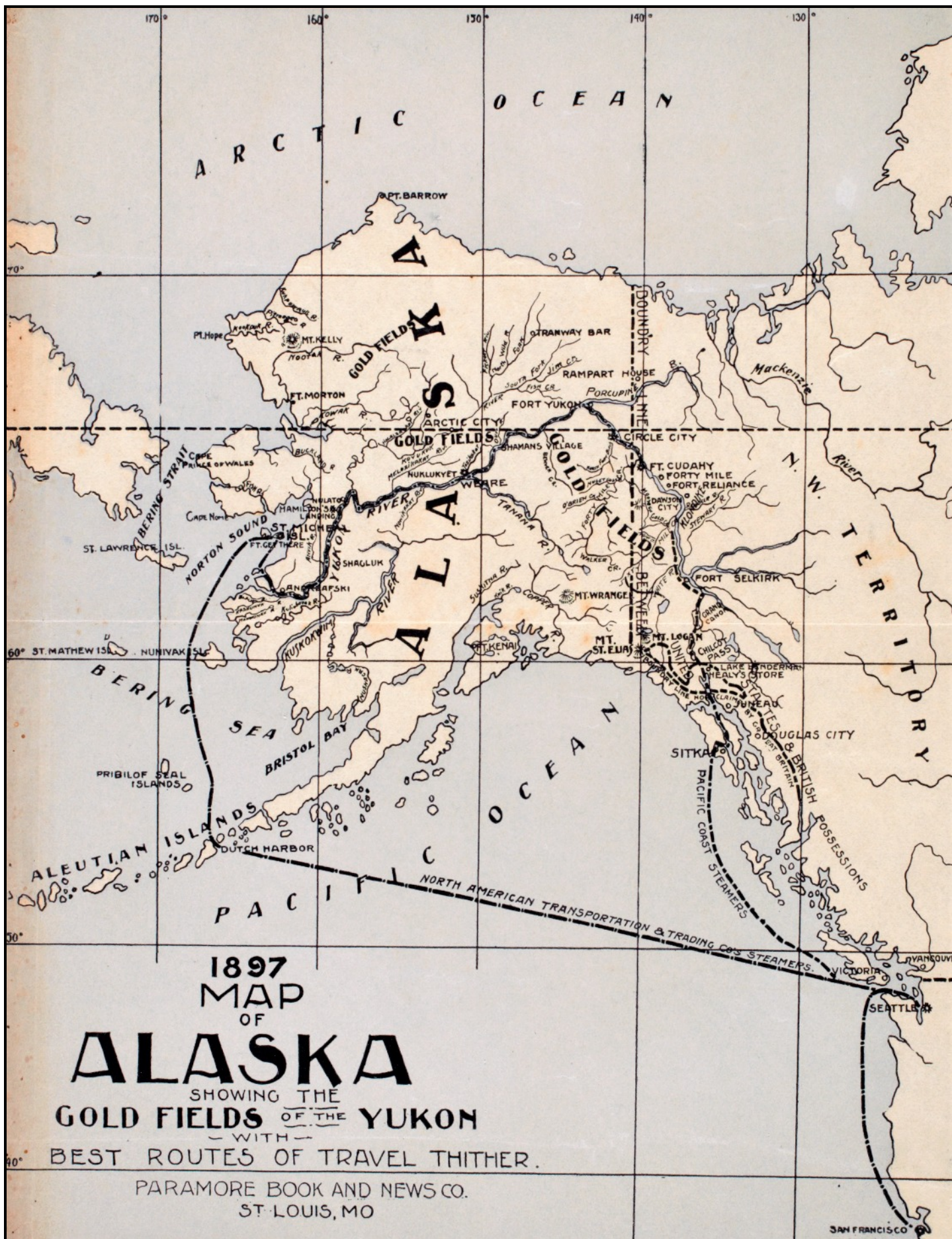
The sun, like a deep-red ball in a red glow, hung in the notch of Eldorado; the smoke settling down like a fog (for the evening fires were starting); men on the high dumps like spectres in the half-smoke, half-mist; faint outlines of scores of cabins; the creaking of the windlasses—altogether a scene more suggestive of the infernal regions than any spot on earth.

This approach to placer mining was called *drifting* because after sinking vertical shafts down to bedrock, the miners dug horizontal tunnels (or “drifts”) to follow the richest gold-bearing layers. Though the permafrost usually held tunnel ceilings in place, cave-ins did occur, as did accidents like heavy buckets falling on the heads of men below. But the greatest threat to the underground miner was residual smoke that irritated the eyes and could blind with prolonged exposure and the noxious fumes that lingered and could kill by asphyxiation.

At first this perilous underworld was known only to the ambitious few who were willing to brave the dark, but before long a handful of photographers took their cameras into the mines. Using flash photography, which was still an experimental technology, they captured haunting images of the miners at work. The photographers Asahel Curtis, Eric Hegg, George Cantwell, and Henry Goetzman documented the action above ground and, when venturing below, used the blinding flash of powdered magnesium to make luminous the stubborn gloom. Their photographs—all taken between 1898 and 1901—are rare because of the challenges of using what they called a “flash-light” in cramped conditions deep below the surface.

The goal of this booklet is not to explain every aspect of underground placer mining in the Far North—rather it attempts a meditation on the subject using excerpts from newspaper accounts and miners' journals as well as drawings, poetry, and photography. Readers will encounter several themes: the dangers of burning down, the use of candles for lighting, flash photography, and the introduction of steam-thawing. These are important for understanding the history of the Klondike-Alaska gold rush in general and the history of Yukon-Charley Rivers National Preserve in particular, where small-scale drift mining continued for decades after the gold rush faded.

Note: This booklet relies almost entirely on photographs taken in the Klondike, in northwestern Canada, even though gold miners faced the same conditions and used the same techniques along the Yukon River corridor and as far north as the Kobuk and Koyukuk rivers. Few examples of underground photography from Alaska exist, likely because, in the early days, the Alaskan goldfields were far from a population center like the Klondike's Dawson City where photographers had studios and customers to buy their prints.





"At the Windlass, 40° Below"—On a cold day a miner hoists paydirt in a wooden bucket from underground workings thawed by fire. University of Washington Libraries, Special Collections, William E. Meed Collection (MEE100).

THREE YEARS IN THE KLONDIKE (1904)

by Jeremiah Lynch

When Lynch arrived in the Yukon goldfields, he was exploring a Klondike River tributary called Hunker Creek and searching for mining properties to buy when he encountered Andy Hunker, the man who had discovered gold there:

In the morning Andy took us over his claims, and gathered a pan of dirt scraped from the bottom of a ten-foot shaft. The pan was washed in a big tub filled with water obtained by boiling ice continually in a pot on the stove. When the pan was emptied of gravel, stones, and dirt, there remained about 5 dollars' worth of coarse gold—lumps, that is, averaging from 10 cents to 50 cents. They looked shining and attractive, despite the cold and bleak surroundings, and I breathed an inward prayer that I might have something of the same kind before long. . . .

After paying 18 dollars in dust for our night's lodging [at the roadhouse], sleeping in our own robes, and having for food poor beans, bacon, coffee, and bread, we left about eleven. Up from the narrowing valley rose spirally clouds of white smoke, obscuring and perceptibly warming the air. These clouds came from the burning wood used for thawing.

Every half-mile we met a group of heavily-clothed men working round a shaft. The shafts were 6 feet in diameter, and seldom timbered. Wood—mostly birch, for that lasts longer—was placed in the bottom of the shaft, loose dirt thrown on top, and then the wood was lighted. It burned and smouldered ten hours before being entirely destroyed. This process warmed the gravel below to a depth of 2 feet, which was at once taken out by miners and the process renewed.

The dirt was removed by means of a windlass and oddly-shaped bucket, the latter holding 150 pounds; one man below to pick and shovel it in, and one at the windlass. It seemed pitiful to see a man standing on the frail platform, slowly turning the tedious windlass in a keen, biting atmosphere 45 degrees below zero. Indeed, as I often thought, these men who come here and work thus deserve all they find, and more.

One man we watched for a while with curiosity and sympathy. He was working entirely alone. Down a slender ladder he would descend twenty-five steps to the bottom. Filling the bucket, he would then ascend the ladder, windlass the bucket up wearily and painfully, and then down again to repeat the process, like the toils of Sisyphus. He did not stop to speak or rest as we looked on, but silently and steadily continued his labours.

We were told later that he was a carpenter from St. Louis, who had a 2,000 dollar mortgage on his home there, where lived his wife and young children. If not paid in the spring the mortgage would be foreclosed. Hence his fierce, tireless efforts to extract the gravel for the spring wash-up. No one would work for or with him, for it was doubted if that ground contained much gold. We went on with a silent wish and hope for his success. I never heard of him afterwards, nor of his success or failure, although I made inquiries. People disappear in this country like a pebble in the water, and with equal suddenness.



Miners hauling and splitting spruce logs to fuel fires in two drift mining shafts. From a glass slide in author's collection.

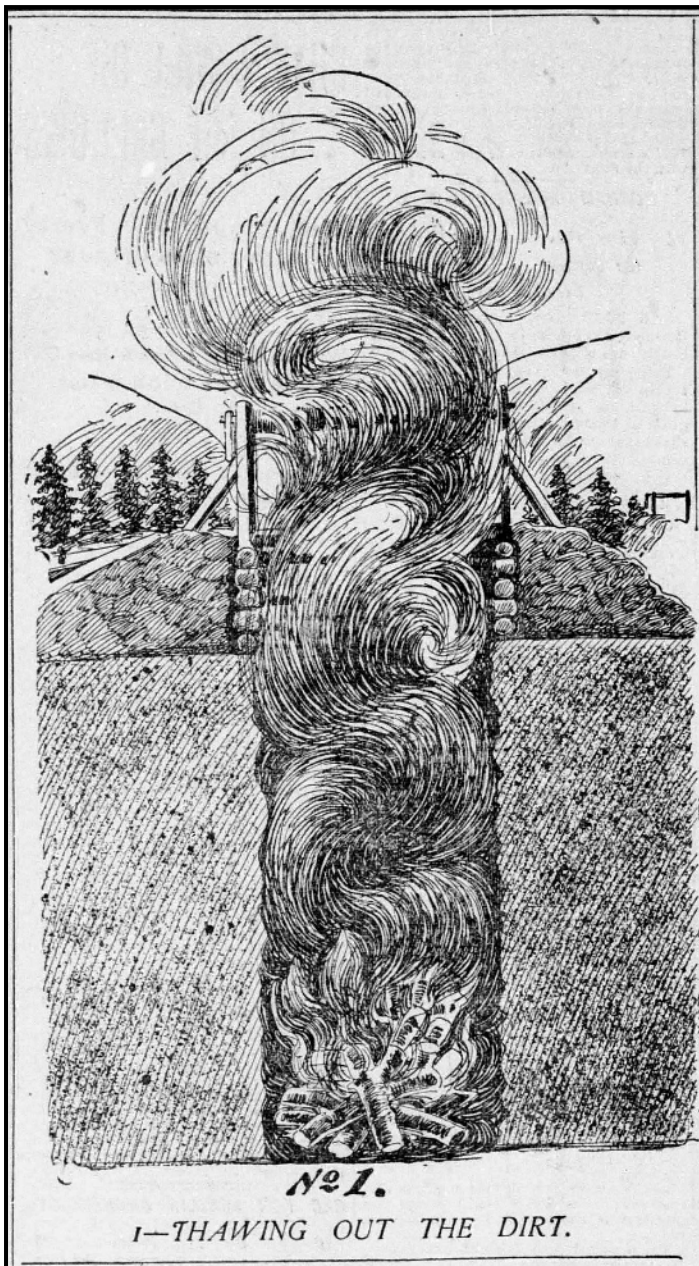
THROUGH THE YUKON AND ALASKA (1909)

by Thomas A. Rickard

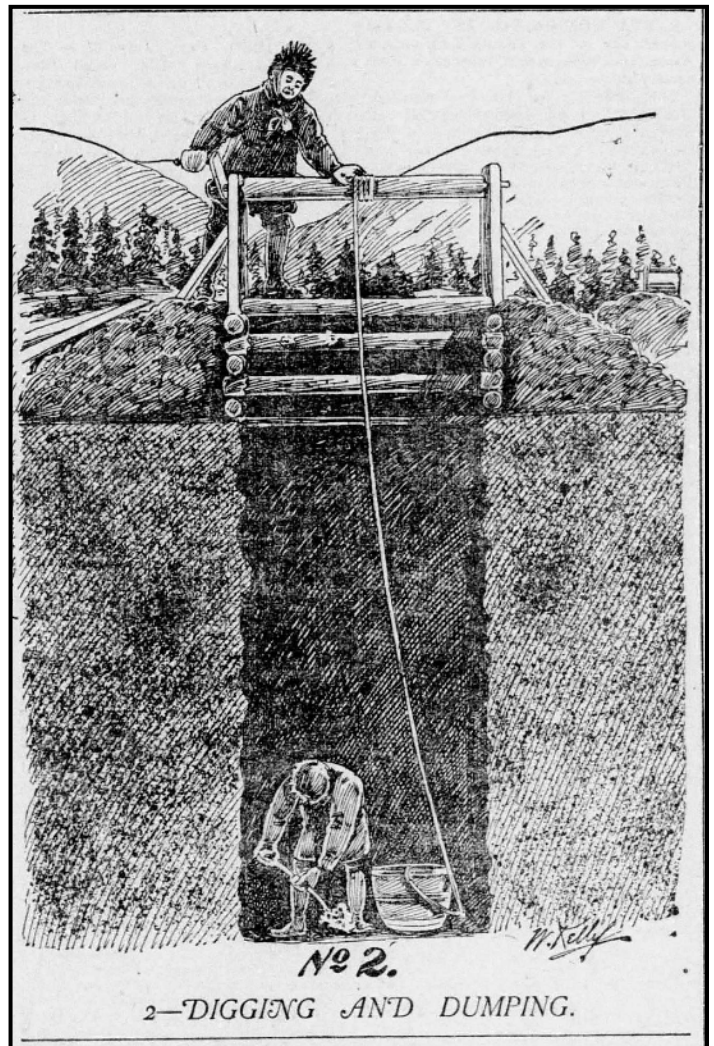
As a mining engineer, Rickard had a professional, largely technical interest in the new northern goldfields, but his writing skills also made him an effective journalist. Here he explains how the Klondike goldfields differ from others he had visited:

There was no noise, for there was no machinery; there were no whistles to announce the noon hour or the evening rest; there was no drilling in the hard rock nor cheerful hammering. A weird silence brooded over the wastes of snow. The gloom was thickened by a pall of smoke escaping from holes in the ground, whence an occasional figure issued. Not many men were visible, for they were below in the rabbit warren of their diggings.

At the top of a shaft, here and there, a weary gnome might be espied turning a windlass and emptying buckets loaded with dirt that came from a small pit beneath. The flare of red fires parting the twilight marked the beginning of the work of shaft-sinking. The snow, the moss, and the fog muffled every foot-fall, deadened every sound. It looked like hell—but it was freezing.



Drawings from: San Francisco Call, July 28, 1897





Men banking firewood and flat stones against the face of a drift mine tunnel. Once on fire, green wood called "lagging" slowed the burn so that it lasted all night. Top-bottom: Dawson City Museum (1994.279.53) and University of Washington Libraries, Special Collections, Asahel Curtis Klondike-Alaska Collection (CUR1817).



WORKING A CLAIM IN THE KLONDIKE REGION

Plain Dealer, Cleveland, Ohio, January 2, 1898

Henry W. Elliott was an artist and government official well known for his attempts to save the northern fur seals that breed on Alaska's Pribilof Islands. Here he explains the hazards and inefficiencies of wood-fire thawing and predicts that a new strategy will emerge:

I have made frequent reference to 'thawing out' in these gravel shafts and drifts. This is done by fire and the fire is made of short wooden faggots. I do not find myself able to adequately describe the discomfort and misery of this particular form of mining up there. Strange as it may seem, the summer work of the drifting is the worst—the fires do not draw as well, then, and the great increase of water in the shafts makes it exceedingly disagreeable in addition to the smoke. When the winter season sets in, there is but little water released in thawing these holes, and the fires burn much better.

In the first place this wood is chiefly spruce, and is highly charged with balsam. It burns with an intense heat and dense acrid smoke, which fills the strongest eyes at once with tears, even to closing them; and it also gives out a carbonic gas, that in the low levels will quickly overcome life, if it is trifled with. It must be carefully guarded against.

You will naturally ask why should the miner employ such an unpleasant and dangerous agency to loosen the dirt? Why not confine himself to his pick? For the simple reason that the frozen gravel resists his pick ax as so much sandstone or slate, and unless he has a full equipment of anvil and bellows, with a supply of charcoal or coal, to forge anew every hour or two the points of his tools, he cannot continue to work with them.

Therefore the prospector opening up a new claim far away from a settled camp or base of supplies, must preserve his tools—they cannot be renewed except at long intervals, and these intervals in Alaska mean the utter loss of a year to him. Hence, the primitive use of wood fire, with all of its power, and its annoyance and physical misery, is invoked by the Yukon miners. They go about it, all of them, in the following manner:

The surface moss, sphagnum, stumps, etc., being removed from the gravel bed over a circular space, say, eight or ten feet in diameter, then a fire is made of cord wood sticks and logs cut in lengths of five or six feet. The fire is so laid that it burns for several hours. The fuel then consumed, and the ashes growing cold they are raked off, and the moist steaming gravel under this recent bed of coals will be found thawed out mellow [meaning soft and loamy soil], down to a depth of two or three feet. This earth is then shoveled out into a particular 'dump,' being duly sampled by the pan, so as to record its value as 'pay dirt.' Another fire is then laid on the frozen surface below; another rake off of ashes and another record made of the second thawing. So on the work proceeds to the bottom of the ground bed.

Thus far, and in so far as sinking by this procedure of fire, a hole straight down into the frozen dirt, goes, the work is not disagreeable or very tedious. Two miners can have half a dozen shafts thawing at the same time, if they want to hustle, and manage to get a good many cubic yards of gravel out every working day from these simple shaft holes. And they can get in this manner a much wider understanding of the value of the frozen dirt under their feet than would at first seem possible.

But the tug of war arrives when these men are compelled to drift with fire. Then the draft fails, and raking off the coals and half-consumed, smoking pieces which the miners cannot wait for the entire burning of, becomes exceedingly trying to the workmen. The difficulty increases in geometrical ratio as the drift deepens under the surface and away from the shaft. It finally becomes so slow and difficult to use fire by the time ten or twelve feet have been so thawed on the pay dirt level away from the opening of the shaft, that work in the opening must close, and a new shaft is sunk to meet it by drifting back in the same way that this one has been operated.

The smoke and wood gas are bad enough in all seriousness, but they are not all the drawbacks to 'drifting' for gold in the Yukon region. The fire in thawing this earth so hard frozen up there since time everlasting, causes a steady flow of water to trickle down the shaft and drifting walls of the opening during summer. The miners must bail and pump this out with steady and unflinching attention or constantly lose their fires. In new and remote claim work this labor of pumping and lifting the water is done by bucket and chain pumps, all operated by hand.

But as the Klondike district develops, I believe that steam will be used to thaw the 'drifts' out, and as the pumping power. When it is definitely understood, as it may be by the lapse of next summer, that the Klondike region is a rich and extensive placer district, there will be many applications of steam to the frozen gravel beds and their drainage. Of course, if it is nothing better than the Forty Mile creek district on the Yukon above, or Circle City below, then that costly application will not pay; and it will not be undertaken.

The thawing of such hard frozen dirt, as that now uncovered in this region, will never be continued on the present crude and tedious plan, for if it is really a rich deposit over considerable areas, steam is sure to be employed and electricity for light in the shafts and drifts. This aid will increase the output per man tenfold and make the district a famous camp.



Miners fill buckets of gravel and slide them along wooden rails toward the mine's exit. Dawson City Museum (1983.181.35).

"The miner's light is pre-eminently the candle, which is used in a special candlestick of steel, with a point to thrust into the face of a bank of earth, and a hook for hanging to a nail in the wall." —Tappan Adney



Cramped work at the Lee Brothers Claim on American Gulch. Dawson City Museum (1999.15.5); an 1899 patent design for a candlestick with a prominent hook by William H. Pleasants of Victor, Colorado.

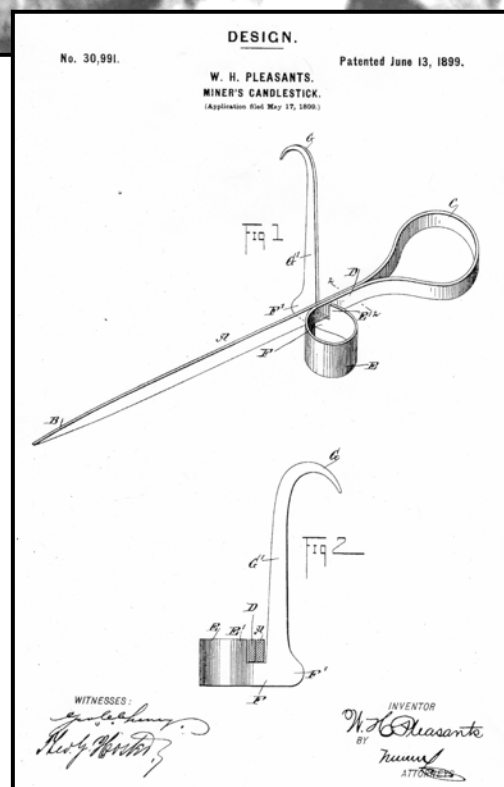
A MINER'S CANDLESTICK

The Silverton, British Columbia, August 11, 1900

Oh, my old candlestick, you're my constant friend
Down under the ground where the shadows blend,
And a man's shut away from the God's good light,
From the blush of dawn to the hush of night;

.....

A drill makes the music that rings in his ears,
But a candle's the charmer to drive away fears,
Down deep underground where grim shadows are thick—
Here's to you always, my old candlestick!





"Following the Paystreak Underground at 44 Bonanza Below"—Miner's candlesticks in the walls of this drift tunnel can be seen on the left and at center-rear. Dawson City Museum (1984.216.19).

A PURPOSE UNINTENDED

Territorial Enterprise, Comstock, Nevada, January 23, 1869

For decades miner's candlesticks were so commonplace that newspapers seldom mentioned them and miners did not bother to write about them in journals. The humble candlestick normally made headlines only when it was used in fights—here is an early example of one such altercation in Nevada:

Yesterday afternoon, Stephen Quick, a car-man in the Imperial [gold] mine, ran his car against a miner, who, becoming enraged thereat, pitched into him pretty thoroughly and stabbed him in two or three places about the body with a miner's candlestick. He also made one stab which took effect in Quick's nose, the stem of the candlestick passing clear through that useful and ornamental organ. The steel prong of a miner's candlestick is about as long, and as sharp, and produces the same kind of a wound as an Italian stiletto.

Editor's note: Gruesome reports of this sort appeared in newspapers throughout the American West. In 1906, in Alaska's Ready Bullion Mine on Douglas Island, a miner entered the hospital "suffering from a very painful wound in the shoulder, inflicted by a miner's candlestick" and some years later a miner named Sam Vuck stabbed his foreman through the arm in Juneau's Perseverance Mine. Meanwhile, a judge in Los Angeles declared the candlestick a "concealed weapon" in an effort to prevent California miners from skewering each other. Douglas Island News, August 22, 1906; Daily Alaska Dispatch, May 18, 1915; and Los Angeles Herald, August 8, 1911.



"Going Down the Shaft"—In a series of three images the photographers Clarke and Clarence Kinsey illustrated the dangers of underground placer mining. Not only were miners threatened by smoke and carbon monoxide during winter work, they also faced gasses from decaying vegetation in the warmer months. Either one could be lethal. University of Washington Libraries, Special Collections, William E. Meed Collection (MEE145).

TAKING GOLD FROM DUMPS

San Francisco Chronicle, July 7, 1899

A Dawson miner named Harry Hunt reflects on the hazards of burning down:

It is a sort of carbonic gas and is generated in large quantities when wood is used for thawing. In cold weather its pressure is not detected, but with the thermometer anything above the zero mark it is very unpleasant to work in the drift, unless two or more shafts are connected giving ventilation, and even then at times it is impossible to work. Several people have lost their lives through it, and everyone who has worked underground here has suffered more or less from it.

The first effects of the gas is upon one's eyes. The vision becomes impaired and on looking at a lighted candle the light appears blurred and indistinct like a street lamp in the fog. When a man experiences this he should go at once to the surface, for shortly after this the eyes become hot, and inflamed, water runs from them and they feel as though on fire. The only sensation I have experienced that I can compare this to is getting hot coal tar in one's eyes. Applications of hot tea leaves will in some cases bring relief, but the only cure is to keep above ground in the fresh air. The effect will wear off in a day or two but after one has been caught once one is very susceptible to its influence.



"Overcome by Gas, the Rescue"—Here the unfortunate miner is lifted to the surface with the bucket raised by a windlass. Museum of History & Industry, Seattle Historical Society Collection (SHS15076).

TRIP OVER THE TRAIL OF '98

This excerpt is from an account by the miner Frank A. Skog about his first year in the Klondike. The manuscript is held at the Alaska and Polar Regions Collections & Archives at the University of Alaska Fairbanks:

When we got back to our claim I went down into the hole with my pick and shovel and miner's candlestick. I lit the candle, stuck it into the ground, and started to work. I was a Sourdough now, having seen the Yukon break up, and knew quite a bit about prospecting and mining, so when the candle flame got smaller and smaller, I knew what was happening. The bottom of the hole was filled with gas, and no oxygen! I yelled for the bucket and held my breath as much as possible, then stepped into the bucket and yelled, 'Hoist!' I could have easily lost hold on the rope and fallen back into the hole, but I didn't. As I approached the surface I took a deep breath of fresh air and got out all right. We later removed the gas from the hole by raising and lowering the bucket rapidly to ventilate.



"Overcome by Gas, the Resuscitation"—Left to right: George Archer, Asa Thurston Haydon (feigning unconsciousness), and Clarence Kinsey. University of Washington Libraries, Special Collections, William E. Meed Collection (MEE146).

THAT DEADLY GAS

Klondike Nugget, November 8, 1899

News reports like this were common but failed to cool gold fever:

James Shotwell, who owned a one-half interest in a bench claim opposite No. 42 lower, Bonanza Creek, is the last man to fall a victim to the fatal gas which has cost so many lives. Shotwell and his partner, John Hemsley, had a shaft sunk 110 feet on their claim and on Friday last the former went down to place a fire. Late in the afternoon the fire had gone out and Shotwell went down to replace it. When at the bottom he called to the men above to hoist, but was unable to hold to the rope. Hemsley and several bystanders raised the rope and the former immediately started down, but was unable to proceed but a short distance and was forced to have the men pull him back. The next day Shotwell's body was recovered. He was from Linden, Michigan, and a member of the Masons.

YUKON RIVER WILD CATS

San Francisco Chronicle, July 24, 1898

Here a miner named Ben S. Goodhue describes the challenges of living and working in the Far North, including frostbite:

It is difficult to mine alone in Alaska. You should have at least one partner, so that you can work to advantage, alternating in the hole and on the windlass. Old California miners find the process of mining in Alaska a revelation. Nature, instead of aiding, is in opposition during nine months of the year. During the sluicing season the methods are about the same as employed in placer mining in California. At nearly every turn obstacles must be overcome by human energy.

In sinking a single shaft you consume from five to fifteen cords of wood in burning down to bedrock. This wood must be cut often when the temperature is 40 to 70 below zero. Green wood is the best for sinking, as it burns longer. In drifting, dry wood is necessary, with a covering of green logs to confine your fire in bringing down the pay dirt only, avoiding the handling of much waste. A drifting fire is a nice piece of work, resembling the fires in a charcoal pit if properly made. The amount of preparation before beginning to mine is considerable.

In a country where tools are so scarce you are often compelled to depend upon your ingenuity alone. In fact, you must resort to a couple of oil cans if you want a stove, fruit cans joined together by swelling the ends if you want a stovepipe, stripping a birch tree if you want a broom, corrugating a slab if you want a washboard, etc. Before you commence you need rope, ladders, windlass and frame, a bucket for hoisting dirt, a mud box for panning and a cabin to live in.

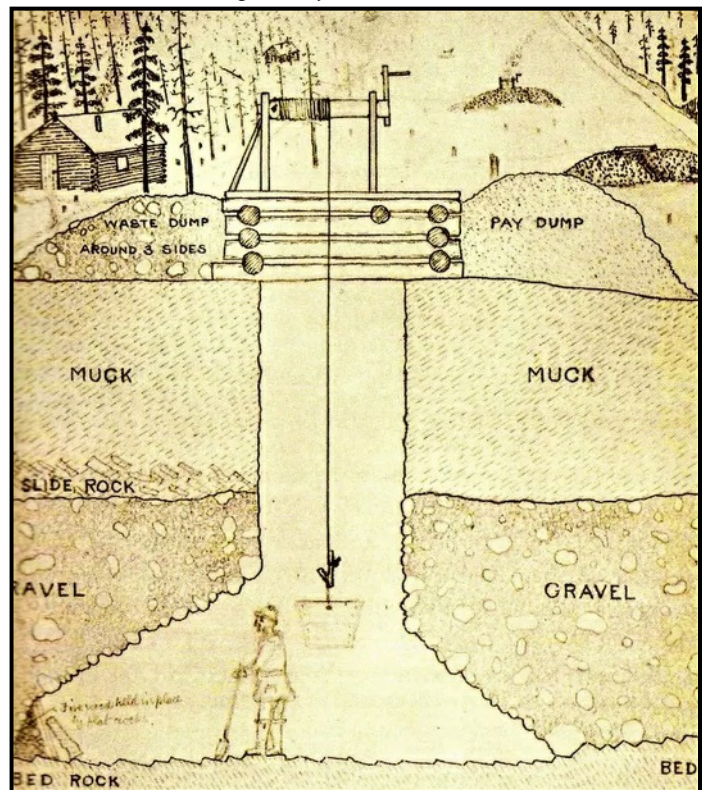
With these preparations completed, you can go to work. Sinking is easy compared to drifting. In this work, if you have any physical weakness it is sure to assert itself. The work is hard enough, but to endure the stifling gasses, affecting the eyes, heart and respiration, will severely test your staying qualities. I am blessed with a pair of strong lungs that were taxed to the fullest extent to keep the machinery in motion.

I could often feel, almost hear my heart beat with a heavy pounding and was often compelled to grope and feel my way to the shaft to be hoisted as quickly as possible by the man on the windlass, who stood by in case of such emergency. In our drift we were finally compelled to dig an air vent at the expense of an infinite amount of labor. To my surprise I seemed to bare the strain well. After his being in the last drift a week or ten days, Mr. Taylor's eyes gave out, becoming bloodshot and affected almost to blindness from which he recovered very slowly.

In places I found some very rich dirt. To pick up nuggets to the amount of thirty to forty dollars in a space as big as my two hands was something of a solace. Windlass work is also hard on a man, generally laming the back severely until he becomes accustomed to it. As you are constantly exposed to the cold, you are apt to freeze your hands or feet. I experienced the sensation of a frozen nose one day while at the windlass while the temperature was down to 56 below zero. There is no real pain, however. The member feels unusually long, turning white, and gives the impression of being appended somewhat misplaced on my countenance.

The old method of rubbing snow to take out the frost is not as good, I believe, as to rub the frozen part with a dry woolen. If you are wearing a woolen mitt and your nose or face is frozen, rub it with that . . . All that is necessary is to restore the circulation. If this can be done without creating moisture you will have no further difficulty.

Drift mining diagram from Basil Austin's The Diary of a Ninety-Eighter (1968). The writing at the thawing face says, "Firewood held in place by hot rocks."





"Underground on #16 Eldorado." University of Washington Libraries, Special Collections, George G. Cantwell Photographs (AWC3860).

THROUGH THE YUKON AND ALASKA (1909)

Here Thomas A. Rickard explains how permafrost aided placer gold miners and made small-scale mining efforts possible. While miners often located gold on their own, they usually formed partnerships or hired laborers to help with developing a claim:

The 'frost,' indeed, was the miner's friend. It enabled him to sink a shaft even in the bed of the creek; it permitted him to dispense with timbering; it allowed him to burrow with safety and to follow the layer of golden gravel with impunity under the ice-bound surface. Moreover it obviated work on a large scale. One man could, and sometimes did, work alone, descending the shaft, filling the bucket, ascending to the surface, hoisting the load, and so forth. No machinery was needed save the simplest tools; no organization was required, beyond a willing partner; no capital save muscle.



"RUBBERING" DOWN A MINING SHAFT.

PHOTO BY C.F. ROSTEDT

"'Rubbering' Down a Mining Shaft"—This photograph shows people peering, or "rubbernecking," down a frost-encrusted mine shaft. The duct on the left with the ladder is intended to improve ventilation. Dawson City Museum (2006.33.1.295).



"Underground by Flash Light, 80 B. Below Bonanza." Alaska and Polar Regions Collections & Archives, Selid-Bassoc Photographs (1964-92-306). At lower-right the photographer uses a squeeze bulb to simultaneously ignite the flash (with the battery in a case) and trigger the camera shutter.

AN EDITOR'S NOTE ON FLASH PHOTOGRAPHY

Photographers began using "flash-lights" in the 1860s to capture images where light conditions were poor—like in their own studios—or in complete darkness. After much experimentation, they found a mixture of pulverized magnesium and potassium chlorate, ignited near the camera at the moment of exposure, would produce artificial light similar to the sun. Flash photography soon led to a number of innovations like photographing inside caves or capturing images of wildlife at night. But there were perils to using volatile chemicals and flammable metals; photographers caught curtains and backdrops on fire, scorched their own lungs on the fumes, and were even maimed or killed in explosions.

In the northern goldfields, a flash was essential for photographing inside cramped log cabins, though the burst of flame sometimes caught ceilings on fire where moss was used as insulation. Photographers also wrestled their bulky cameras down mine shafts and, one imagines, battled claustrophobia to document the subterranean labors of men who lighted their way through the gloom with candles. Always in search of the exotic, these photographers advertised their skills by inscribing their negatives (with "by flash-light") and marketing to a public eager to pay for something beyond the known and the ordinary.





"Boulder Hill. Flash-Light Underground"—Henry J. Goetzman worked in Dawson City and, as seen here, he advertised his ability to take photographs using a magnesium flash. University of Washington Libraries, Special Collections, H.J. Goetzman Klondike Gold Rush Photograph Collection (AWC1924).

DOWN IN THE UNDERLAND

San Francisco Examiner, June 3, 1894

Several years before the Klondike rush, the reporter F.B. Millard describes exploration and photography in what is today Oregon Caves National Monument & Preserve:

Down in the underland . . . an abysmal world of blackness and yet of beauty, a serene world of unsounded depths and unmeasured breadth, a world with the sun shut out! . . . From a central view the points of light that came from torch and lantern seemed near enough at hand, but when you came to grope your way over the rough floor toward one of them you found they were not close after all. When the photographers flashed their magnesium light upon their end of the cavern and the whole wall over there stood out in ragged relief, the instant darkness that followed the blinding flash was thicker than ever. It was fairly palpable and incisable.



Adapting to the challenges of underground photography, George Cantwell took multiple shots in this drift mining tunnel to create a composite image or montage. University of Washington, Libraries, Special Collections, William E. Meed Collection (MEE246). On July 25, 1900, the hazards of his work landed him in the Dawson Daily News: "Mr. Cantwell. . . burned his right hand very seriously a few days ago while taking a flashlight photograph. His friends say he has a very bad 'mitt.'"

A WORD OF WARNING

In the early days of flash photography accidents, including fatalities, were so common that one writer issued this advice in the Lewiston Evening Journal of Lewiston, Maine, on January 8, 1898:

The possibilities presented in flashlight photography are destined to make it more and more popular. . . . [However], the abuse of flash powders after they fall into the photographers' hand reflects severely upon their intelligence and good sense. I would urgently recommend to photographers, professional and amateurs:

1. The observance of the greatest care under all circumstances.
2. A thorough series of private experiments before making any demonstrations or taking any flashlight pictures, with a view to acquiring knowledge and confidence.
3. To remember that a flashlight powder is intended to burn when it comes into contact with a flame or a spark; and to keep carefully the powder and the flame or spark separated by a respectable distance until the moment arrives when the picture is to be taken.
4. Never use any flash powder containing chlorate of potash [an explosive]. Accidents are liable to happen, and the fumes are very corrosive, therefore likely to injure curtains, hangings, etc.
5. If you have an assistant, do not intrust to him any part of your flash-powder work, unless he knows the work practically.



"Fourth Tier, Gold Hill, Opposite No. 5 Bonanza." University of Washington Libraries, Special Collections, Eric A. Hegg Photographs (HEG231).

FROM THE DAIRY OF LAWRENCE THIMME

Here Lawrence (or Lorenz) Thimme describes the challenges of thawing frozen earth in the Klondike and of the dangers he faced when spring arrived. The diary is held at the Alaska and Polar Regions Collections & Archives at the University of Alaska Fairbanks:

April 1, 1899: We found several prospect holes started, and we kept on sinking them deeper, which was slow work as the ground was frozen solid, and had much trouble to get wood for thawing it out. . . . A fire only thaws about six inches of dirt and only then when the coals touch the ground and the surrounding dirt stays hard 3 inches from the blaze. While I was picking at the frozen dirt near the blaze, frozen chunks struck my face and drew blood as I was bending over the pick. [Nine days later Thimme wrote], I was just in time to avoid being struck by a cave-in as a result of the melting snow in the fields. I came out of that prospect hole in a hurry.

TO EXTRACT THE FROST FROM THE GROUND— MANY GROTESQUE DEVICES

From William Stanley's *A Mile of Gold* (1898)

It has been said that necessity is the mother of invention. Truly the field is wide enough here to give full scope to the ingenuity for which the Americans are famed throughout the length and breadth of the world. To increase the comforts of life in this frozen land, affords, in itself, a subject that will not be disregarded by inventive minds . . .

Again, there is an unlimited field for some mechanical genius to bring forth a machine or appliance that will extract the frost from the earth with less cost and labor than is necessary at the present time. The man who succeeds in doing this will own a mine of wealth, greater than the entire Eldorado Creek; as the field for the use of such a contrivance is limited only by the North Pole. A number of devices have been invented, within the last two months, for the purpose of doing this. Two in particular have attracted attention, though the general verdict of Yukoners is that they are not practical and will be worse than useless.

One of these is an ordinary upright boiler with a steam jet that is inserted in the ground and the escaping steam is supposed to melt the frost from the earth. A hole is first drilled and the jet inserted, the steam is then turned on and is supposed to thaw the earth for a number of feet around, providing, however, that the frost in the earth does not freeze the steam. Another is by means of a hot air jet. The air is heated and then blown against the frozen ground which it is supposed to thaw. It is generally thought that this machine will prove quite a money-maker, if an exception is made of it by the climate, and it is not frozen up while in operation.

None of these devices have been tested, and the chances are that they are not suited to the work it is proposed they should perform. However, if one of them should prove a success it will cheapen mining to such an extent that most of the mines that have been abandoned can be taken up again and worked at a profit.

DEVELOPMENT OF MINING METHODS— THE STEAM POINT

From T.A. Rickard's *Through the Yukon and Alaska* (1909)

Although several people are credited with inventing the steam point style of thawing, Rickard offers a convincing case for the Klondike pioneer Clarence Berry:

In 1898 Clarence J. Berry discovered that steam could be directed to thaw frozen earth. The steam escaping from the exhaust of his engine had accidentally thawed a hole in the solid 'muck.' Berry noticed this and picked up the exhaust pipe, which was a rubber hose. On applying it to the frozen ground he found that it would thaw the muck so as to penetrate for the full length of the hose within a few minutes. This excited the men who happened to be watching the experiment. All of them at once began to devise a scheme for doing this work effectively.

A rifle barrel was chosen, then a small hole was bored into one side so as to admit the steam. Thus, the 'steam-point' was invented. In its rudimentary form the steam-point was a short length of iron pipe, pointed at one end, and attached to a length of rubber hose, through which steam traveled from a small boiler at the surface. The pointed end of the five or six feet of iron pipe was inserted into the frozen gravel and driven forward gently by taps from a hammer, as the ground was softened by the steam issuing from the orifice at the lower end. . . .

When the steam-point was introduced, the extraction of gravel from the drift-mines was continued in summer, as well as winter, and the production of gold proceeded concurrently, as long as the weather at the surface permitted. The dump accumulated in winter would freeze before spring, necessitating the employment of steam-points before it could be moved. Moreover, the boiler erected for the purpose of thawing was also used for hoisting. Larger buckets and a bigger scale of operation became possible.



"Thawing a Dump"—A worker melts paydirt with steam points after the pile sat frozen all winter at the Eldorado claim near Dawson City. University of Washington Libraries, Special Collections, Asahel Curtis Klondike-Alaska Collection (CUR2034).



A note on the back of this photograph reads, "Albert Covenagle on Gold Hill, 1900. First thawing machine on Gold Hill near Dawson, 88 feet underground." Covenagle is wielding a wooden mallet to tap a steam point into the mining face as the gravel thaws. University of Washington Libraries, Special Collections, Asahel Curtis Klondike-Alaska Collection (CUR1789).

TAKING GOLD FROM DUMPS

San Francisco Chronicle, July 7, 1899

Henry Hunt of Dawson describes steam points and the role of unused rifles in thawing:

The application of steam to frozen ground has been demonstrated this winter to be a practical success, and if sufficient boilers of a few hundred pounds weight are brought in they will entirely supersede burning with wood fires. There are several different systems of applying the steam to the frozen ground, but the underlying principle is the same in all. The most practical in my estimation is a drill made of a piece of three-quarter-inch gas pipe, steel tipped, with one end flattened and shaped like the bit on a rock drill, leaving a narrow slot for the steam to escape. The other end has a 'T' with a plug in it. The drill is connected with the main steam pipe by a rubber hose and is held against the face until it penetrates far enough to stay in place, when it is driven in as fast as the ground thaws.

The drills are usually long and are driven in their entire length, when they are allowed to remain several hours. I have known one of them to thaw a block of ground 6 feet square and 8 feet deep in four hours. Compare this with an average of eighteen inches with a wood fire. . . . Rifle barrels are in great demand for steam drills just at present, and, being of heavier material, are more serviceable than gas pipe. No matter how badly a rifle is rusted the blacksmith at the Grand Fork or El Dorado City, as it is now called, pays \$6 for it. As nearly every one brought a rifle into this country the supply is equal to the demand.

A NEW INVENTION WORKS WONDERS IN KLONDIKE

San Francisco Call, March 4, 1900

Here John E. Doherty, private secretary of mining mogul Alexander McDonald, offers another version of the steam point thawing breakthrough:

The greatest drawback encountered when the Klondike was opened up was the difficulty of mining . . . and this, added to the isolation of the place, made it hard indeed. Everyone knows that the weather in the Klondike is not Washington's Birthday weather in San Francisco—that it is cold there, and that for eight months of the year they are pretty well frozen up, even to the collection of Canadian royalties of 10 percent.

As a consequence of there being such a long frozen period very little could be done during the winter months. Gold was there and men wanted it and they were going to have it. Necessity was there and invention soon followed. . . . By the introduction of the new process, steam thawing, sluicing is not only made possible the year around, but the cost of production is lessened and a great deal more may be accomplished with the same amount of time, labor and capital.

This new method is the invention of Mr. [Simon] Stiles, who has been in the employ of Mr. Alexander McDonald, the Klondike king, for a number of years. Mr. McDonald was the first to use the new process, and since its advent a great many miners have taken it up. The method is quite simple and is easily put into operation at a comparatively small cost. A steam boiler is placed upon the surface and a shed built above it as a protection against the weather.

From the boiler, which may be of any size, according to the magnitude of the operations, pipes radiate, and lead down the main shaft, which is cut as the thawing progresses, until the gravel bed is reached, and then a tunnel is cut at right angles some 400 to 500 feet in length. Down the shaft and through the tunnel a three-inch pipe is run, which carries the steam from the boiler above on the surface. To the end of this pipe is attached a rubber hose especially made for the conveyance of steam—this hose branches out into eight or ten smaller tubes, each of which has attached at the end an iron screw, wedge or point. These points are driven into the frozen gravel or moss; the steam is turned on and the process of thawing takes place.

As soon as the pay dirt has thawed sufficiently it is loaded upon cars and taken to an elevator, where it is hoisted to the surface, there to be run through the sluice boxes. In these tunnels and shafts no timbering is required, as the decayed vegetation is frozen so solid that there is not the slightest chance of a slide. However, after thawing, some of the moss becomes loose and falls away, but as the miners work backward the fallen material does not cut off the exit.

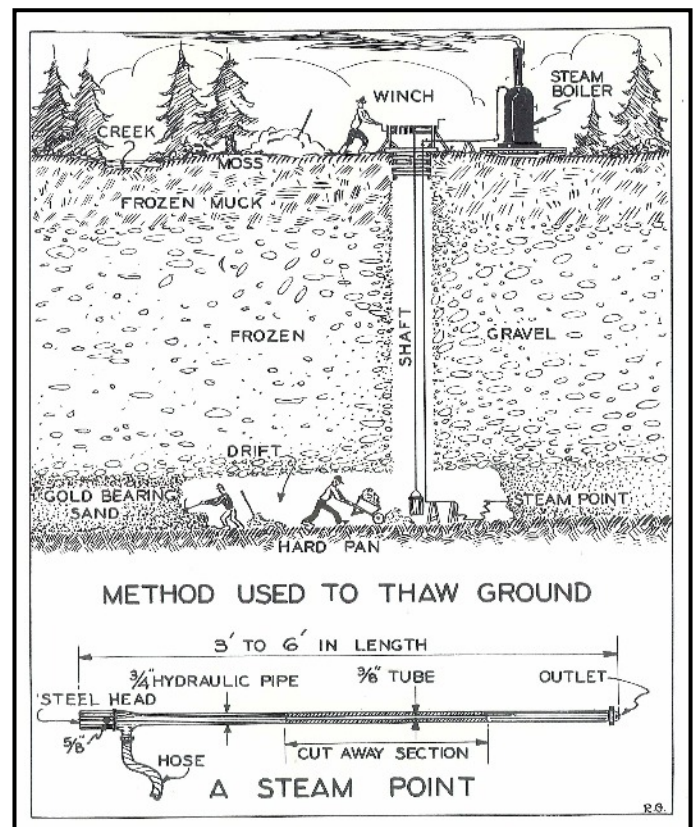
The tunnel is dug and then, commencing at the end, the dirt above, below and at the sides, is taken from the extreme end first, so that, as the miners work, enlarging the tunnel all the time, the earth which falls in occupies a space already gone over by the miners. With the attendant heat of the steam and the length of the tunnel the air becomes scarce and foul. To avoid this air is supplied through a separate shaft dug from the surface down to the tunnel and rising perpendicular to it.

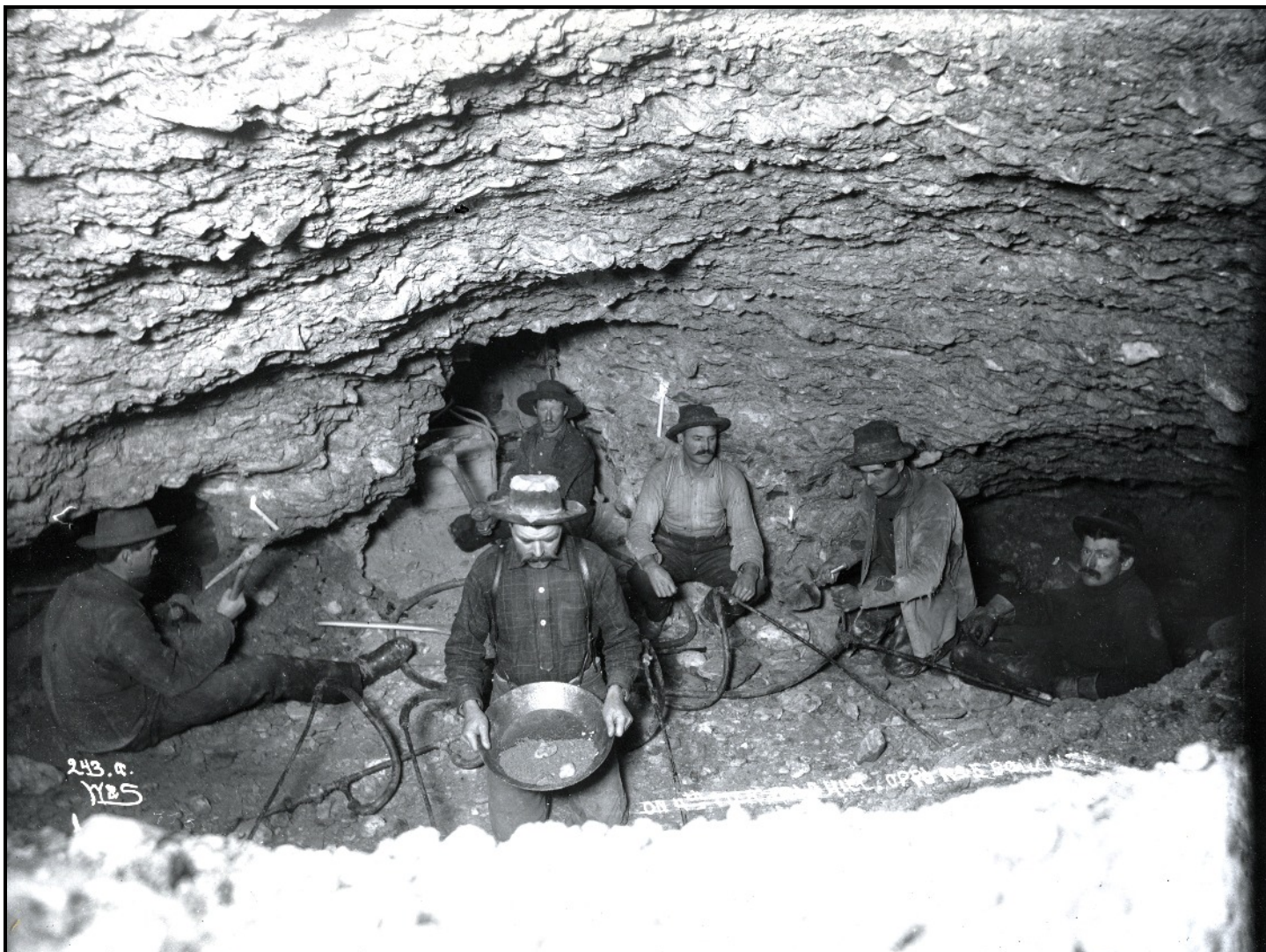
A ten-horsepower boiler will run eight or ten points, or nozzles, and will thaw ten times as much as the ordinary wood fire. The process is as cheap as wood, the fuel used is close at hand, all that is necessary to obtain it being the cutting.

Quicksilver is used very little in these placer mines. The sluice boxes are made long and narrow, with the ripples placed in the bottom of the boxes, running parallel. These ripples are made of two-inch scantling [wood rails] and to prevent the wear and tear of the water and gravel they are covered with sheet iron. They are set two inches apart and are blocked at each end to prevent the gold from running out.

Conditions have changed in Dawson within the past few months and there has been a great reduction in prices, both for labor and supplies, the reduction being brought mainly through increased transportation facilities and the good effects of competition. And then again, the newness of the Klondike has worn off. It is no longer a venture. It is a certainty. It has lost its excitement and has settled down into a position of evenness and advancement.

From: Klondike '98: E.A. Hegg's Album of the 1898 Alaska Gold Rush (1949).





"On 4th Tier, Gold Hill, Opposite No. 5 Bonanza"—Miners in a tunnel thawed by steam points show off two large nuggets in a pan of gold dust. University of Washington Libraries, Special Collections, Eric A. Hegg Collection (HEG232).

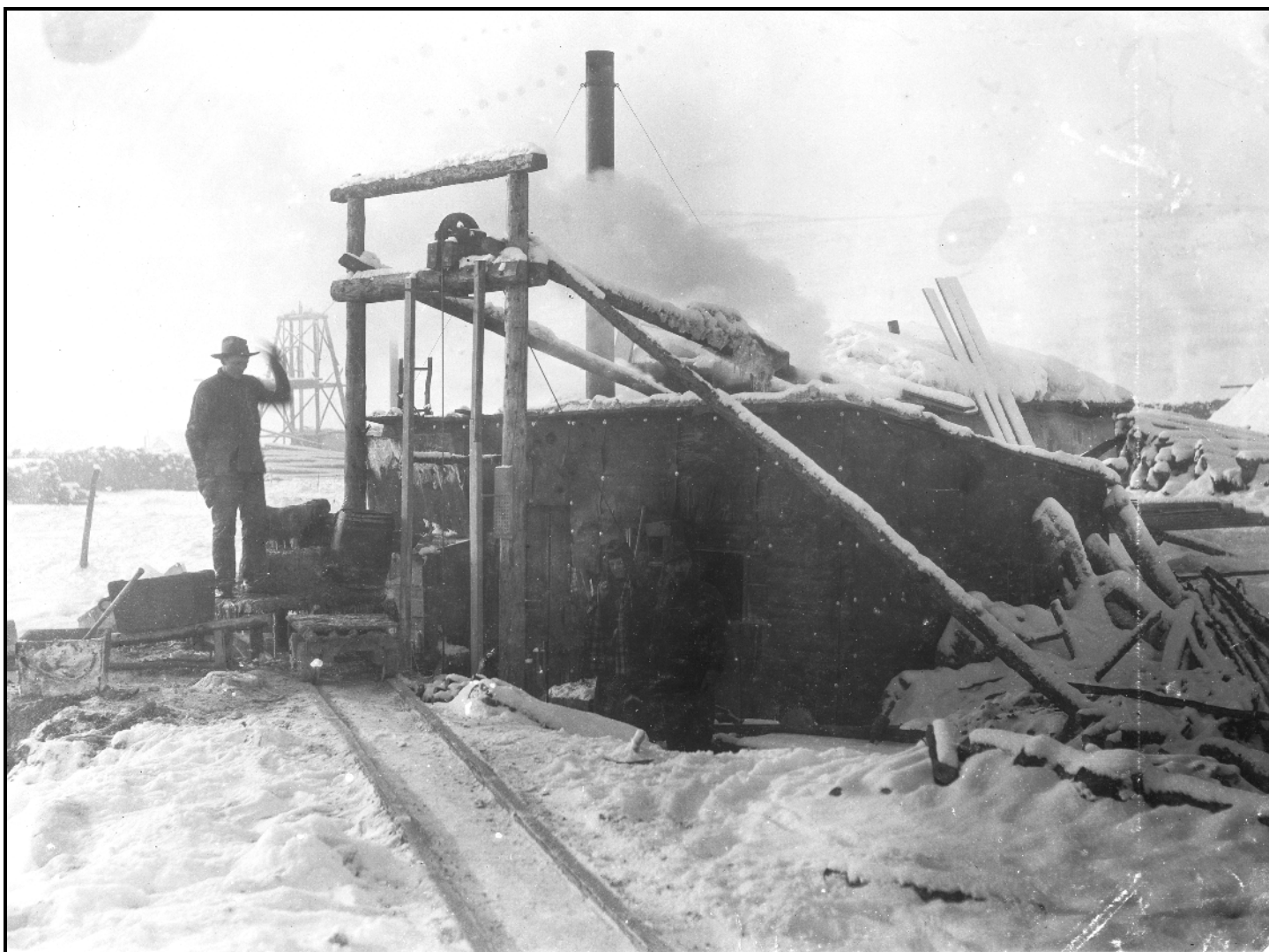
DAWSON'S SPRING CLEAN-UP WILL BE ENORMOUS

San Francisco Call, March 18, 1899

The journalist Sam W. Wall reports on the rising popularity of using steam for thawing:

Steam thawing is so vastly superior to the present method of 'burning' that it will soon be generally employed—unless something better is developed by the busy brains now working upon the problems here presented. Steam thawing machines to the number of a score have been employed this winter on Eldorado, Bonanza, Hunker and Dominion creeks and Victoria and Gold hills. The machines are very simple, introducing steam into the shaft by pipes.

A fire will thaw during the night from twelve to eighteen inches of gravel. The shaft or drift is left full of smoke and unless there be a connecting shaft giving a draft, which is very often not the case, the men are unable to descend for hours, and many have become blinded from the effects of working in the smoke. With three hours application of steam similar gravel is thawed to a depth of from five to ten feet, according to the volume of steam applied.



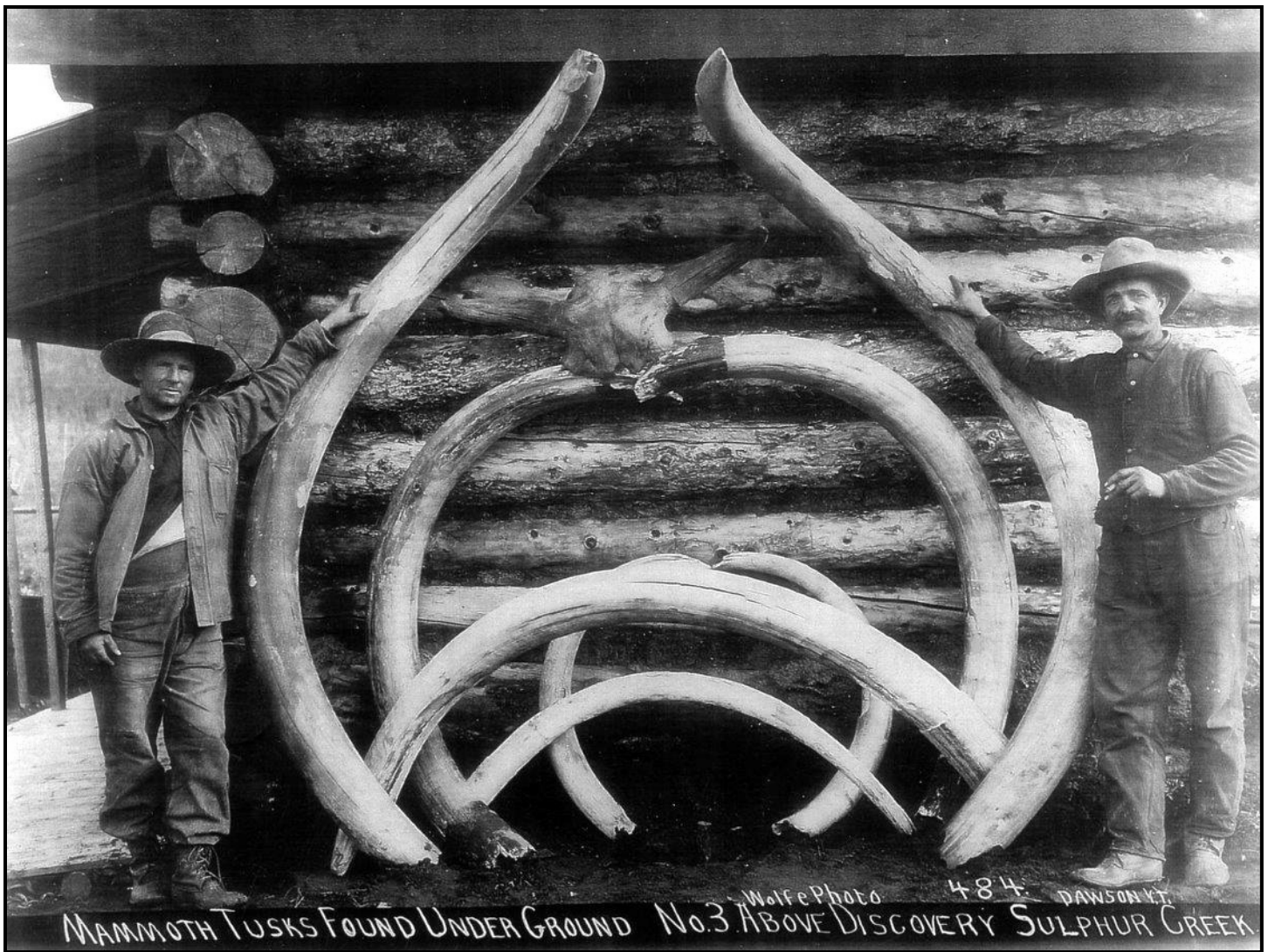
"S & S Boiler House and Shaft, March 5, 1901"—This steam-powered operation includes a boiler (concealed in the structure), a hoist for removing gold-bearing gravel from the drift tunnels, and the hose and pipe assemblies called "steam points" for melting frozen ground. The small car and rails in the foreground deliver the gravel to a nearby dump. University of Washington Libraries, Special Collections, Henry M. Sarvant Photographs (SAR148).

KLONDIKE, PAST AND PRESENT

Detroit Free Press, January 6, 1901

The use of steam for thawing made poor ground profitable and the work a great deal safer, but the new technology did not make it easy. The reporter Sidney Church explains:

In the morning, the ground is thawed back six or seven feet, four or five feet high and the width of the battery of points. Here they work with flickering candles all day long, winter and summer, sometimes with the roof so low that they are constantly stooped, or even working on their knees with pick and shovel. The dirt is conveyed to the mouth of the shaft with cars, or wheel-barrows, and hoisted by steam. The air is damp and heavy with an earthy smell, water drips from above, the miner's back aches from stooping, and his hands are puffed from the jarring of the pick handle, but his eyes are clear, and he is looking constantly for bright yellow chunks.



"Mammoth Tusks Found Underground, No. 3 Above Discovery Sulphur Creek"—In this photography by Frank E. Wolfe of Dawson, workers pose with ivory tusks and a partial bison skull taken from mining shafts. Courtesy of George Lounsbury.

MINING FOR MAMMOTHS

Daily New Era, Lancaster, Pennsylvania, August 13, 1904 (reprinted from *Dawson Daily News*)

Finding ancient bones in mining shafts was not uncommon and here the Dawsonite William Foster describes excavating the remains of a mammoth with the help of steam points:

We climbed down a ladder in the shaft 38 feet deep, and groped our way through the drifts with lighted candles for about 150 feet, when we came upon his royal highness at the end of this drift. . . . The sensation of meeting this silent monster of prehistoric origin in such a place, associated with gold in the frozen gravel, is something so novel, so interesting and so awe-inspiring that I cannot begin to describe it. . . . Mr. Swanson and myself were in the drift nearly all day, while we were thawing out the gravel so as to remove the skull.

The steam, laden with foul odors from the phosphates of lime, permeated the entire atmosphere, and we were compelled to inhale this stench while removing the thawed gravel. Boulders, muck and gravel rained down from the ceiling upon our heads and bodies continually, while our candles, which were almost useless, were frequently extinguished thereby, and even knocked out of our hands. The feeble glimmer of a single candle would hardly penetrate the steam-laden air for a distance of a foot, so we were continually groping about in the steam looking for one another to get a new light to enable the driving of the steam points into the gravel. We employed seven steam points at the same time, and used the greatest care in removing the thawed gravel to prevent damaging this wonderful skeleton.

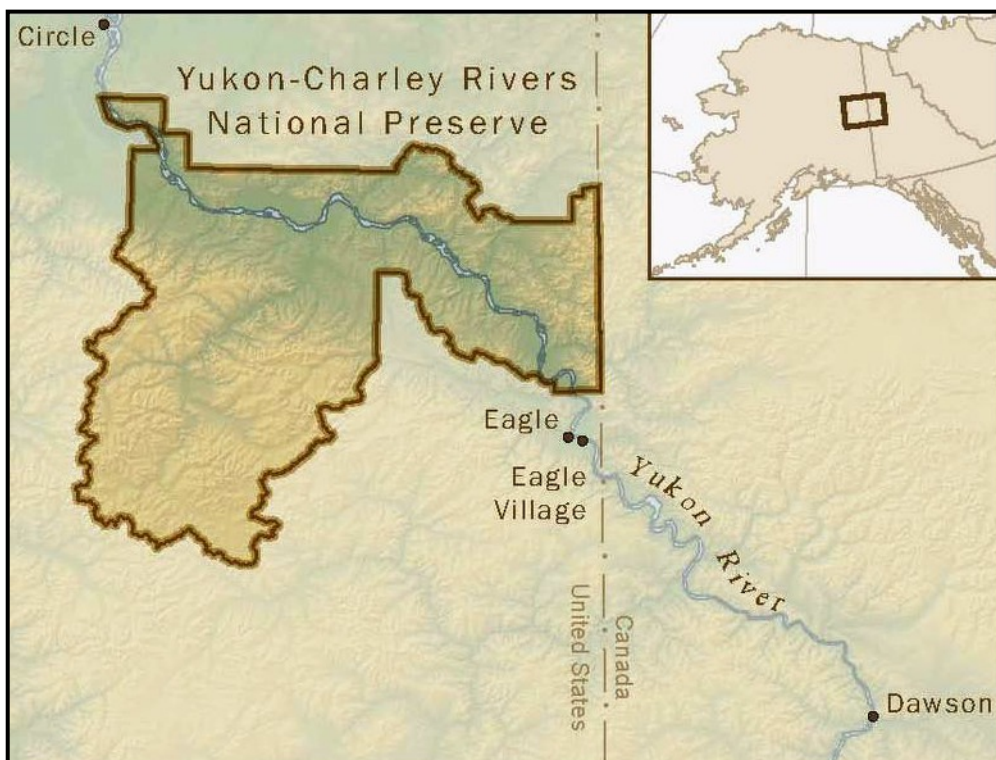
Conclusion

The Klondike rush was a brief and explosive phenomenon with thousands of gold-seekers arriving at the Canadian goldfields, only to find that the best mining ground had already been claimed, and then moving across the border to try their luck in Alaska. Thousands more chose to ignore the Klondike entirely and ended up, in the early 1900s, mining in Nome, Fairbanks, and dozens of smaller Alaskan locations. Although placer mining (above and below ground) continued, the work was increasingly mechanized by the use of steam-powered hoists, drag-lines, and thawing operations. Even individual miners could obtain a *doghouse boiler*—so called because of its size and shape—for transport to remote mines by sled to operate a single steam point in frozen gravels.

This small-scale approach, far from population centers and easy access to supplies, was common in what is today Yukon-Charley Rivers National Preserve. Through a quirk of geology, prospectors found profitable amounts of gold on the Yukon River's southern tributaries, including Fourth of July Creek, Charley River, Sam Creek, Ben Creek, Coal Creek, and Woodchopper Creek. After the frenzy of the gold rush faded, a few determined miners remained on these waterways and combined mining with fishing, gardening, and hunting. They also earned cash by fur trapping, operating roadhouses, and chopping wood to sell as fuel for steamboats. These gold miners were part of a loosely organized community stretching along 150 miles of the Yukon River between Circle, Eagle, and the gold camps of the Fortymile and Seventymile rivers.

In the mid-1930s the Canadian entrepreneur Alexander McRae financed the construction of two bucketline dredges—on Coal Creek and Woodchopper Creek—which revolutionized placer mining in the region. With the help of mining engineer and future University of Alaska president Ernest Patty, McRae used these mechanical behemoths to pull several million dollars worth of gold from the earth. When combined with other tools like bulldozers and hydraulic cannons for clearing the land, the dredges could dig down to bedrock with a speed the early miners could only dream of. And, as the machines moved up and down the two drainages, they occasionally encountered drift mining shafts and tunnels excavated by “pick and shovel” miners decades earlier.

Today in Yukon-Charley Rivers National Preserve signs of the area's industrial mining past remain, including the dredges, hydraulic pipes, bulldozers, sluice boxes, roads, and the camps where the dredge workers lived. However, evidence of older placer mining techniques like ‘burning down’ and steam thawing is harder to find. At Coal Creek and Woodchopper Creek, the gold dredges have obliterated much of the mining landscape that came before, and elsewhere in the national preserve the drift mining shafts and tunnels have collapsed, cabins have rotted away, and vegetation has grown back. This booklet sheds light on that more distant era when miners labored mightily by candlelight and risked their lives deep underground.



Yukon-Charley Rivers National Preserve, established in 1980, was created in part to “protect and interpret historical sites and events associated with the gold rush on the Yukon River...” (ANILCA, Title II, Section 201). Map by Adam Freeburg, NPS.

SOURCES

All of the newspaper articles used in this collection came from these online databases:

Library of Congress—Chronicling America
California Digital Newspaper Collection
Genealogybank.com
Newspapers.com

If you are interested in knowing more about topics raised in this booklet, see:

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This booklet is one of a series highlighting historical topics related to Yukon-Charley Rivers National Preserve and its surroundings. Each booklet features eyewitness accounts, from diaries and newspaper stories, as well as maps, art, and photography. The other titles are:

The American Side of the Line: Eagle City's Origins as an Alaskan Gold Rush Town as Seen in Newspapers and Letters, 1897-1899

Of Gold and Gravel: A Pictorial History of Mining Operations at Coal Creek and Woodchopper Creek, 1934-1938

A River's Many Faces: Depictions of Life on the Yukon River by Charles O. Farciot and Willis E. Everette, 1882-1885

In the Shadow of Eagle Bluff: A Pictorial History of the U.S. Army's Fort Egbert at Eagle, Alaska, 1899-1902

