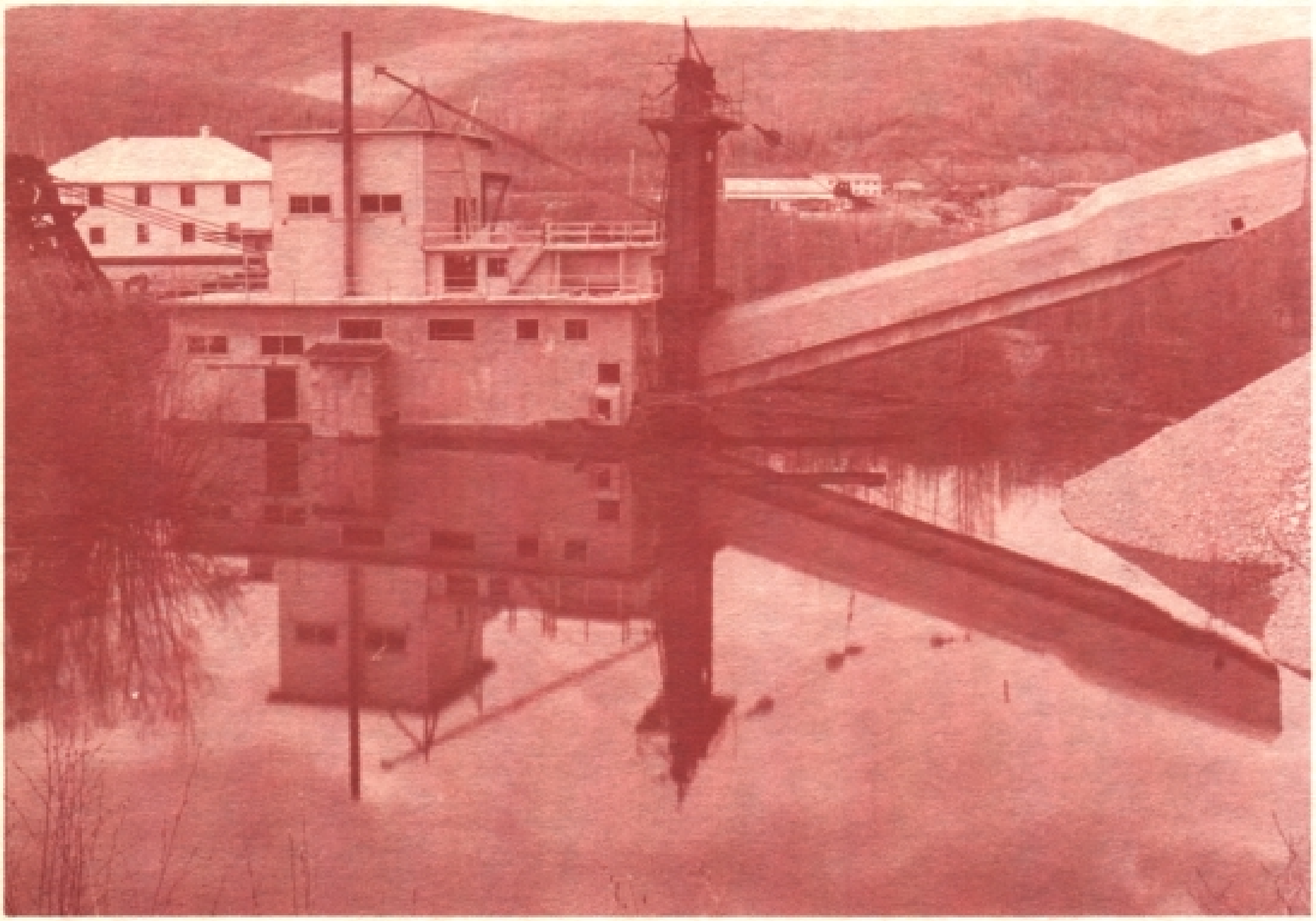
Gold Dredge Number 8



National Historic Mechanical Engineering Landmark

May 16, 1986

The American Society of Mechanical Engineers

introduction

Gold Dredge Number 8 represents an exciting part of the history of development in the West. The dredge is a reminder of the “gold fever” that swept the nation and lured miners and entrepreneurs into the frontiers of Alaska. The machinery exemplifies the best in practical engineering solutions to resource development obstacles. It also represents stability in the mining industry and a break in the boom and bust cycle that plagues Alaskan employment. Gold Dredge Number 8 provided jobs and an economic base for Fairbanks residents from the time it was assembled near Fox in 1928 until the mining operation was closed in 1959. The equipment stands as a monument to the engineers who designed it and the miners who used the machinery to produce more than 7.5 million ounces of gold from the Fairbanks Mining District.

Dredge Number 8 was manufactured in 1927-28 by Bethlehem Steel Company, Ship Building Division. The equipment was shipped from Pennsylvania by transcontinental railroad and by ocean-going barge and was assembled in early 1928 just west of Fox, Alaska, at the head of the Goldstream Valley.

The dredge vessel has a steel hull, 99 feet long, 50 feet wide, and 10.5 feet deep. Fully loaded, its 7.75 foot draft displaces 1,065 tons, including the ballast of steel machinery and on-board equipment. A coal-fired boiler produced steam which powered generators, air compressors, and pumps on board. The dredge itself was powered by electricity from the large coal-fired generating plant in Fairbanks.

The dredge crew worked in three shifts a day for about eight months each year. Work stopped each fall when the dredge pond froze solid and resumed each spring when crews excavated four to five feet of ice from the ponds in the spring to start the dredges again. Minor repairs were made only during periodic cleanups; if possible, major maintenance work was held until the winter shut down. The work crews consisted of a skilled winchman, two oilers and one or two roustabouts or general purpose hands. The three shifts were supervised by a dredgemaster who supervised the twelve to fourteen people needed to operate the dredge. For between 150 and 180 days each year, other laborers operated the 36 to 48 giants, huge water nozzles, used to thaw and remove overburden at an average rate of about 9 inches per day. Gold-bearing gravel was thawed in place to await the powerful buckets of the dredge.

During thirty-two years of operation, the dredge has moved a distance of 4.5 miles, leaving a trail of rock debris behind. The mechanical giant was capable of digging 35 feet below the water line. Gravels were scooped from the ancient stream bed by the dredge’s continuous bucket chain, to be sorted, and washed. Gold was trapped on the riffles of the gold tables and waste gravels were sent out on a conveyor chute to be deposited behind the dredge. In late 1982, John and Ramona Reeves purchased Gold Dredge Number 8 and the surrounding land. Since that time, the Reeves have moved two historic buildings onto the property—remnants of better days in the Fairbanks Mining District. The dredge is open to visitors from May 15 to October 15.

Gold Dredge Number 8
Gold Stream Valley
1928-1959

DREDGES WERE BROUGHT IN TO MINE GOLD-BEARING DEPOSITS IN THE FAIR BANKS MINING DISTRICT AFTER 1920. THIS BUCKETLINE OR LADDER DREDGE HAS 68 BUCKETS EACH WITH A CAPACITY OF 6 CUBIC FEET. THE BUCKET LINE WAS DRIVEN BY A 150 HORSEPOWER MOTOR THAT ENABLED EXCAVATION TO DEPTHS OF 28 FEET. THE GOLD-BEARING GRAVEL WAS SORTED AND WASHED ON THE DREDGE.

DREDGING BECAME POSSIBLE IN THE 1920s AFTER THE UNITED STATES SMELTING, REFINING AND MINING COMPANY (USSR&M) BROUGHT WATER TO THE AREA VIA THE 90-MILE DAVIDSON DITCH. THE DREDGE WAS BUILT BY BETHLEHEM STEEL’S SHIPBUILDING DIVISION IN PENNSYLVANIA AND ASSEMBLED IN THE FOX AREA IN 1928. IT OPERATED EACH YEAR UNTIL 1959.

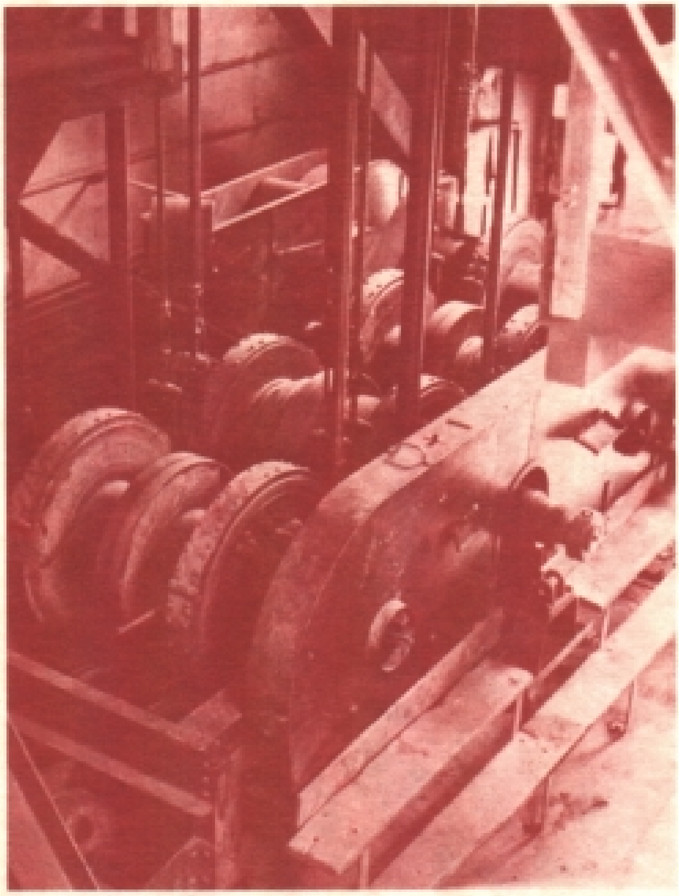
background

Boom

On July 22, 1902, Felix Pedro discovered gold on Pedro Creek, 16.5 miles northeast of Fairbanks. Pedro's discovery launched a gold rush in the area which resulted in other discoveries and the establishment of camps on Goldstream, Cleary, Ester, Dome, Eldorado, Fish, Fairbanks, and Vault Creeks. The camps were connected by the narrow-gauge Tanana Valley Railroad.

In the stampedes that followed in 1903 and 1904, the town of Fairbanks was established. The thriving mining community was named by Judge James A. Wickersham for his friend Senator Charles Fairbanks of Indiana (Fairbanks later became Vice President of the United States under Theodore Roosevelt). The 1910 census lists a population of 3,541 in Fairbanks; miners living beside their claims on the creeks north of town were not counted in the census, however, and the Fairbanks Mining District population has been estimated to have been 11,000 people.

Fairbanks became the administrative center of the Third Judicial Division when Judge Wickersham moved his court from the mining town of Eagle. The Alaska Railroad reached Nenana from Seward in 1915 and was finally extended into Fairbanks in 1925. The Alaska Agricultural College and School of Mines (now the University of Alaska) was established in Fairbanks in 1917.



Winches and cables under the control room maneuvered the dredge on its 4.5 mile trek through the Goldstream Valley.

Bust

During the years following Pedro's discovery, numerous small mining ventures used placer and crude underground mining methods to extract nearly $7 million worth of gold. The gold-bearing gravels were reached by sinking vertical shafts to bedrock and striking out in any number of directions. The frozen gravel stood with little or no support, and mining operations were limited to the winter months when tunnels chould be kept dry. Miners thawed the rich pay gravel lying on the bedrock with steam points driven into the gravel face. They hoisted the ore to a surface dump and sluiced the material to recover the gold when water became available in the spring and summer. By 1920 when miners exhausted the supply of readily accessible gold, few mines remained active.

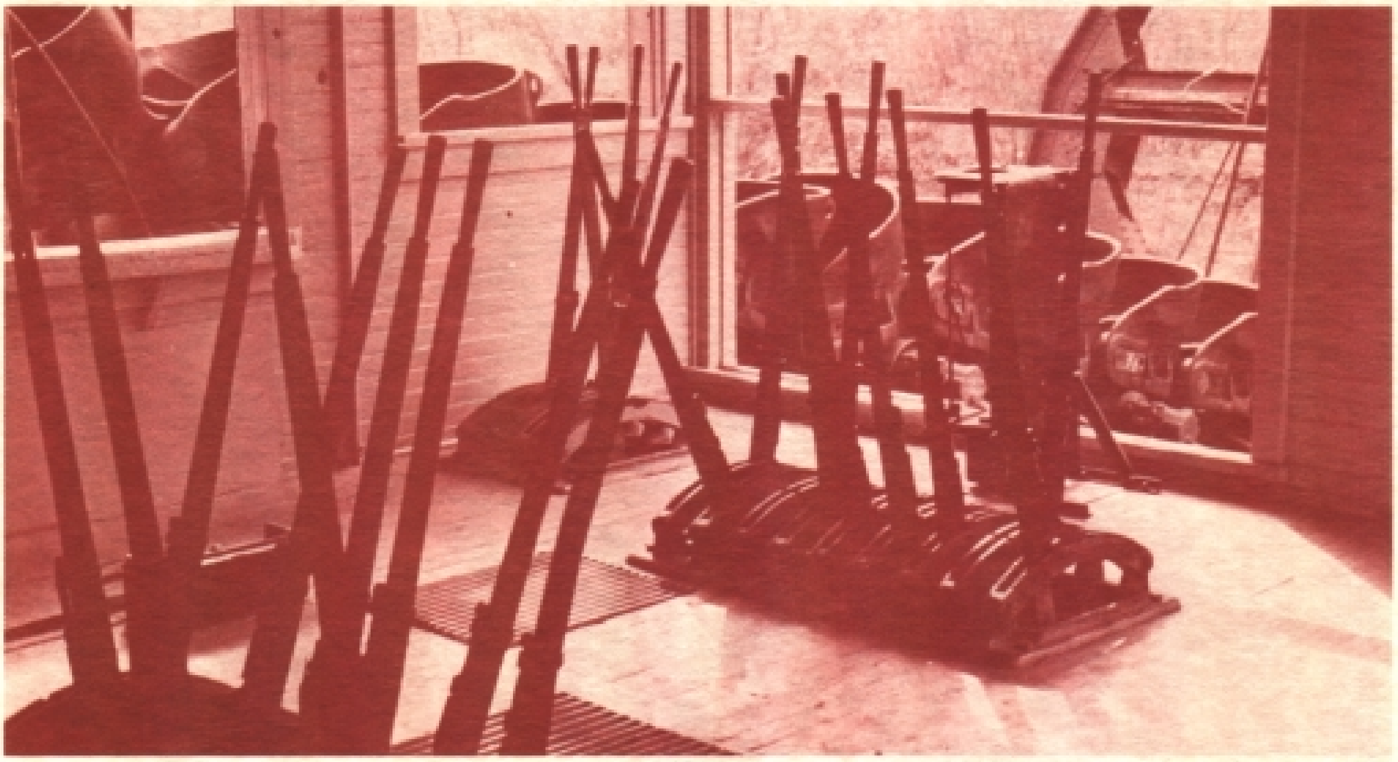
Second Chance

In 1920 Fairbanks Exploration Company entered the field north of Fairbanks and acquired large blocks of already-worked claims. The organization invested an additional $10 million in equipment and in construction of the Davidson Ditch which delivered water to the mine sites and allowed for operation of eight giant dredges.

The company revolutionized mining in the district and constructed a complex of warehouses and offices. The complex included a large, completely equipped machine shop and a smaller building housing the “gold rooms” where assaying and retorting were handled. Gold from the dredges was melted down into large bars. The company also constructed a large, coal-fired electric power generation plant which was not dismantled until 1974. In addition, the company built a score of houses for its employees, many of which stand in Fairbanks today.

James M. Davidson was the ingenious civil engineer who proposed, and then built, the 90-mile ditch which made massive strip mining, dredge, and hydraulic operations, possible in the Fairbanks Mining District. During the earlier phases of pick-and-shovel placer and hard-rock mining in the District, water had been the critical element for sluicing the stockpiles of ore which had been hand-dug from tunnels and shafts during each winter season. Ditches had been constructed on a local basis from creek to creek, following the contours of the low hills, but in the near-desert climate of Alaska’s Interior, water was a major stumbling block for mining operations.

Davidson’s routing of vast amounts of water from the Chatanika River to Fox and the Goldstream Valley was a requisite part of Fairbanks Exploration Company’s plan to mine the valley. Most of the water was used to thaw frozen soils and wash away overburden that covered gold-bearing gravels.



The dredge master’s control room was located in an enclosure on the upper deck above the bucket line.

mining operations

Gold-bearing deposits in the Goldstream Valley typically were overlain by 10 to 150 feet of silty overburden or muck. To compound this problem the overburden, gravel and bedrock were frozen. All of the materials had to be thawed before they could be moved.

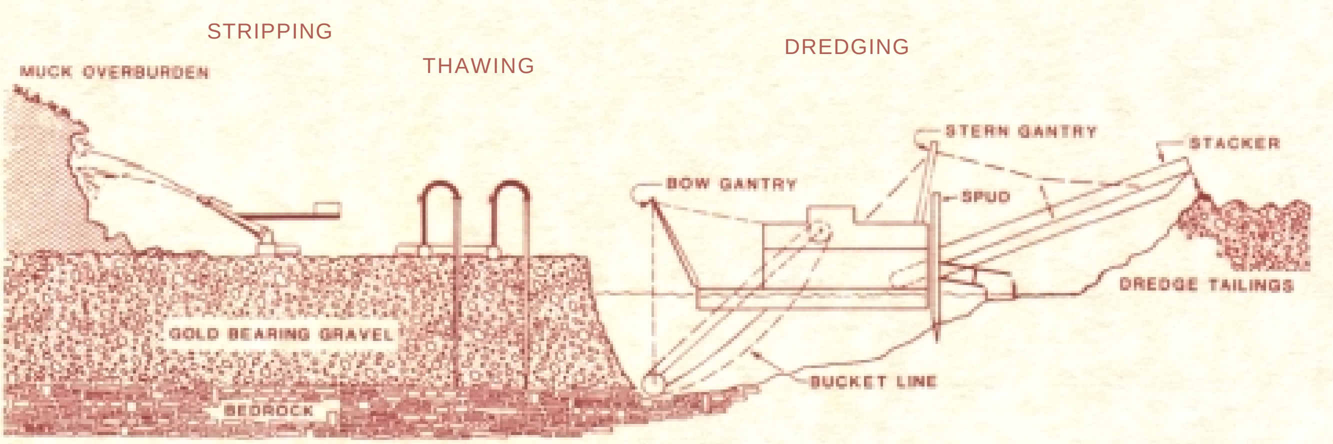
Manganese steel buckets weighting 1,583 pounds each were mounted on the digging ladder assembly. Each bucket had a capacity of 6 cubic feet.

The first step in the mining operation was to drill the ground to determine the gsold content. This was done with Keystone churn-type drills. Holes were spaced from 200 to 400 feet apart. Results of the test holes determined what areas could be economically dredged.

Frozen muck was removed with hydraulic 'giants' (huge water nozzles). The stripping operation took up to three seasons depending upon the depth of the silty overburden. The gold-bearing gravel was thawed by driving pipes or "thaw points" down to bedrock and forcing water through them. The points were ordinarily spaced 16 feet apart and took at least six weeks to thaw the ground around them. Once the ground was thawed it did not freeze back; thawing was usually completed at least a year in advance of dredging as a safeguard against water shortages. Harsh weather limited thawing operations to four or five summer months.

Where the gravel was extraordinarily deep, up to 50 feet of barren gravel was stripped away with draglines and discarded by conveyors. Dredging was done with standard floating bucket-line dredges of the California type. U. S. Smelting, Refining, and Mining Company had seven of these machines operating near Fairbanks at one time. The largest of the dredges was capable of digging to a depth of 70 feet below water level and handling 10,000 cubic yards of gravel a day.

OPERATION OF UNITED STATES SMELTING REFINING AND MINING COMPANY



dredge operation

To open the ponds in the spring, rectangular steam cutters, drawing steam from the dredge boiler, cut 3,000 to 5,000 pound blocks of ice. Chains were looped around the blocks of ice and the stern gantry, the lifting mechanism that controls the height of the "stacker" or conveyor arm that moves tailings during dredging, was used to lift the blocks to a dump point some distance from the pond.

Dredges, floating on ponds, scooped up alluvial gold-bearing gravels with a bucket chain. The gravels were then washed and sorted, and the gold separated over the gold tables. On the tables, gold was trapped in a series of intricate riffles.

Gold Dredge Number 8 has a 43 foot 9 inch high bow-gantry which supported the belt-driven bucket line, with its seventy manganese steel buckets, each with a capacity of 6 cubic feet and weight of 1,583 pounds. The buckets were mounted on a steel digging ladder which measured in excess of 84 feet. The bucket line discharged gravel into a dump-hopper at a rate of 22.2 buckets per minute. The gravel passed from the dump-hopper to a belt-driven trommel-screen, where perforations ranging in size from 3/8 to 1-5/8 inches, sized the gravel. During this process, an occasional large gold nugget would stick in the screens as the dredged material traveled down a gentle incline (the slope was usually 1.5/8 inch decline per foot in length). In the trommel, the relatively heavy gold fell through the screens; the rocks and gravels passed onto a conveyor belt to be discharged. Nozzles inside the trommel drum were used to wash the gold from the gravel before it was carried by a steel-reinforced conveyor belt to the tailings pile behind the dredge.

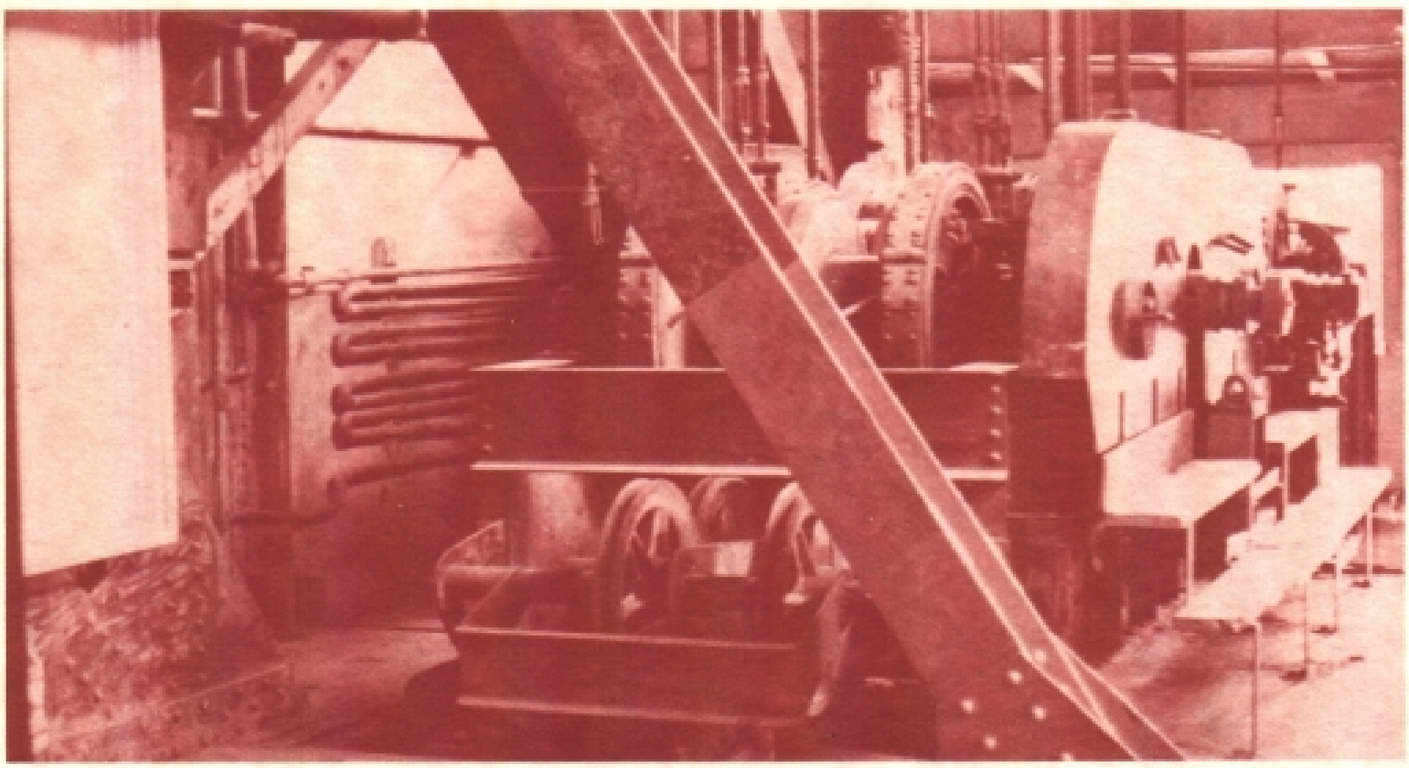
The 32-inch wide, belt-driven stacker conveyor operated at a rate of 262 feet per minute and was capable of stacking tailings to a height 27 feet above water level. The stacker was supported by a 56 foot high stern gantry.

Two steel "I" beams called "spuds" were connected by winch lines to anchors set in the gravel near the dredge pond. By adjusting the tension on the lines, crews maneuvered the dredge in a sweeping motion so the dredged channel would always be wider than the craft's hull. The machinery advanced as it took material from

The bow-gantry lifted the bucket line as it moved gold-bearing gravels into the dump hopper at a rate of 22.2 buckets per minute.

in front of the dredge and stacked it behind, moving the pond in which the dredge floated slowly forward.

After passing through the trommel screens, gold-bearing material was sent to a series of twenty-six 30-inch wide tables. On the extraction tables which were set at an incline of 1-1/4 inches per foot, the majority of the gold was recovered. From here, the remaining gold-bearing material moved on to pulsing and milling jigs to extract more gold. The resulting fine slurry was sluiced over special coco matting where the gold was mixed with mercury to become amalgam. Gold was recovered from the amalgam in the retorting process, where mercury was distilled off, leaving nearly pure gold. This entire process resulted in removal of approximately 97 percent of the gold from the rich gravels.



Hoist machinery connected to winch lines raised and lowered the bucket line or digging ladder.

The American Society of Mechanical Engineers

The American Society of Mechanical Engineers (ASME) was founded in 1880 as an educational and technical society. With a membership of 113,000, ASME seeks to provide an impetus for the continuing professional development of its individual members and advancement of the state-of-the-art of mechanical engineering.

Through its National Historic Mechanical Engineering Landmarks Program, ASME recognizes artifacts of technological evolution and seeks to educate the general public, as well as the engineer, about America's rich technological heritage.

Gold Dredge Number 8 is the 83rd ASME National Historic Mechanical Engineering Landmark. During the past decade, the Society's History and Heritage Committee has designated nearly 120 regional, national, and international landmarks. Each landmark represents a progressive step in the evolution of mechanical engineering, and each reflects an influente on society. The Landmark program illuminates our rich technological heritage and serves to encourage the preservation of the physical remains of historically important works. It provides a roster for engineers, students, educators, historians, and travelers and highlights milestones along the paths of technological development.

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acknowledgments

The Alaska Section of ASME gratefully acknowledges the efforts of all who participated in the landmark designation of Gold Dredge Number 8. We wish to extend special thanks to John and Ramona Reeves, owners of the dredge; to Judy Bittner and Paul Chattey, State of Alaska, Division of Parks, Office of History and Archaeology; and to Sue A. Degler.