INFORMATION - BIMA DREDGE

Dredging the Bering Sea for Some of What Glitters

By WALLACE TURNER, Special to the New York Times
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She looks like a barn built by an eccentric farmer, but she shows promise of breaking a barrier that has frustrated gold miners here for most of the 20th century.

"We'll never make her pretty," says Dennis Josephson, the man in charge, as he recalls his first thought on seeing Bima.

She is a monstrous bucket dredge built on a barge. The dredge stands 14 stories above the Bering Sea's rolling swells about a half-mile off the sand beaches where miners collected tens of thousands of ounces of gold in the first years of the century.

The sea has beaten back previous attempts to test an idea that, if there is lots of gold on shore, plenty of the pinhead-sized flecks of gold would continue across the surf and onto the sea floor. Works 24 Hours a Day

Bima, built in Singapore in 1978 and 1979 to dredge up tin ore from the seas off Indonesia, operated successfully here for 40 days last summer and went back on station June 12 to operate until winter cold closes her down.

Working 24 hours a day, she swings in an arc back and forth across the sea floor 30 feet below her hull. The swing lets the buckets chew into the bottom in a pattern designed to cover the 21,000-acre lease with the State of Alaska.

Al Mullins, of Coos Bay, Ore., and Ed Roberts of Vancouver, Wash., sit six hours each at the console of television monitors and levers that let them control the movements of Bima on her system of five anchors, each secured by 2 1/2-inch cables.

The levermen, who are replaced by two others on the night shift, are veterans of dredging jobs around the world, but this is new to them, to mine for gold from the sea floor. Errors Can Be Costly.

The dredge's pendulum-like swings against her head line, attached to an anchor a quarter-mile off her bow, are carefully controlled, because an error could bypass thousands of tons of gold ore and leave it on the sea bottom.

Bima's cavernous interior echoes with the shrieks of machinery and the thump of boulders, clay and gravel dumped by the dredge buckets.

The material goes into a sifting system, which saves the mud and small particles and dumps the rest back into the sea.

The product of this noise and confusion focuses into a small room with two rocker tables monitored by Vernon Kuggruk, an Eskimo. 'That's the Gold'. "There," he said, indicating a stream of tiny flecks moving slowly down one side of the table. "That's the gold."

Like 48 others on the payroll of 95, he comes from Nome. They work 12-hour shifts, seven days a week, time-and-a-half over 40 hours. With base hourly scales of $11.15 to $17.15, they earn up to $1,800 a week for a season that can be 20 weeks long.

The rocker tables where the gold shows up are flat surfaces, crossed by channels somewhat like the old-time prospector's pan. As water and gold-bearing mud run in the channels, the table vibrates slightly so that the heavier gold flakes separate, to be led off, dried and smelted into gold bricks.

If the operation continues as it has so far, Bima will move much more than one million cubic meters of ocean bottom this season, and more than 30,000 ounces of gold will pass across the rocker tables to the smelter. Stakes and Costs High.

In the gold rush days, gold sold at $20 an ounce. Today, it sells at about $450 per ounce. Officials of the company that owns Bima have estimated production costs at about $240 an ounce.

Inspiration Gold Company, a subsidiary of Inspiration Resources Corporation, has invested more than $20 million in buying the Bima and putting her into place here.

This includes the cost of mining rights to 21,000 acres of Bering Sea floor and drilling through winter ice to determine whether profitable deposits of gold actually exist.

Jake Timmers, president of Inspiration Gold, said the terms under which Inspiration Gold got the lease gives a share of income to three previous lease owners who explored possibilities and then backed away. Learning as They Dredge

"I don't know how we could have proceeded here if we had not found Bima available," he said.

Mr. Timmers also said he feels that the unusual ocean-floor dredging operation will provide new technological expertise that the company can use in future projects.

The dredge was purchased in Singapore and had to be towed here last year. During the winter, she was refitted and touched up at Tacoma and Seattle and returned here June 12 to begin work.

Previous attempts to mine the Bering Sea floor have included a barge, a wheeled vehicle that tended to float, and even miners who stood in the surf and tossed shovels full of rock and mud ashore, where they could pan it by hand. Stable in Stiff Seas

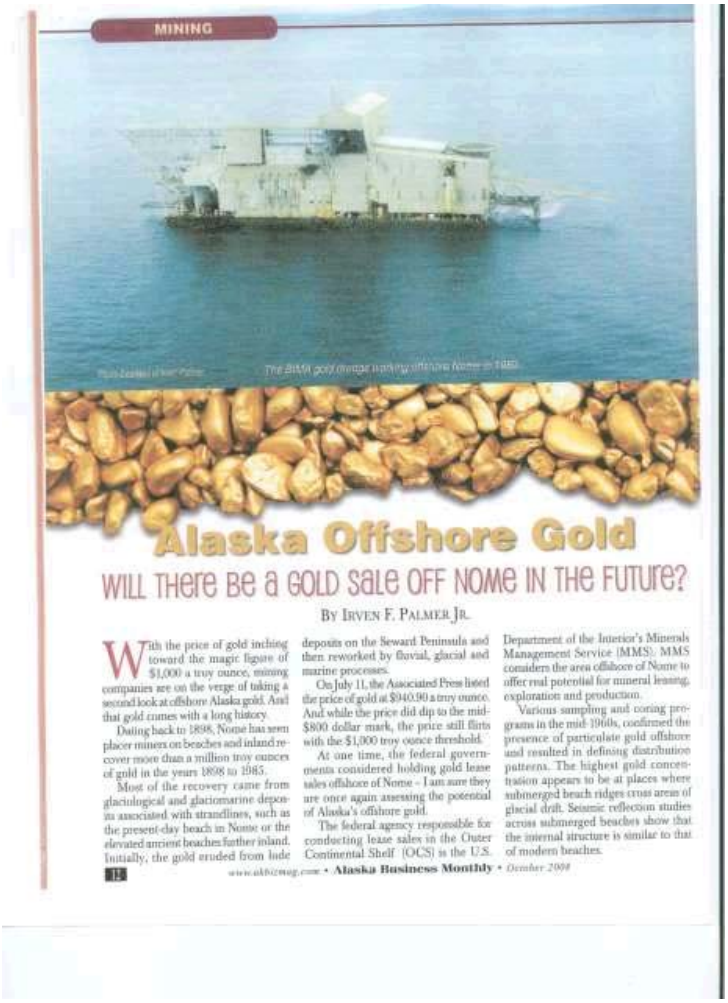
Only one operation had limited commercial success. That was 50 years, ago when two men sawed through the ice and, with a drag line, pulled up bottom material which they stored on the beach until summer, when they ran it through their pans.

Bima, built to dredge ocean bottom, has buckets that can reach 140 feet down. She is stable in fairly stiff seas, and can process much more ore.

On one occasion, the dredge line brought up a walrus. The crewmen named him Big Wally. After being removed once, he returned immediately, seemingly enchanted by the ride in the buckets. So they took him 20 miles away to an island.

BACKGROUND

Location of Nome in Alaska



MINING

Alaska Offshore Gold

WILL THERE BE A GOLD SALE OFF NOME IN THE FUTURE?

BY IRVEN F. PALMER JR.

With the price of gold inching toward the magic figure of $1,000 a troy ounce, mining companies are on the verge of taking a second look at offshore Alaska gold. And that gold comes with a long history.

Dating back to 1898, Nome has seen placer miners on beaches and inland recover more than a million troy ounces of gold in the years 1898 to 1985.

Most of the recovery came from glaciological and glaciomarine deposits associated with strandlines, such as the present-day beach in Nome or the elevated ancient beaches further inland. Initially, the gold eroded from lode deposits on the Seward Peninsula and then reworked by fluvial, glacial and marine processes.

On July 11, the Associated Press listed the price of gold at $940.90 a troy ounce. And while the price did dip to the mid-$800 dollar mark, the price still flirts with the $1,000 troy ounce threshold.

At one time, the federal governments considered holding gold lease sales offshore of Nome – I am sure they are once again assessing the potential of Alaska's offshore gold.

The federal agency responsible for conducting lease sales in the Outer Continental Shelf (OCS) is the U.S. Department of the Interior's Minerals Management Service (MMS). MMS considers the area offshore of Nome to offer real potential for mineral leasing, exploration and production.

Various sampling and coring programs in the mid-1960s, confirmed the presence of particulate gold offshore and resulted in defining distribution patterns. The highest gold concentration appears to be at places where submerged beach ridges cross areas of glacial drift. Seismic reflection studies across submerged beaches show that the internal structure is similar to that of modern beaches.

Jig Recovery Systems

Circular 52, April, 1995
by H. Mason Coggin, Director

Jigging is one of the oldest processes used to separate heavy minerals from the lighter gangue. This technology was used in Cleopatra's time to separate wheat from chaff. A jigging sieve was described by Agricola in De Re Metallica in the 16th century.

How the Jig Works

The jig consists of a cell containing water with a screen on the top. Steel or stainless steel shot is placed on the screen. A rubber diaphragm located at the bottom of the cell is driven up and down by a walking beam and eccentric mechanism.

On the up, or expansion stroke, the water column is forced through the shot bed causing the shot bed to dilate and differential particle sorting to take place, based on Stokes Law of Hindered Settling. This allows the heavier particles on or near the shot bed to settle through the shot while the lighter particles are carried onto the tails. On the down stroke these heavier particles are pulled down through the bed and discharged through the hutch concentrate valve at the bottom of the cell.

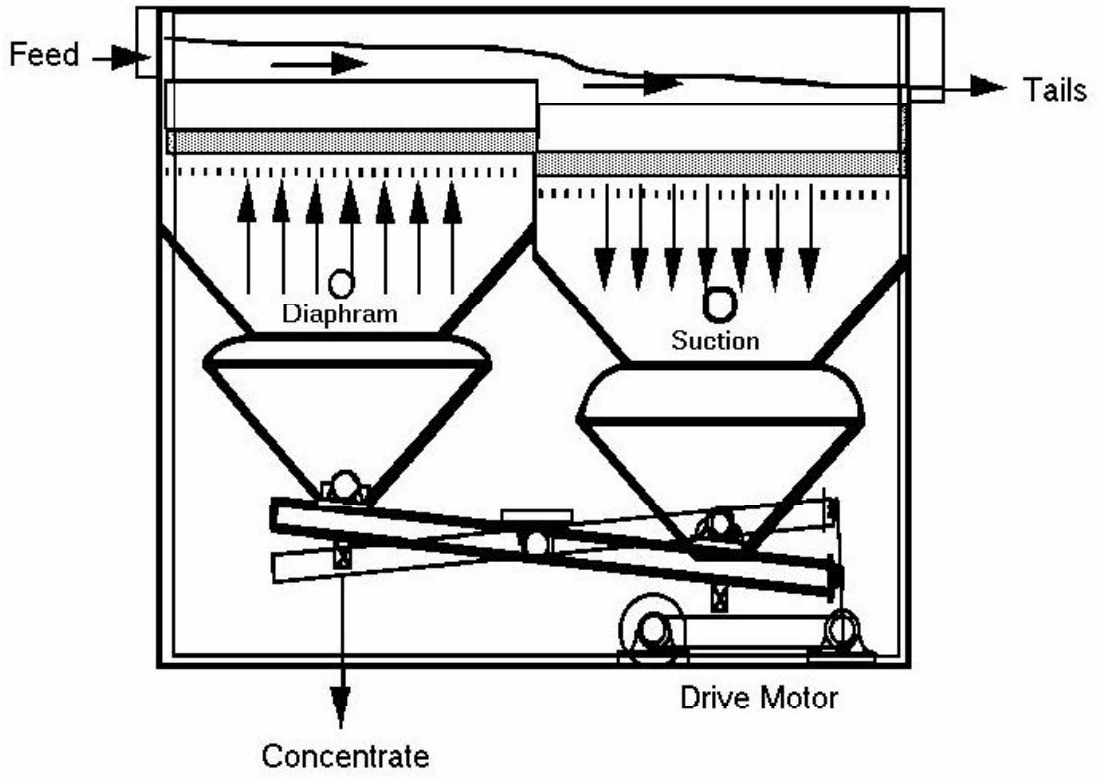


Figure 1. Section of a modern placer jig

Feed rate, depth of bed, pulsation frequency, stroke length, and make-up water are the main variables used to adjust the jig for optimum recovery. These basic features of the jig system are shown in Figure 1.

Although jigs were extensively used in coal and base metal recovery at the turn of the century, it was not introduced to the gold placer mining industry until 1914. From that time until 1942 jigging became the most popular method of placer gold recovery. Beginning with the gold mine closing order of 1942, production from placer gold mining and jigging all but disappeared until the gold price was released in 1975. Gold mining has had a most remarkable revival in the last two decades, but the practice of jigging has lagged.

In 1914 J.W. Neil installed a large-scale test jig on the Yosemite dredge in California. Subsequent testing of the Neil jig by Natomas Consolidated resulted in the conversion of their sluice dredges. At first jigs were placed on the end of the sluices as a final cleanup. The next year they were moved to the head of the sluices. The following year sluices were being removed from many of the dredges and jigs were installed as the only recovery system. The improved recovery from jigging resulted in the profitable reworking of the tails from some previously mined deposits that had been considered marginal.

Conversion by other companies was slow. It was not until 1932 that the Bulolo Gold Dredging Company initiated testing. This test work resulted in the immediate conversion of their largest dredge then operating in New Guinea. The Bendalari Jigs became the dredge's sole means of primary recovery. With the success of this operation, the company began to convert all of their dredging operations to jigs.

To remedy the design and installation problems of the original Bendelari Jigs, the Bulolo engineers designed a new machine that they called the Pan-American Placer Jig. The new design, adapted for use on board a dredge, was compact and could accommodate a great deal of wave movement on a small barge operating in an active dredge pond.

The success of this new design was so great that Bulolo converted their dredges in New Guinea and Columbia. Observing the high recovery of these installations, Yuba Consolidated Goldfields, Ltd. converted all of their California Fisher and Baumhoff operations to jigging plants in 1936 and 1937.

These efforts marked the last technological advancement in gold dredging. With the L-208 closing order of WWII all placer gold mining in the U.S. was stopped. Few of the dredges survived the scrap drives of the war. When L-208 was rescinded at the end of WWII, a few of the survivors were refitted, but inflation and the fixed gold price halted the construction of new dredges for North American placer gold mining. Placer gold mining was almost forgotten until 1975 when the price of gold was allowed to float on the world market. Somehow, during this long sleep the success of the jig was forgotten.

The Cleveland Circular Jig was designed to treat the tin bearing sands off the coast of Indonesia. Feed is entered through the center and as it travels outward to the tail weir the velocity is decreased with obvious advantage. At the present time these jigs are manufactured in Europe. One manufacturer has even developed a hydraulic stroke for the diaphragm that is claimed to be superior to the mechanical eccentric drive.

Circular jigs have not been generally accepted in gold mining, probably because of their high cost, large capacities, and low (20:1) recovery ratios that were developed for the offshore tin industry.

The concentration of free gold in a gold placer is very small and a high concentration ratio is required to make an economic concentrate. There is a great deal more tin in a tin placer than gold in a gold placer. To be economic the ratio of enrichment for tin placers need only be 10 or 20 times.

One of the few modern operators using circular jigs was WestGold in their offshore operation at Nome, Alaska. These jigs were already onboard when the dredge, Bima, was purchased.

Jig Operation

Although great improvements have been made in their design, riffles have inherent metallurgical limitations. The gold must settle and be trapped behind the riffle in a swift current of water. The current's velocity must be great enough to transport crudely classified material across the riffles. The slower the velocity the better the tendency for the gold to settle and be saved. This lower velocity, however, has less carrying capacity and will allow black sand and other heavy minerals to pack behind the riffles leaving no trap for the gold. If the amount of water and the slope of the riffle are increased to provide sufficient velocity to clean the riffle, gold particles that were previously trapped will be remobilized and lost. Sudden surges in feed may also dislodge gold. If the velocity is too low during the down cycle, black sand will again pack behind the riffle.

In either case the first gold lost by the riffles is presumed to be the fine (- 200 mesh) gold. Flat gold or light gold because of its poor setting ability will also be lost.

Jigging avoids these limitations. The best can be adjusted to permit settling and trapping of the gold at all times. Once trapped, the gold is removed from the stream and the losses from packing and surging are eliminated. The jig can be adjusted to remove a large percentage of black sand and the balance can be eliminated on tables or further jigging. The pulsations of the jig move material across the jig to the tail, and consequently, less water is required to move material. Conditions at the top of the jig bed are quiescent at the top and bottom of each stroke. This provides a better opportunity for the gold to settle.

The jig has few limitations, but it is a gravity machine and therefore can recover only the gold that will settle by gravity in the jig bed. Some of the finest gold will be lost, but in most deposits this loss is below the economic limits of present technology. In the majority of placer deposits the total amount of fine gold is difficult to quantify. If the deposit was formed as alluvial, colluvial or eluvial, the finest gold has already been eliminated by the poor sluicing provided by nature. There are a few exceptional deposits in which the gold has been liberated by oxidation of gold-bearing sulfides, or is still locked up within the sulfides or oxides that were deposited with the gravels of the deposit. These deposits present problems that involve milling methods and the economic advantages of a placer operation are voided.

Flotation, for example, may be applicable in the recovery of fine gold that will be lost even by jigs. Without specific research on the increased recovery from flotation and the costs involved for each specific property, it is doubtful if flotation would recover more gold values than it would cost. A 1933 installation of six full-size flotation machines, treating 300 tons per day, was made on one of the dredges operating on the American River in California. After three months of operation the recovery of

gold by flotation was only 2 cents per ton on heads to the cells of 3.5 to 9 dollars per ton.

Design Considerations

Placer jigs present a different set of problems from those encountered in the concentration of base metals. The ratio of the specific gravities is higher and the feeds are not as well classified as those in hard rock milling. The hard rock jigs are generally much longer and narrower. To work with the lower specific gravities, close classification is essential and the longer jig beds provide for slower setting. With these advantages the load per square foot for the placer jig can be increased without appreciably affecting the recovery. This allows a lower cost unit to be produced per ton of material jigged.

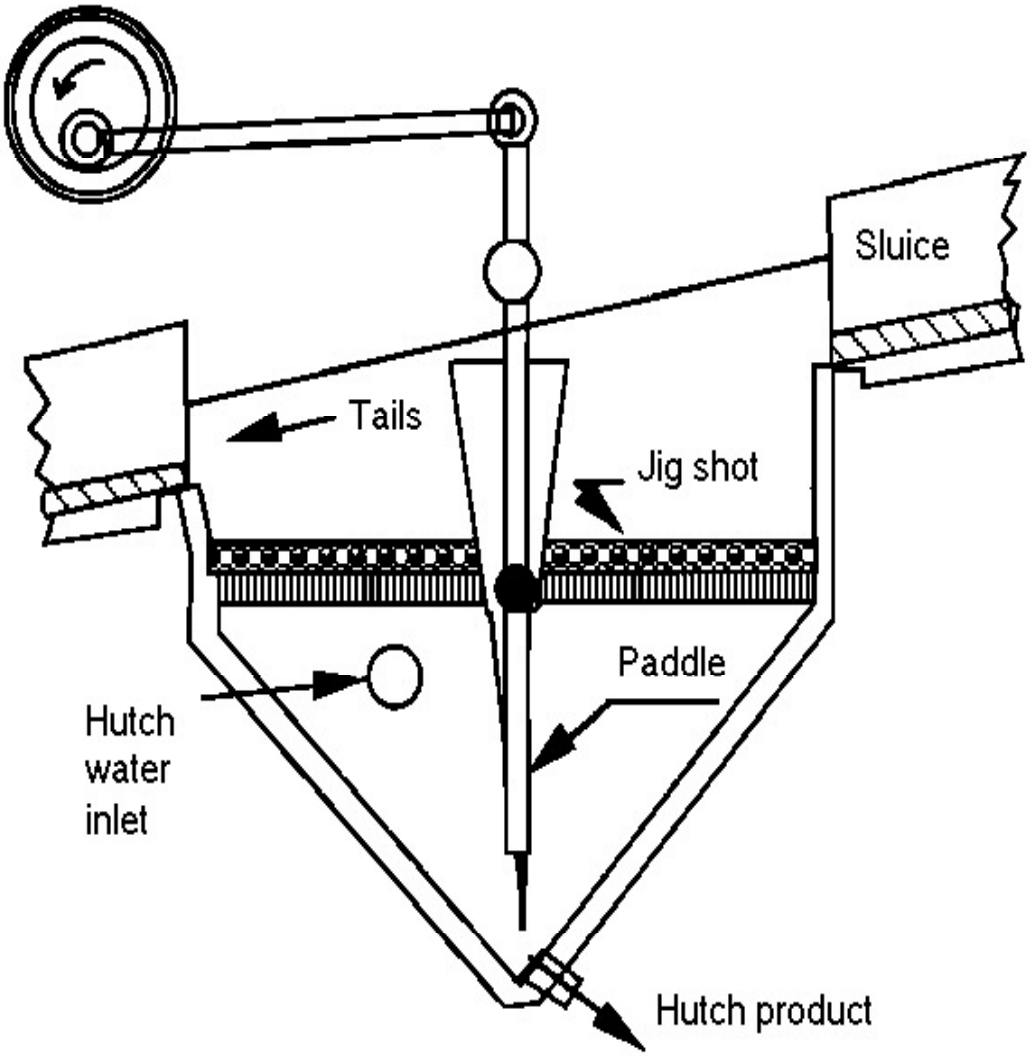


Figure 2. Neil jig, about 1907 (after Taggart)

When jigs were first considered for placer mining, several different designs were available from coal washing and base metal operations. These jigs were heavy, cumbersome, and occupied considerable

space. On a dredge, floor space is a critical design consideration. The Neil Jig, was modified to take up no more floor space than the actual jigging surface.

The Bendelari Jig, which followed the Neil design, was actuated by a plunger sealed with a rubber diaphragm located below the jigging surface. This allowed the floor space requirement to be defined by the jigging surface.

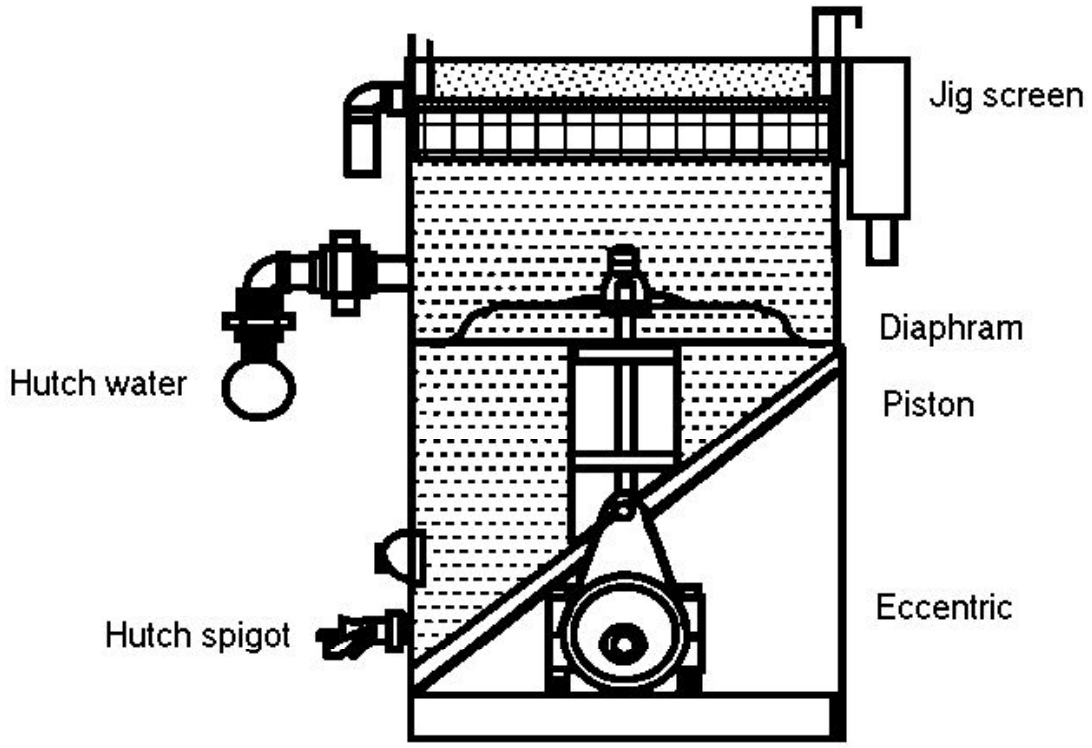


Figure 3. Bendelari jig (after Taggart)

Pan-American Placer Jig

In the Pan-American Jig, the hutch is an inverted cone that moves by means of an eccentric cam and a walking beam. A rubber diaphragm between the cone and the jigging screen provides a positive displacement of the hutch water to insure jig bed pulsations. Concentrates discharge freely through the metered outlet in the bottom of the cone. A large volume of water is added in the hutch to provide an upward flow through the screen during the up stroke while maintaining the flow of concentrate out the bottom. This provides a zone in the hutch, below the screen, where the flow is neither up nor down. Gold particles settling through this zone are accelerated by the velocity of the flow to the discharge.

Hutch water flow also aids in the suspension of the pulp as it passes over the screen providing for additional separation in the ragging. In the final design, the weight and volume of the machine was cut to a minimum for further cost reduction and volume efficiency.

The Pan American Placer Jig is designed to hold a certain volume of steel shot on the screen as

bedding. The restriction, through the spaces between the shot, reduces the amount of concentrate and provides for maximum recovery at a high concentration ratio.

The 42" x 42" duplex cell arrangement has become a de facto standard in the industry. In this arrangement two cells are set in series with a drop between the cells. The rollover of the material as it passes over this drop between the cells further increases gold recovery. Material, which may have been riding on the top in the first cell, is rolled to the bottom of the flow and adjacent to the bedding. The effectiveness of this toss is demonstrated at each jig screen cleaning. Particles of coarse gold that escaped the first cell will be found in the first few trays of the second cell.

Testing Tailing Losses

Nowhere in the art and science of sampling are results harder to obtain and less reliable than in the sampling of gold placer tails. The volume of material is so great and the effect of one small gold particle so dramatic, that only relative results can be obtained. The following example will illustrate this point.

For a placer operation with average heads of $3.00 and recovery of 90 percent, the tail will carry $0.30 in gold. This is equivalent to about 500 minus 80 mesh particles per yard. An 80 mesh particle is smaller than a speck of ground pepper and has a value of about $0.0005. If three of these particles were found in a single pan of tails, the loss would be reported as $0.30 per yard.

Summary

The jig is again a popular choice for processing placer gold deposits. Operators who have experimented with sluices, spirals, cones, and centrifuges are now changing to jigs. One reason for this may be the great number of manufacturers who are answering the demand for jigs. In most cases these manufacturers have acquired one of the original Pan American Jigs and have copied them as original patents ran out years ago. These designs have proven to be efficient and effective collectors of gold. Innovations in jig design that were tried during the first half of the century are being tested again. Some new and better technology may be developing, but for the present, the old designs are still the best.

Modern Mining

World War II

Wartime restrictions curtailed mining at a time of peak dollar yields. From 1938 to 1941 the industry averaged more than $24 million annually, about three times the production value during the 1900 Nome gold rush. Although the peak of gold production in volume was in 1906, the 1934 price rise caused the value peak of the late 1930s. Most of the gold mined during the peak years was dredged at Fairbanks and Nome.

Except for coastal communities largely occupied with the fisheries, nearly every town in Alaska depended on gold mining. The response of Alaskans to the 1942 closedown order was predictably critical. Anchorage banker E.A. Rasmuson considered the government's action as inconceivably short-sighted, "a scorched earth policy" which would destroy the leading industry of the interior without appreciably helping in the war effort. "The government," Rasmuson argued, "might as well have closed all fishing in and around the coastal towns in the Territory, or closed the saw mills in places where that pay roll is the only one that supports the community." [1]

The ire of Alaskans can be understood, but the reasons for the closure made perfect sense from the government's point of view. Laborers were urgently need in defense occupations, and even mining equipment like tractors, draglines, and bulldozers were needed for the many defense construction projects in Alaska.

In response to protests the War Production Board provided some relief to miners and businesses dependent upon mining. In 1943 a few of the territory's 47 dredges and 38 active lode mines were allowed to operate if they could show that much desired "strategic metals" were mined with the gold. An exception was also made for small placer operations employing seven or fewer men. Such outfits could mine with employees who were overage, handicapped, or otherwise unqualified for essential war activities.

The restrictions were hard on communities like Fairbanks, Nome, and Juneau. In 1944 the Alaska Juneau Mine, the largest lode mine in Alaska, closed permanently. One measure of the low point in gold production that year was in its comparison with coal. Coal production had never been big in Alaska, yet its value, $2.3 million, exceeded gold's output of $1.7 million.

Asbestos mining was not prohibited under wartime measures, and its production during 1944 reminded gold miners that better days were ahead. The Arctic Exploration Company's mine, near Shungnak, produced 50 tons. Asbestos was conveyed by dog sled 3 miles from the mine to the Shungnak airfield, then air freighted to Fairbanks for transshipment Outside. Cost of shipment, $500 per ton for the Shungnak-Fairbanks flight alone, was no object because the asbestos was needed as a filtering agent for blood plasma. [2]

Looking to Revival

Old dreams revived as the war's end seemed near. At Seward active planning for a smelter got under way in April 1945. Boosters argued that such a smelter "would draw business from all over the railroad belt and western Alaska generally, besides arousing interest in removal of hard rock mining throughout Kenai peninsula because of the elimination of shipping difficulties and traffic expense." Some wondered why forecasts were so glowing since investment in a smelter had not been feasible before the war—but such optimism was general in mining circles. [4]

In late June 1945 the government announced the end of the ban on gold mining. Miners could start operations in July but were still under serious restrictions on labor and equipment purchasing and only $500 could be expended for supplies for each operation. Operators were quick to point out that nothing really had been altered by such a tentative lifting of the ban, but, obviously, the removal of all restrictions could soon be expected. By late July the Fairbanks Exploration Company did get one dredge moving, but only "redigging residue left from previous mining." [5]

When all the wartime restrictions were finally lifted, investors, miners, and other interested Alaskans had to face a new reality. It became clear that no renewal of the "golden age" would immediately follow from the war's end. Furthermore, it appeared that miners could not blame the traditional scapegoats—timid investors and a negligent government. Now the principal impediment to profitable production was high costs. Though high costs had always been a problem to mining development, it had been possible before the war to calculate costs and probable gains with thorough research on a particular property. The new element was an unrelenting inflationary spiral that made long-range forecasts uncertain and undermined the confidence of potential investors. Miners came to believe that the negligence of government experienced earlier was a lesser detriment to them than its modern position: the federal government, they concluded, was positively hostile to mining.

The industry was in sad shape in 1945. Most dredges were intact, but other kinds of heavy and hand equipment had been scattered during the three years of inactivity. Abundant capital for expensive retooling was the first necessity, and the assurance of a sustained yield high enough to pay vastly inflated wages was the second. How could the moribund industry be revived while the gold price was still fixed at its old pre-war value? As was soon obvious, it could not be revived under existing conditions. Miners cried for relief and gained some help from territorial, state, and federal governments but nothing like the huge subsidies needed for revival.

In 1949 Alaska newspapers eagerly recalled earlier days of glory in gold mining to herald a stampede. The rumored find of nuggets at Fishwheel, on the Yukon River 20 miles southeast of Fort Yukon, drew 150 people, most of whom flew in from Fairbanks and Fort Yukon. Skeptics quickly voiced doubts, focusing on the alleged appearance of nuggets in the salmon trap of a fishwheel. Perhaps, they suggested sarcastically, the "nuggets" were petrified salmon eggs. B.D. Stewart, Alaska's Commissioner of Mines, warned against disappointed expectations and waste of money: "The futility of attempting to sink by hand prospect holes in the deep water-filled alluvium adjacent to a channel of a river the size of the Yukon," must be considered. In fact, Stewart concluded, the announced discovery "is regarded as fantastic by experienced mining men." And, soon, it was established that fantasy rather than actual gold had caused the excitement. [6]

In 1952 Phil R. Holdsworth, the territory's commissioner of mines, observed that prospecting for gold and other metals was essential to development but would need government's stimulus. Few of the old-time Alaska prospectors were active any more, and the few still working had eyes only for gold. To promote prospecting, Holdsworth called for subsidized technical education, free passenger and freight transport to the field, analysis of samples, and advice on mining plans. The program available to miners in Saskatchewan was the model Holdsworth proposed. [7]

Post-war: The 1950s

Gold production reached a post-war peak of $10 million in 1950 (the previous high was $26.5 million in 1940) before beginning a gradual decline. By comparison, the spending on military and civilian construction was about $250 million per year from 1949 to 1954. Mining suffered from the boom in construction because mining operators could not compete with the high wages offered by contractors. Mining of sand and gravel for construction did accelerate, but that industry is not part of this study.

The federal government encouraged mineral exploration and development in the 1950s with loans and contracts administered by the Defense Minerals Exploration Administration, Defense Minerals Procurement Agency, and the Reconstruction Finance Corporation. Additionally, the General Services Administration was willing to guarantee commercial loans. Particular activities accelerated by federal programs included production of antimony in the Kantishna; mercury from the Kuskokwim; tin and tungsten from the new lode mine at Lost River on the Seward Peninsula; tungsten from the Fairbanks district; and chromite from Red Mountain on the Kenai Peninsula. [8] But miners considered these programs as mere token efforts that scarcely kept an ailing industry alive.

In 1954 the Atomic Energy Commission offered bonuses for the production of uranium. In response to the federal lure, uranium was discovered at Bokan Mountain on Prince of Wales Island in 1955. Two years later uranium production commenced and production went on intermittently until 1971. The area is Alaska's largest reserve of rare earth elements.

High market prices for copper and iron in the 1950s stimulated exploration for these metals. Miners found a copper deposit on the Maclaren River south of the Alaska Range in 1953. Some road construction, such as the Denali Highway in 1953, also encouraged exploration. That year the Kennecott Copper Corporation proved they had not abandoned Alaska entirely. Kennecott's subsidiary, Bear Creek Mining Co., explored a porphyry copper deposit at Orange Hill near Nabesna. This work did not result in any production, but the Bear Creek company continued to explore in other areas and discovered copper-polymetal deposits on Ruby Creek in the Kobuk River Valley.

Southeastern Alaska appeared particularly attractive to seekers of iron. Pilot mill tests on the Klukwan deposits northwest of Haines carried out by American and Canadian steel companies and the U.S. Bureau of Mines appeared favorable in some respects. It was estimated that some 15 billion tons of magnetite ore could yield 15 to 20 percent iron and 3 to 4 percent titanium oxide. The ore could be mined and taken over the Haines Highway to tidewater. Prospects for production were tied development of the Yukon-Taiya hydroelectric project that ALCOA proposed to create enough power for smelting aluminum. When Canada refused ALCOA's request for water rights, the Klukwan mineral schemes died.

Historically, miners had demanded that the federal government provide more roads. Annual budgets of the Alaska Road Commission always seemed paltry to miners despite the agency's accomplishing a great deal. It took defense needs to dramatically loosen the federal purse strings for road building. During World War II the Alaska Highway and other roads serving military installations and a railroad extension from Portage to Whittier were built. During the war period and subsequently Alaska also gained the Haines Cut-off, Richardson Highway, Glenn Highway, Tok Cut-off, and the Anchorage-Seward road. One statistic alone shows the intensity of building: $135 million authorized for a six-year period in 1948 represented more than three times the funding of the previous 43 years. [9] Though miners appreciated the new roads, they recognized that the government's expenditure had not been directed to their needs and resented any suggestion that they were more than incidental beneficiaries.

The 1960s Stagnation

In 1960 the Bureau of Mines noted that the number of dredges working in the Fairbanks district had dropped from six in 1959 to four in 1960. This occurrence "foreshadowed the end of an industry which contributed importantly to the opening and development of Alaska." Within three to four years the FE Company shut down its prosperous dredge operation. Other dredges still operated at Nome, Chicken, the Hogatza in the Hughes district, the Yukon, and in the Kukokwim—some 22 in all. [10]

Production of gold and silver from placer and lode operations had been $5.8 million in 1960, with about half of this coming from the Fairbanks dredges. The total number of mines included six lodes and 92 placer mines.

Production figures dropped through the 1960s, particularly after the Fairbanks dredges stopped work in 1963-64. The decline had started in 1955 with production of 249,300 ounces valued at $8.7 million. In 1964 the numbers were 58,400 ounces at $2 million. Virtually all 1964 production, indeed most of the mining since World War II, had been from placer mines. [11]

A particular low point in gold mining was reached in 1966 when 55 mines did not manage even to produce $1 million. Only $928,620 was earned that year. [12]

Government's Role

The federal government continued its modest encouragement of mining after statehood. In 1961 the Federal Field Committee for Development Planning in Alaska was established to coordinate plans for federal programs promoting resource development. The Federal Field Committee studied the mining industry's needs and published its findings in a series of reports.

The new state legislature at Juneau also wanted to encourage mining. Legislators were forthright in their declarations: "Alaska's progress is directly connected with the development of its mineral resources." [13] The legislature wanted to purchase mineral ores to insure miners a market, but funds were not available. In 1963 the legislature created an assistance grant program for purchasing mining-related equipment and transportation (limited to $2,000 for individuals or $4,000 for parties). In 1967 the state offered a $10,000 bonus for the discovery and production of $100,000 worth of ore or concentrates from a previously undisclosed lode or placer with metals eligible under federal aid programs.

Tax incentive programs established by the territory were continued by the state. A 3-1/2-year exemption from mining license taxes was extended to new metal processing operations. Other legislation allowed tax credits under certain conditions. With passage of the Alaska Industrial Development Act of 1967, Alaska created a public development corporation to help fund industrial plants.

Yet, for all the new state's efforts at encouragement, mining declined to an insignificant level in the 1960s. Gold mining was particularly hard hit by the disparity between high costs and low prices. Gold production was only $803,000 in 1967. Mercury production in the Kuskokwim virtually stopped in 1963, although it revived in 1969. Uranium production at Bokan Mountain stopped in 1964. Gold prospects looked brighter in 1968 after the fixed government price of $35 per ounce was removed. Earlier, the low gold price had been considered a chief impediment to prosperity but, as gold prices rose, other adversities were to arise.

1970s: Good News

Exploration for mineral resources accelerated in the 1970s because of a decline of U.S. production of several metals; the nationalization of mining abroad; Japanese interest in Alaska's resources; Canada's reduction of its tax incentives; settlement of land selections in Alaska; native investment in exploration; and big increases in prices for gold and other metals (except copper). Mining prospects emerged in the 1970s for southeast Alaska. In 1971 nickel-copper-cobalt deposits on Yakobi Island were examined and declared valuable. The Brady Glacier copper-nickel-cobalt deposit in Glacier Bay National Park seemed headed for development until environmental protection legislation in 1976 restricted mining in national parks.

The best prospects in southeast Alaska were a molybdenite deposit at Quartz Hill in the Tongass National Forest east of Ketchikan and the polymetallic massive sulphide deposit at Greens Creek southeast of Juneau. In 1977 U.S. Borax requested an access road permit from the Forest Service that was strongly opposed by environmental groups. Since the establishment of Misty Fjords National Monument, which includes Quartz Hill, by presidential decree in 1978, the molybdenite development was been slowed. Greens Creek, however, is expected to start producing in spring 1989.

Other good news came from the southern Brooks Range when the Arctic, Sun, and Smucker deposits of copper, lead, zinc, and other metals were located. The Red Dog zinc-lead-silver deposit was discovered in the DeLong Mountains and is scheduled for production by 1990.

The following table shows expenditures on exploration from 1959-1979 (oil and gas not included):

Mineral Exploration Expenditures in Alaska
(excluding oil and gas)
1959-1979
($ million)

Year	Expenditure	Year	Expenditure
1959	1.0	1974	6.0
1960	2.0	1975	15.0
1961	1.5	1976	35.0
1962	1.0	1977	63.0
1963	1.0	1978	76.5
1964	1.5	1979	65.0
1965	3.0	1980	65.2
1966	2.0	1981	76.3
1967	4.0	1982	45.6
1968	5.0	1983	34.1
1970	7.5	1984	22.3
1971	10.0	1985	9.2
1972	7.5	1986	8.9
1973	7.0	1987	15.7
		1988	45.5

The Alaska National Interest Lands Conservation Act

In 1980 Congress, after nine years of study and controversy, established huge new parks and expanded other federal areas in Alaska. The Alaska National Interest Lands Conservation Act was heralded as a magnificent achievement by conservationists, who grasped the opportunity created by pressure from various factions for the settlement of critical land issues. "Statehood, Native land claims, and oil combined to impose a new land tenure system on one-fifth of the nation in record time," observed National Park Service historian William Brown. "At some point in this gigantic land disposition the national interest must be served." When President Jimmy Carter signed ANILCA he noted that "never before have we seized the opportunity to preserve so much of America's natural and cultural heritage." [15]

ANILCA required the national park system to extend protection to 10 new areas and to expand three existing preserves. Overall the park service became responsible for 43,600,000 acres of land. With this huge expansion of its responsibilities came new problems of park management. One issue that had generated a good deal of debate from 1971-80 concerned mining in park boundaries. Alaska miners, given the history of their industry and its decline since World War II, were particularly sensitive to any restrictions on their activities. Consideration of mining practices was not an issue that could be negotiated between the park service and the miners. It was one that involved other interested segments

of the public who had standing to bring particular mining activities before the courts.

Mining and the Environment

National environmental groups—particularly the Sierra Club, Friends of the Earth, and the Wilderness Society—have focused on Alaska since the 1960s when the proposed Rampart Dam and the Project Chariot atom bomb tests were major issues. With the passage of the National Environmental Protection Act and other protective legislation from the late 1960s into the '80s, environmentalists gained the means of bringing particular abuses to court. In the early 1970s the construction of the petroleum pipeline from Prudhoe Bay to Valdez was delayed until oil companies complied with studies of the environment required by NEPA and myriad design modifications.

The typical Alaska miner uses heavy machinery to move huge quantities of earth. On Crooked Creek near Central, Paul Manuel has invested $600,000 in machinery. His bulldozers push dirt and gravel into his wash plant at a great rate: every two minutes 30,000 pounds of pay dirt hits the conveyor belts. The yield to Manuel seems ludicrously meager—perhaps $18 in gold from every 15 tons of ground washed.

Whether the yield is large or small the water returned to the creek is full of clay and silt, and its diminished quality has aroused environmentalists. Miners can clean the water they use by allowing debris to settle in storage ponds before returning it to the river. Most court decisions that have recently affected mining in Alaska on public lands have evolved from suits brought to protect water quality. Installing settling ponds takes time and money, so miners must determine individually whether the added costs will still permit profits.

Many miners argue that the mining industry will be destroyed by environmental protection. "I'd have to say that the jury is still out on that question," says Jerry Gallagher, state director of mining. "When you cut through everything else, that's the question: Is there a spot for the placer mining industry in today's society?" While Gallagher's gloom can be understood, state geologist Tom Budtzen expects placer gold production to continue its historic domination of gold output. Overall placers have produced 75 percent while lode has only accounted for 29 percent. [16]

Expansion of Denali National Park included the historic Kantishna mining district within its new boundaries. Kantishna miners were happy to be within the park, but the handful of active miners was left to carry on in the old, careless, water-dirtying ways for several years. Confrontation occurred after a coalition of environmental societies sued the National Park Service in May 1985, alleging that the service had ignored environmental damage resulting from placer mining in Alaska's parks, preserves, and monuments. In July U.S. District Judge James von der Heydt shut down mining in the parks pending assessment of environmental impact by the park service. The order affected 30 mines of the approximately 400 active mines in the state.

Environmentalists sued the Bureau of Land Management in February 1986, calling for environmental impact studies on several rivers. They charged that silty discharges from placer mines fouled drinking water and reduced fish populations. In May 1987, U.S. District Judge James Van der Heydt ordered the Bureau of Land Management to study the cumulative impacts of placer miners of Birch and Beaver creeks, Fortymile River, and rivers draining into the Minto Flats. Placer mines that disturbed more than

5 acres of BLM land were to be shut down after the summer 1987 season until environmental studies were completed. [17]

Jack Hession of the Sierra Club was pleased with the court's decision: "Now nearly every important drainage in the state is subject to an injunction. Finally, we can hope that BLM will begin to regulate placer mining and to control its impact." Though 30 of the 45 mines on BLM land exceeded the 5-acre limit set by the court, what encouraged environmentals most about the restriction was the court's acceptance of their argument that cumulative impacts on the environment must be studied. A year earlier, the court had accepted the cumulative impact study necessity for national park lands and this ruling extended it to the rest of Alaska's public lands. [18]

The resolution of many environmental issues remains in the future. Restrictions could increase. Miners sometimes dream of a perceived national emergency that would induce the government to virtually beg them to mine much needed metals—using traditional methods or any others.

Mining Prospects Today

Meanwhile, mining goes on in areas unaffected by recent restrictions and where operators have met legal requirements. During the summers of 1987 and 1988 the huge, 14-story *Bima,* a gold dredge, worked the bottom of Norton Sound off Nome. *Bima* employs 137 giant steel buckets to scoop up gravel and silt, delivering 11,000 tons daily into vast hoppers. After washing and sifting, the material is returned to the sea leaving flecks of gold in a wire mesh for gathering. *Bima* shuts down at freeze-up, but the yield for 1987 was estimated at $14 million from 30,000 ounces of gold. Even with *Bima's* costs, the payroll of 48 men, and other expenses, the Inspiration Gold Company expects to make a profit during a projected seven-year operation period. [19]

Bima represents a familiar gold recovery technique although its telemetry technology for finding gold is modern. The great dredge's presence off Nome is a reminder of the dreams of some miners of 1899-1900. Miners who had not been able to locate any rich ground figured that the gold found in the beach sands at Nome had been washed in from Norton Sound. Tons of gold appeared to await miners clever enough to reach the sea bottom. All kinds of machinery designed to work the shore front was shipped to Nome, but none of the mechanical monsters performed successfully, even though some cost as much as $75,000 to construct. The fruitless effort ended abruptly in 1900 when a three-day gale smashed across the beaches and scattered the shattered machines far and wide. Today *Bima* is accomplishing what the pioneers failed to do.

Miners elsewhere in the state face changing calculations of the costs of mining and are pleased that the state has renewed its support. In 1981 the legislature appropriated $10 million for a mining loan fund and established the Office of Mineral Development as an advocacy group for the development of an industry willing to meet environmental standards. The Office of Mineral Development provides information, coordinates government task forces, helps provide environmental impact statement information, and advises the legislature.

Exploration has continued during the eighties, although monies spent have fallen off sharply because of world market conditions.

Among promising recent prospects has been the discovery in 1983 of a copper-lead-zinc-silver-gold deposit at Johnson River southwest of Anchorage. Houston Oil and Minerals discovered and worked tin deposits on Coal Creek near Talkeetna. Anaconda and the Cook Inlet Regional Corporation worked together at Johnson Creek and at Coal Creek. By 1988-89 expectations faded, and most activity has stopped.

The state's willingness to assist development was made clear in 1984 when the Red Dog developers (Cominco and the NANA Corporation) asked for assistance for a 57-mile road from the mine to the port. Alaska's legislature agreed to loan $150 million for construction through the Alaska Industrial Development Authority because of the promise of 400 jobs for the Northwest region.

Optimism and Drift Mining

Mining geologist and historian Tom Bundtzen has kept his eye on the persistence of traditional mining methods with underground drift miners. In small mines at Wiseman, Innoko, and Fairbanks, independent miners are trying to make a living with low-cost methods. Wally and Bonnie Gordon of Wiseman chose drift mining because they "get to work all the time, to put supper on the table—beans if nothing else—and to become intimately involved with mining." [20]

The Gordons' methods are the same as those used by hundreds of miners in the early years of the century. They thawed the ground with wood fires, hoisting the dirt with a hand-turned windlass using 5-gallon cans as buckets, and broke large rocks with a sledge hammer. Underground they used kerosene lamps for lighting. Digging went on from October to mid-January, when they reached bedrock at 39 feet and started their drift (tunnels). By May they were ready to wash down their mound of pay dirt. Modestly, the Gordons did not tell Bundtzen how much they made, but they "were able to put beans on the table."

With some refinements the Gordons have continued their operation year round. Though small, their mine held the distinction in 1984 of being "the only year-round operational metal mine in the 49th state." [21] It would not do to call the Gordons "successful" miners yet. They hope to get some expansion capital to develop open-pit mining.

By 1988 there were some reasons for optimism in the mineral industry. As Tim Bradner reported in the *Anchorage Daily News,* "placer miners and government environmental agencies are getting along better . . . It's not all hugs and kisses yet, but miners are making important progress in meeting strict federal and state water-quality standards, and regulating agencies are demonstrating a pragmatic flexibility in enforcing those standards." [22] Four months later, Bradner attended the Alaska Miners Association convention to see "lots of happy faces . . . Times are good, and getting better, for Alaska's miners, particularly those involved in exploration." [23]

Prospects are brightest in southeast and northwest Alaska, particularly for large mining companies. Near Juneau the $106 million Greens Creek Mine, expected to be the nation's most productive silver mine, was scheduled for operation in spring 1989. Some 250 miners would be employed at Greens Creek, and eventually this number could double. Owners of this underground mine on Admiralty Island expect production of 6.37 million ounces of silver annually. In addition, the annual yield will include 36,000 ounces of gold, 25,000 tons of zinc, and 9,000 tons of lead. The mine was specifically

exempted from wilderness designation in the 1980 Alaska National Interest Lands Conservation Act despite its location on the edge of the 17,000-acre Admiralty Island National Monument. Particular attention has been paid to land and water environmental protection. Also, a major exploration program could bring the historic Alaska-Juneau Mine and the Old Kensington Mine north of Juneau into production. In northwest Alaska work is going forward on the big Red Dog lead mine, scheduled to begin production in 1991.

These few developments have sparked exploration elsewhere, including surveys of the Golden Zone Mine south of Denali National Park and The Big Hurrah near Nome. The days of fixed gold prices are long gone. Now wide fluctuations are the rule but not of special concern to miners. Prices have remained $200 an ounce, and miners believe that some prospects under consideration can prosper with prices at approximately $200.

Since Alaska mining development owes much to the Klondike experience, Alaskans show lively interest in developments in the Yukon Territory. In summer 1988 miners were working on Gold Bottom and many of the other famed creeks of 1897-98 gold-rush excitement in the Dawson area. Some 200 small mining ventures are scattered along the creeks of the Yukon—two-thirds of them within 50 miles of Dawson City. In 1987 the Yukon miners produced 106,237 ounces of gold valued at $64 million, the highest amount since 1917, and production for 1988 was expected to be 50 percent higher. [24]

Miners in late 1988 were more optimistic about future prospects than they had been in several years. One reason for optimism, of course, was the continued acceleration in the price of gold—to more than $400 an ounce. With gold inflation the estimated value of Alaska's gold resource increased by a third between 1986 and 1988. The optimism is reflected by extensive exploration activity.

In 1987 Alaska's mines produced 229,700 ounces of gold valued at $104.5 million. Small quantities of tin, silver, tungsten, and platinum were also produced. The gain in southeast Alaska was particularly dramatic—from 150 ounces in 1986 to 3,400 ounces in 1987. [25]

Numbers of claims filed have accelerated rapidly in recent months. A ninefold increase in the third quarter of 1988 over the same period a year earlier is dramatic evidence of optimism. There were 16,132 new claims filed stateside in the third quarter of 1988, 3,000 of them in the Fairbanks district, and most of them on gold lode deposits. Larger mining companies were responsible for most of the claims. They have been motivated by advances in technology as well as price incentive. Technology at issue involves the use of chemicals to separate, or leach, microscopic gold particles from low-grade ore deposits. The geological formation of the Fairbanks area lends itself to use of the leaching technology.

State mining director Jerry Gallagher noted a difference between current locations of claims and those filed in the early 1970s when gold prices started their rise. Earlier claimants staked "in the middle of nowhere. This time the interest is in precious metal deposits along side existing roads and rivers. I'd say it's a little smarter." [26]

Rare-earth Elements

Rare-earth materials are certain oxides of metals needed in the manufacture of crystals, alloys, magnets, and solid-state devices. The state of Alaska has been encouraging miners to consider the long-range prospects of rare-earth mining. According to state mining director Jerry Gallagher miners must look to the future: "It takes a long time to develop these things, but this is what the mining industry needs. We need to develop new technologies, instead of having everyone running out into the hills every time the price of gold hits $400 an ounce, and shutting down every time the price drops again." [27]

Conclusion

A review of the efforts by national and state governments to revive mining over the last 40 years indicates that the industry's potential has not been neglected. Some miners have complained that the government programs have accomplished little because they did not really provide substantial aid. Some miners want more government help to get the industry on its feet. No government program offered anything like the assistance most miners believed they needed. Some miners argue that they do not need aid but do need the removal of government restrictions. "Get off our backs," is their cry. Given the importance of mining in Alaska's past and the potential defense needs of the nation, miners have been unhappy with governments' stinginess. And they have felt particularly uncomfortable about government policies and supposed official hostility to mining, particularly by the National Park Service, since ANILCA passed in 1980.

Mining can no longer operate with the freedom of earlier days. But, despite environmental restrictions, a mining revival is under way. Miners note that the high prices of gold and other metals have much more to do with the revival than do any government programs. How much mineral production will increase in the years to come cannot be known. It seems unlikely that mining will ever be as important as it was during the early years of the century but neither does it seem likely to fade away as it did to some gloomy observers in the 1960s and 1970s.

Notes: Chapter 17

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4. *Alaska Weekly,* April 20, 1945.
5. *Alaska Weekly,* June 29, July 27, 1945.
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9. Claus Naske, *Paving Alaska's Trails* (New York: University Press of America, 1986), 227; Roads, *Mining,* 184.

10. *Minerals Yearbook 1960,* 81.
11. Ibid., *1964,* 95.
12. Ibid., *1966,* 81.
13. Roads, *Mining,* 195.
14. Ibid., 20; Tom Bundtzen to author, July 20, 1989.
15. Willis, "Do Things Right the First Time, " iii, 237.
16. Ibid., June 28, 1987; Tom Bundtzen to author, July 20, 1989.
17. Ibid., May 31, 1987.
18. Ibid.
19. Ibid., September 27, 1987.
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21. Ibid., 3.
22. *Anchorage Daily News,* June 5, 1988.
23. Ibid., October 22, 1988.
24. *New York Times,* July 28, 1988.
25. *Anchorage Daily News,* August 19, September 29, 1988.
26. Ibid., September 13, 1988.
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Significance of Mining in Alaska's Past

Number Games

Showing the value of Alaska's mineral resources to the nation used to be a popular political tool for Alaskans. James Wickersham and other Alaska representatives to Congress loved to compare the modest purchase price of the territory and the total government's expenditures on improvements to the value of Alaska's product. With gold, salmon, and other products, Wickersham figured in 1932 that Alaska had contributed $2.5 billion more to the nation than the government had spent in the territory. Philip Smith of the USGS calculated that by the end of 1936, the total value of all minerals produced in the territory was $720,000,000 "or one hundred times the purchase price of the Territory." In January 1941 the *Seattle Post-Intelligencer* crowed about Alaska's record gold production of $25,375,000 in 1940. The editor reminded readers that Alaska's total gold production mounted to $561 million, "a wonderful return on an investment of the $7.2 million purchase price." [1]

Many general claims made by the Seattle editor were true enough: "The Yukon and Alaska discoveries of the Klondike era strikingly altered worldwide financial conditions, completely changed the trend of monetary theory over a large part of the United States—and incidentally made Seattle as a modern city." [2] Pacific coast cities had prospered at least partly because of the gold rush, particularly Seattle, Tacoma, Portland, Victoria, Vancouver, and San Francisco. Seattle gained most because the business community established the port as the best outfitting, shipping, and trading center for the North. Merchants, whose total pre-Klondike sale of goods was some $300,000, were selling $10 million worth in 1899.

The nation as a whole benefited as well. Economic depression, which had dogged the 1890s, gave way to much better times with the gold boom.

Alaska's Development

Altering worldwide financial conditions was less important from a national and regional standpoint than was the impact of gold production on Alaska's development. Great wealth was produced in a region that had formerly produced little. The wealth was bountiful, widely distributed throughout the territory, and capable of supporting communities for decades.

An assessment of the importance of mining cannot be measured solely in terms of production. Alaska's development owes more to mining than perhaps any other region in America. But for gold discoveries on the Yukon and Seward Peninsula, the interior might have remained a scarcely known, sparsely populated region into the present. Thanks to the Klondike and Nome gold strikes the population of Alaska doubled between 1890 and 1900 to reach 63,592 persons. The native population remained stable at some 30,000, so the gold rushes were responsible for bringing in some 30,000 new residents.

Gold excitement helped to interest and educate the nation to the value of Alaska. It fostered progress in exploration, transportation, land administration, and law-making by government; and it greatly increased capital investment by private individuals. The general movement of the American population from east to west was stimulated by related economic activity in Pacific Coast cities.

The mining industry greatly influenced and largely directed the course of Alaska's development. By 1912 the total gold output exceeded $225.5 million. Copper production had been only $16 million by that early date, but Kennecott's operation had scarcely begun. In addition to the great wealth of gold and copper produced, there had also been more than $2 million in silver. It was significant in fostering development that the mineral production had been so widely dispersed from Juneau, Unga Island, Kenai, Prince William Sound, Seward Peninsula, and the subarctic and arctic interior. It was also important that the several major discoveries occurred over a number of years, thus allowing a more orderly development of transportation and other support services.

Exaggeration of mining's effects on development would be difficult. In several regions the first permanent communities were established as a direct result of mineral discovery. Tens of thousands of people first settled in Alaska because of the mineral discoveries and at times up to 60 percent of the population was supported directly or indirectly by mining activities. From 1885 to 1964 gold production totaled $750 million.

The peak year of Alaska's gold production was 1906, when the territory ranked second to Colorado in output. Overall, for production in this century, Alaska ranks fifth after California, Colorado, Nevada, and South Dakota. These states are generally referred to as "the big 5" and account for 80 percent of gold mined in the United States. Among the nation's individual mining districts, Alaska's leaders—Fairbanks, Juneau, and Nome, rank seventh, eighth, and 13th nationally. Fairbanks leads all placer districts, however, with a production of 7.2 million ounces. Nome's output totaled 3.5 million ounces. By comparison, Canada's Klondike district leads all those in North America with 11 million ounces. [3]

Alaska's contribution to the nation's total gold production has been substantial too. In 1908 Alaska's share was 8.8 percent rising to 16.9 in 1910, 16.7 in 1915, 17.1 in 1920, and peaking at 20.1 in 1933. From that time the decline was sharp, yet remained about 10 percent in the early 1960s. [4]

It was not until 1938 that commercial fishing superseded gold as the most valuable export from Alaska, but mining continued to be significant for several more years.

Cultural Significance

Any gain to individuals, communities, or the nation must be considered a significant value and be worth inclusion in an assessment of mining history. The perceived value of the experience in character building upon participants has been discussed (see Chapter 5). Though such intangibles are impossible to measure, it does relate to a well-known overall interpretation of the frontier experience. The Turner thesis, a contribution to American thought made by the 19th century historian, Frederick Jackson Turner, holds a number of elements. Of application here is Turner's view that Americans' westwarding tendencies stamped the national character with qualities of initiative, resourcefulness, courage, and other virtues. In substance, Americans became better people because they forced themselves out of settled molds into novel and unsettled conditions on the frontier.

Whether derived from Turner or not the same theory has been presented by Alfred H. Brooks, chief of the USGS in Alaska. Brooks, whose fieldwork dated from the Klondike era, liked to generalize about 50,000 stampeders to Alaska. They were "thrown entirely" on their own resources, Brooks argued.

> Life on the Klondike Trail was a great winnowing process. A man stood on his own feet. If he had the basal character, he won; if not, he became a derelict. A small percentage failed through lack of moral stamina . . . On the other hand, many a man who had not developed beyond mediocracy in his own community, tightly bound by tradition and customs, found in Alaska his opportunity and rose to his true level. This last of our frontiers, therefore, has played a part in developing breath of view and character among our people. [8]

Brooks may have overstated his case, but his position has some validity

Colonial Mentality

The attitudes of miners to the government reflect a negative cultural heritage. Miners long resisted the fact that investing in mining was a risky venture for both private capital and the government. Territorial mineral resources could not be exploited profitably unless transportation difficulties were reduced and the quantity of placer or ore was great enough to justify expenditures on equipment and other costs. Investors had to make the same calculations on a mining investment anywhere, of course, but particular considerations of distance, costs, length of working season, and other matters were required in Alaska.

Similarly, the government had to balance the demands of Alaskans for improvements against other national needs and in terms of long-range gains to the territory. But Alaskans also had a difficult time in assessing government's efforts in fostering mining and other development. Rather early in territorial history the tradition of blaming the government for everything but the weather became established. As mining opened up the country, it somehow seemed reasonable to praise the initiative and other fine qualities of involved individuals and to censure the government when conditions went sour. Government officials, on the other hand, thought that they deserved some credit for Alaska's progress.

This peculiar tendency of Alaskans was a familiar attitude on other western frontiers as well. Home-rule measures, including territorial representatives in Washington, elected officials, and a legislature were long in coming to Alaska so the "colonial" attitude persisted longer than elsewhere. Even when some elements of home rule were established, the critical attitude of Alaskans towards the national government persisted strongly until statehood. After statehood, Alaskans had control of many matters, but Uncle Sam remained the major landowner so the occasions for complaining did not vanish entirely.

Cultural Influence

Cultural influences expressed in mining literature and legend have been treated elsewhere (see Chapters 5 and 6), but some general characteristics are worth noting. Few Alaskans today have anything directly to do with mining, but a general understanding of methods and historic activities forms part of the popular culture. Alaskans commonly use mining terminology and metaphor. This was even truer in earlier decades, of course, particularly in areas where mining was common. Even with the decline of mining in recent times, interest in historic activity has flourished.

The efforts of state, federal, and private landholders to preserve remnants of mining industry have been valuable. The state park preservation of Independence Mine at Hatcher Pass; the National Park

Service's care at Skagway and along the Chilkoot Trail; and the restoration of buildings in the old mining camp at Crow Creek near Alyeska are examples.

Still another explanation of the modern public's ease of identification with the mining tradition is in its relationship to other activities. Alaska's hunters, trappers, dog mushers, and hikers have a certain respect for those early miners. It required travel skills and a spirit of adaptation that is generally admired by Alaskans who have a particular sensitivity to their natural environment.

Conclusion

Emphasizing the great significance of mining in Alaska's economic history is easier than predicting what might occur in the future. The "boom or bust" cycle of Alaska's economy has been prominent throughout territorial and statehood history. The ups and downs of mining have contributed to this characteristic cycle. Whether those who in recent years have forecast the end of Alaska's metal mining have read the future accurately cannot be known. Interestingly enough, the latest statistics of 1988 show gold production of 265,500 ounces—a 16 percent increase over 1987. [9]

Many observers of the industry argue that other contemporary trends point to a gloomy future. The number of mines has fallen sharply over the last five years. Most of the production increase can be traced to the mines at Valdez Creek and *Bima's* work off Nome. Many placer miners have relocated in the Yukon Territory, where the government's policies favor mining and where support efforts far exceed any that Alaska miners have ever received.

Notes: Chapter 18

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