Cultural Landscape Report

Bremner

Historic Disctrict

Wrangell-St. Elias National Park and Preserve, Alaska

By Paul J. White

Michigan Technological University, National Park Service 2000

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Appendix 1 has been omitted from this document.

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Cover Inset Photo: Upper camp of the Yellow Band Mine, circa 1938, looking south down Golconda Creek Valley. Courtesy of Sylvia Baldwin.

Background Photo: Yellow Band Mine aerial tramway, viewed from near the upper tram terminus, circa 1938. Courtesy of Sylvia Baldwin.

Opposite: Main camp of Yellow Band Gold Mines Inc., in use from 1939 to 1941. Photo by Mary Beth Cook, July 1998.

As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural and cultural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to assure that their development is in the best interests of all. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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At the National Park Service, Anne Worthington, archaeologist at the Wrangell-St. Elias National Park and Preserve, played a key role in wrestling with the logistics of this project and also supplied documentation and important suggestions. Geoff Bleakley and Logan Hovis, respectively from the park office and National Park Service Alaska Support Office in Anchorage, generously shared their knowledge of mining history, providing me with pertinent source materials and invaluable editorial comments. Mary Beth Cook from the park provided botanical data used in this report and helpful comments on the vegetation section. Thanks also to Robert Spude for information on National Park Service activities in the Bremner District during the 1980s, as well as suggesting valuable resources for mining history research.

I would like to express sincere gratitude to Sylvia Baldwin, who generously loaned previously unknown documents and photographs pertaining to her father's operation in the district. In addition to providing an enhanced perspective of the Bremner District's significance, this collection enabled the writing of a more comprehensive site history and led to the identification of new archaeological sites in the district.

Many thanks to circulation desk, inter-library loan, and government documents staff at the J. R. Van Pelt Library, Michigan Technological University, for pursuing requests for contemporary texts and documents. Additional thanks to Susan Kruger at Michigan State University, India Spartz at the Alaska State Library, and archivists Erik Nordberg (Michigan Technological University's Copper Country Archives) and Bruce Merrill (Anchorage Municipal Libraries) for providing useful materials and assistance during research.

As a final note, thanks to faculty, staff, and fellow students in the Program in Industrial History and Archaeology for generating an enthusiastic and truly supportive environment throughout the MS degree.

PJW

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Introduction

The Bremner Historic District is a nationally significant gold mining landscape formed in the early-to-mid-twentieth century during the Klondike Gold Rush and Great Depression eras. Encompassing more than 20,000 acres in the Wrangell-St. Elias National Park and Preserve (WRST), southcentral Alaska, the Bremner District superbly preserves a broad spectrum of mining technologies and infrastructure, existing as standing structures, surface remains, isolated artifacts, and archaeological sites. In the absence of major disturbances, the Bremner Historic District retains much of the fabric of a small-scale mining landscape, rarely so well preserved.

Both remoteness and comparatively few tourists to the park account for the Bremner District's low-to-moderate visitation levels. However, as the popularity and accessibility of other scenic mining locations in the park increase, the Bremner District is similarly expected to become a popular destination for its virtues of impressive scenery and excellent heritage preservation.

This cultural landscape report provides information preparatory to the anticipated need for more thorough management of the Bremner Historic District. In the absence of a prior historic resource study, this report includes a comprehensive documentation of the historic mining landscape formed from 1901 to 1998. In keeping with standard cultural landscape report formats, this report identifies the significant natural and cultural elements defining the historical landscape, describes the potential threats to the integrity of the district, and provides management recommendations to ensure the district's future preservation.

Study Location and Boundaries

The Bremner Historic District is located approximately 30 miles southwest of the town of McCarthy in the Wrangell-St. Elias National Park and Preserve, Alaska (figures 1.2 and 1.3). The district occupies a mountain pass between the North Fork of the Bremner River and Monahan Creek in the Chugach Mountains,

Figure 1.1. Historic accommodations at the Yellow Band Mine. Tin sheeting and dry-stone walls have protected the canvas wall tent, in addition to furnishings that include clothing and foodstuffs, from the elements for over sixty years. Photo by Patrick Martin, MTU #BL-10.41.98.

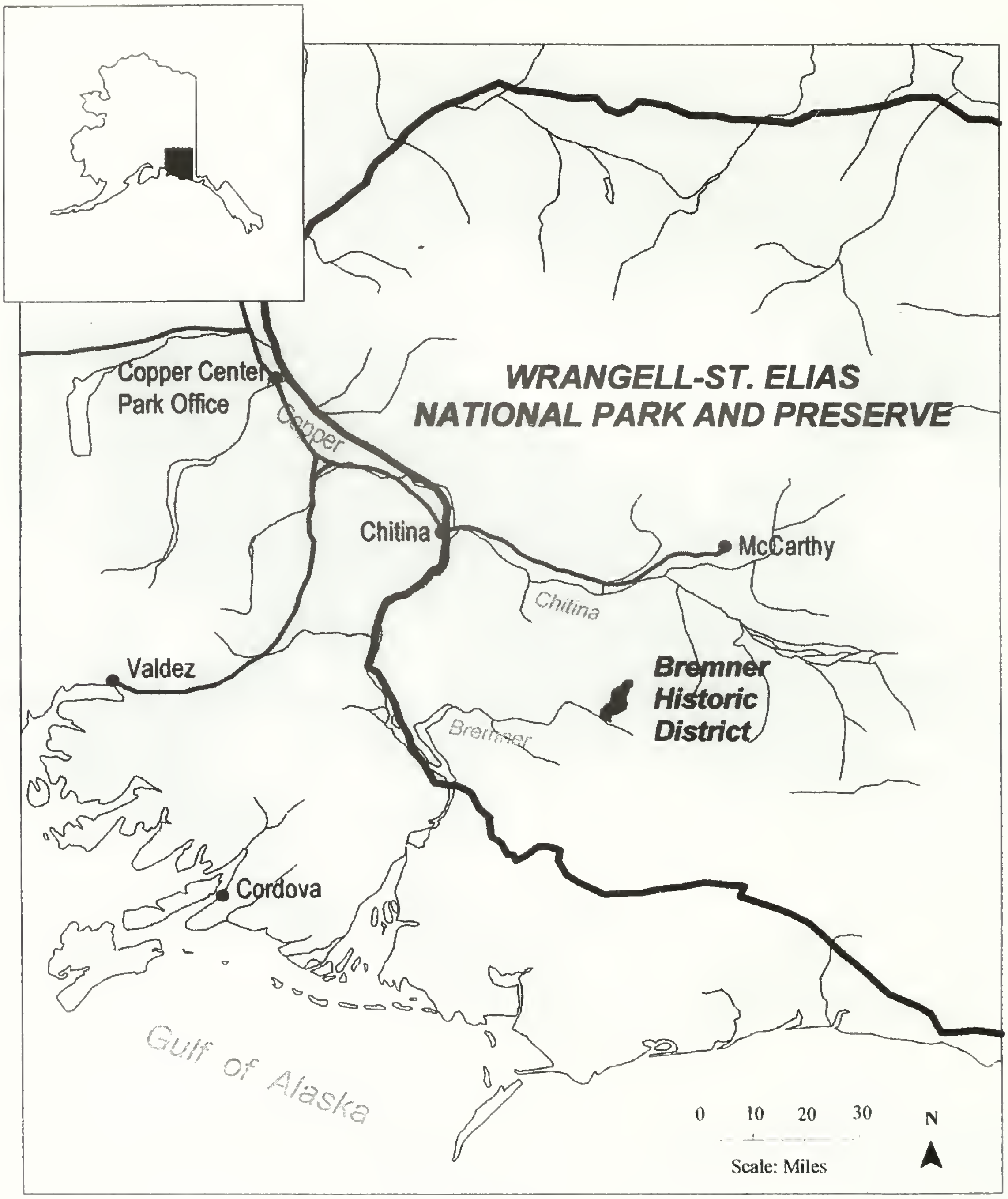


Figure 1.2. Location of the Bremner Historic District in the Wrangell-St. Elias National Park and Preserve, Alaska.

Figure 1.3. Bremner Historic District, showing National Register boundaries and adjacent areas included in this report.

national register boundaries following the watersheds of Standard Creek, the northern half of Golconda Creek, and the southern part of an unnamed stream north of the pass. Northern and southern limits are defined respectively by the confluence of two unnamed streams a mile southwest from Monahan Creek and the confluence of Golconda Creek and Lost Shovel Creek. The district extends for a linear distance of seven miles with a general width of two to three miles (maximum width is four-and-one-half miles).

The important historical connections linking the Bremner District to other mining districts in the Copper Basin, as well as to regional and territorial agencies and national economic conditions, necessarily extend the landscape context of this report beyond the confines of national register boundaries. Management recommendations, nevertheless, relate specifically to sites and areas within and immediately adjacent to lands proscribed for the National Register of Historic Places.

Statement of Significance

The Bremner Historic District meets all four significance evaluation criteria for the national register, defined as association with important events, significant individuals, the embodiment of distinctive characteristics, and potential to yield important information.

Mining in the district closely followed national gold mining trends during the Alaska Gold Rush, World War I, Great Depression, and World War II eras. Mining practices reflected a number of themes important to America's mining history, including changes from placer mining to lode mining, the use of air transportation, and the shift in the control of operations from self-taught miners to university-trained mining engineers. Gold mining in the Bremner District was also firmly connected with significant places and events in the Copper Basin, including the Kennecott Copper Corporation, Copper River and Northwestern Railway, and the Nizina and Nabesna gold mining districts (all of which at least partially reside within park boundaries). Conversely, the discovery of gold in the Bremner District triggered a small rush that encouraged additional prospecting in the region and aided the establishment of regional transportation networks and support industries.

The district is intimately associated with Asa C. Baldwin, a significant figure in Alaska's heritage. In addition to working mining claims in the district between 1935 and 1942, Baldwin served as a field officer in the 1910-1913 Alaska Boundary Survey and played an important role in the Chitina Valley region as a contract surveyor for other mining companies, including the Kennecott Copper Corporation, Nabesna Mining Corporation, and various mines in the Nizina District.

During its operation, the Bremner District incorporated technologies in accordance with contemporary small-scale mining techniques. The district preserves placer mining and lode mining activities from all periods of operation. The preservation of mine sites, milling machinery, habitation sites, claim boundary markers, water conveyance systems, and other supporting infrastructure provide unique insights into understanding the diversity and texture of early-to-mid-twentieth century mining practices.

The excellent preservation of the Bremner Historic District yields an invaluable resource for the study and interpretation of Alaska's mining heritage. In the absence of non-mining related activity, and the minimal impact of mining operations after World War II, the Bremner Historic District preserves a near-pristine historic mining landscape. Consequently, the district has the potential to contribute significantly to the understanding of technological adaptation and change, abandonment processes, and human social behavior applied to the small-scale mining industry. In addition, the Bremner District provides a wealth of information (both documentary and archaeological) pertaining to mining operations during the Great Depression, a significant period in the history of the United States that has not yet seen active preservation or interpretation.

Historical Summary

Mining operations in the Bremner District occurred in two principal phases. From 1901 to 1916, miners worked placer claims located in the southern half of the district. Between 1927 and 1942 the mining emphasis shifted to the exploitation of gold lode deposits in the upper portions of the valley.

In the summer of 1901, a small group of prospectors discovered gold-bearing gravels in payable quantities near the head of the North Fork of the Bremner River in the Chugach Mountains. Despite efforts by the prospectors to suppress the news of discovery, the Bremner District experienced a limited gold rush in the following two years. Prospectors and land speculators quickly staked streams in the district, including Monahan Creek, Golconda Creek, and Standard Creek. In mid-1902, however, news of more promising gold strikes in the Nizina District attracted the bulk of rushers, leaving only a dozen miners in the Bremner region. Operations at this stage centered on gravel deposits along Golconda Creek (at the center of the Bremner Historic District). Initial workings employed hand techniques and the limited use of water power. By 1904, efforts included the direction of pressurized water against bench deposits (hydraulicking), similar to methods employed in Chitina Valley placer claims. In 1911, the Golconda Mining Company consolidated all claims on Golconda Creek and installed a second hydraulic plant. Falling gold prices coupled with the outbreak of World War I aggravated the gold industry nationally. Reflecting these trends, workings in the Bremner District practically ceased after 1916.

The reestablishment of mining activity in the late-1920s brought a new emphasis on the working of gold lode deposits discovered near the headwaters of Golconda Creek. During 1934 and 1935, the Bremner Gold Mining Company installed necessary mining support infrastructure, including a power plant, concentration mill, and tramway.

The improvement of gold prices in the early 1930s also stimulated the activities of other prospectors. By 1935, the Yellow Band Group managed by Asa Baldwin (a prominent mineral surveyor), was mining lode claims a few miles south of the Bremner Gold Mining Company's workings. Three years later, the Yellow Band Group consolidated all lode mining claims in the Golconda Creek area and formed Yellow Band Gold Mines Inc. During that time, the Bremner District contained the only operating lode gold mine in the Chitina Valley. Gold mining activity ended in 1942 with the imposition of War Production Board Order L-208 declaring gold and silver mining a non-essential war-time industry.[1] The death of Asa Baldwin in September of that year, coupled with the depressed economy for gold mining, crippled the Yellow Band Gold Mines and forced its eventual demise. In the late-1950s, Yelinore Inc. conducted assessment work on claims belonging to the moribund Yellow Band Gold Mines. Low gold prices and high development costs, however, continued to discourage operations and attempts to rejuvenate lode mining ceased altogether by the late 1970s.

Placer deposits received sporadic attention in the post war period. An increase in gold selling prices in the mid-1970s saw the return of small-scale placer operations in the district, typically employing mechanical excavators. At the formation of the Wrangell-St. Elias National Park and Preserve in 1980, attempts to mine deposits soon ended. Throughout its history of exploitation, miners in the Bremner District reaped only low to moderate profits. Belief in the district's potential wealth, nevertheless, continues, and visitors today occasionally engage in gold panning.[2]

Administrative Background

Federal interest in the formation of a National Park in the Wrangell-St. Elias region has a long and complex history, beginning while lode mining companies still conducted operations in the Bremner District. In 1938, Ernest Gruening, director of the U.S. Department of the Interior's Division of Territories and Island Possessions, formulated plans for the "Kennicott National Monument," also heralded as the "Alaska National Park" and "Panorama National Park."[3] Proposed park boundaries incorporated only the Chitina Valley in order to enable continued mineral exploration in the Wrangell and Chugach ranges. Initial plans for the park, however, were dashed by the refusal of the Kennecott Copper Corporation in 1940 to grant full rights to its mining property north of McCarthy and, a year later, by President Roosevelt's rejection of the plan.

The disparate interests of federal agencies impeded proposals for a national park in the Wrangells region after World War II. Until the mid-1970s, the Bureau of Land Management, Bureau of Outdoor Recreation, National Park Service, United States Fish and Wildlife Service, and United States Forest Service all competed individually for land in the area. However, the number of cooperative inter-agency studies conducted in the park gradually increased through the 1970s. Recommendations primarily designated wilderness areas and areas for economic or subsistence use, but catered little to heritage preservation. Indeed, a 1973 cooperative report recommended the Bremner District, along with other historic mining districts in the park, for exclusion from preservation in the interests of potential mining.[4] Park proposals in the post-war era faced the conflicting interests of local user groups (including miners, tour guides, sport hunters, and residents) that persisted even after the formation of the Wrangell-St Elias National Park and Preserve.[5] In addition, proposals faced a growing animosity by Alaskans toward the federal "locking up" of large land tracts after Alaska statehood was granted.[6]

In 1980, after more than 40 years of debate, the 13.2-million-acre Wrangell-St. Elias National Park and Preserve was formed with President Carter's signing of the Alaska National Interest Lands Conservation Act (ANILCA).[7] The Bremner District, consequently, became part of a wilderness area in the park. Although ANILCA's objectives included the management of cultural and archaeological resources, the purpose statement for the park only addressed these values indirectly:

> The park and preserve shall be managed for the following purposes, *among others:* To maintain unimpaired the scenic beauty and quality of high mountain peaks, foothills, glacial systems, lakes, and protect habitat for, and populations of, fish and wildlife including but not limited to caribou, brown/grizzly bears, Dall sheep, moose, wolves, trumpeter swans and other waterfowl, and marine mammals; and to provide continued opportunities, including reasonable access for mountain climbing, mountaineering, and other wilderness recreational activities.[8] [emphasis added.]

The absence of a formal heritage statement reflected, in part, the paucity of cultural resource information about the region until then. Given the park's immense size, the first few years of its existence necessarily focused on administration. This provided a low-scale National Park Service presence in the park throughout the early-1980s and limited the implementation of cultural resource studies. Consequently, the Bremner District received only limited attention during the 1980s. In 1982-3, the park initiated an inventory of historic properties to acquire base-level information on cultural resources. Researchers visited the Bremner District and briefly documented the two most visible sites on the valley floor, the Lucky Girl Mill (XMC-104) and Yellow Band Gold Mines camp (XMC-105).[9]

At the implementation of the Cultural Resources Mining Inventory and Monitoring Program (CRMIM) in 1985, the National Park Service began compliance-based documentation of mining sites in the park.[10] Focusing initially on areas with active mining claims, the inventory later expanded to include other accessible sites with high potential for renewed mining activity. A National Park Service mining compliance team visited the Bremner District around then, but conducted no extensive fieldwork due to the area's low priority.[11]

In 1986, the Yellow Band Gold Mines camp and Lucky Girl Mill acquired eligibility to the National Register of Historic Places as intact examples of early twentieth century gold mining technology. A National Register nomination was initiated then, but left incomplete until 1998.[12]

Beginning in 1990, the National Park Service undertook more intensive documentation in the Bremner Historic District. Fieldwork conducted during the summer seasons of 1990, 1991, and 1993 followed standard surveying procedures, with sites mapped, photographed, and inventoried. A total of 11 sites (including site clusters) and 21 "isolates" were recorded by these methods.[13] Concentrated largely on the lode mining landscape in the north half of the valley, these surveys nevertheless indicated the diverse texture and excellent preservation of the Bremner District and laid the groundwork for its development as an interpretive resource.

In 1997, the park entered in a cooperative agreement with the Program in Industrial History and Archaeology at Michigan Technological University for the continuation of a cultural landscape inventory, and production of a cultural landscape report for the Bremner Historic District. In addition to identifying and documenting cultural resources, this contract involved assessments of archaeological resources and features associated with mining technology, suggestions for the treatment of significant resources, and the creation of a Geographic Information Systems (GIS) database.

Methodology and Scope

This cultural landscape report was generated by Michigan Technological University in consultation with the Wrangell-St. Elias National Park. Following cultural landscape report guidelines, the report's production involved both the recording of existing conditions and extensive documentary research. This report serves concurrently in lieu of requirements of an MS degree in Industrial Archaeology at Michigan Technological University.

Existing conditions were recorded on two occasions, 4-13 August 1997, and 21-27 July 1998. The 1997 field team included graduate students Will Updike and Paul White from Michigan Technological University and National Park Service seasonal archaeologist Meagan Wehrstedt. Park historian Geoff Bleakley visited the Bremner District from 10-13 August. An archaeological survey of the north pass region and an extended survey along Golconda Creek in the southern portion of the valley added five sites and 53 isolates to the archaeological inventory. In addition to the generation of site maps and photographs, Global Positioning Systems (GPS) were implemented to record site locations accurately for incorporation into the GIS database.[14]

The 1998 field survey was conducted by archaeologists Pat Martin (Michigan Technological University) and Paul White. Focusing on the pass region, fieldwork involved a detailed documentation of the Lucky Girl Mill, the recording of two new sites, and collection of additional GPS locations. Areas not surveyed on either occasion included the upper reaches of Standard Creek, Shovel Creek, and approximately four miles of the lower reaches of Golconda Creek.

Michigan Technological University conducted historical research with some materials supplied by the Wrangell-St. Elias National Park and Alaska Regional Office. Primary sources consulted included contemporary accounts by federal and territorial agencies (including United States Geological Survey [USGS], Alaska Territorial Department of Mines, Alaska Road Commission, and Annual Reports of the Governor of Alaska), census data, and materials held in the Asa C. Baldwin Collection in the Alaska State Library, Juneau.[15] A prior local newspaper search (conducted by Robert Spude, National Park Service) was available on file at the National Park Service Alaska office in Anchorage.

Other research included an extensive documentary search of contemporary mining literature, including geological reports by the USGS, mining periodicals (*United States Bureau of Mines, Engineering and Mining Journal, Mines Magazine, Mining and Metallurgy, Mining Journal, Mining Congress Journal, Minerals Yearbook*), mining texts, and theses. Current mining litera-

Figure 1.4. Haul road constructed by the Yellow Band Gold Mines and Alaska Road Commission between 1939 and 1941. Five miles in length, the road improved access to company timberlands and the Chitina Valley. Photo by author. MTU #BL-12.8.97.

ture consulted included mining histories and journals (*Mining History Journal, Technology and Culture*), archaeological reports, theses, and conference papers. Administrative documents pertaining to the Bremner Historic District (including site reports) and the formation of Wrangell-St. Elias National Park and Preserve were acquired from government documents and documents on file at the National Park Service Alaska office and at park headquarters.

A wealth of previously unknown primary documents (including annual reports, photographs, and letters) pertaining to the Yellow Band Group and Yellow Band Gold Mines Inc. were uncovered during the course of research. Sylvia Baldwin, daughter of mine manager Asa Baldwin, kindly sent originals to the author to aid the generation of this report. These materials now reside in the Asa C. Baldwin Collection, with copies filed at park headquarters in Copper Center.

Organization of the Report

This cultural landscape report is organized into seven chapters. The following four chapters present landscape information gathered from the existing conditions survey and documentary research.

Chapter II uses information from archaeological reports, contemporary literature, and the 1997 and 1998 existing conditions surveys to detail the environmental setting of the Bremner Historic District. This chapter also provides an historical background to the recording of environmental conditions in the Bremner District and Chugach Range.

Chapter III provides an overview of the history of mining in the Copper Basin using information gleaned from recent and contemporary mining literature. This chapter also discusses the economic, social, and technological trends affecting the mining industry between 1898 and 1998 and reviews mining techniques employed by miners in the Copper Basin.

Chapter IV uses information gleaned from primary documents and the existing conditions surveys to specifically address the history of the Bremner District. Activities in the district are classified into six historic periods, 1900-1916, 1916-1927, 1927-1938, 1938-1942, 1942-1980, and 1980-1998. Impacts to the landscape are described for each period, in addition to the site history.

Chapter V employs archaeological site reports and information gathered from the existing conditions surveys to present a detailed account of the current state of cultural resources in the Bremner Historic District as of 1998. This includes site-by-site and area descriptions. Sites lying immediately outside national register boundaries are also discussed.

The remaining two chapters compile information from chapters II-V to present an assessment of the nature of resources in the Bremner Historic District. In Chapter VI landscape characteristics essential to the historical integrity of the Bremner District, as well as potential threats to the cultural resources, are identified and evaluated.

Chapter VII presents preservation strategies applicable to the management of the Bremner District. Management options are selected from those strategies able to retain the significant landscape characteristics identified in previous chapters and from those considered applicable to industrial sites and sites within the Wrangell-St. Elias National Park and Preserve.

Chapter I: Endnotes

[1]A. H. Koschmann and M. H. Bergendahl, "Principal Gold-Producing Districts of the United States," *USGS Professional Paper 610* (Washington: GPO, 1968), 6.
[2]This practice was witnessed during the 1997 and 1998 existing conditions surveys.
[3]Refer Michael Lappen, *Whose Promised Land?: A History of Conservation and Development Management Plans for the Wrangell and Saint Elias Mountains Region, Alaska 1938-1980*, M.A. thesis (1984: Univ. of California Santa Barbara); John D. Coffman and Harry J. Liek, *Report on Proposed Alaska National Park* (National Park Service, 1938).
[4]Refer M. W. Henning and P. Dobey, "Geologic and Mineral Evaluation of the Chitina and Bremner River Drainage Basins," *Alaska Division of Geological and Geophysical Survey Open File Report 25* (1973), 10.
[5]Refer Donald C. Defenderfer and Robert B. Walkinshaw, *One Long Summer Day in Alaska: A Documentation of Perspectives in the Wrangell Mountains* (Santa Cruz: Univ. of California Environmental Field Program, 1981).
[6]Lappen, *Whose Promised Land?* (see n. 3).
[7]Public Law 96-487, 2 December 1980.
[8]Public Law 96-487, 2 December 1980. Section 201 (9), 2381.
[9]Site numbers in parentheses were not designated until surveys in 1990. The numbering system refers to 1:250,000 quadrangle maps. XMC designates those sites in the McCarthy quadrangle, XBG those in Bering Glacier.
[10]B. M. Saleeby provides an overview of the CRMIM program. Refer *The Quest for Gold: Overview of the Cultural Resources Mining Inventory and Monitoring Program* (National Park Service, n.d. draft on file at Alaska Support Office). Limited mention of the Bremner Mining District was given in William Hunt, *Mountain Wilderness: Historic Resource Study for the Wrangell-St. Elias National Park and Preserve* (National Park Service: Alaska, 1991), a park-sponsored historic resource study.
[11]Robert Spude, personal communication, 1997.
[12]The 1998 National Register nomination form is part of a multiple listing, "Historic Properties Associated with Mineral Development in Wrangell-St. Elias National Park and Preserve, Alaska, 1898-1947." Refer Geoffrey Bleakley, *National Register of Historic Places Registration Form: Bremner Historic District, Wrangell-St. Elias National Park and Preserve* (manuscript 1998, on file at park office).
[13]Isolates include those artifacts of significance found individually or in clusters too small to warrant designation as an archaeological site, such as a sled, rock cairn, or small artifact scatter. The 1998 national register nomination reclassifies 10 of these sites as 17 buildings, 22 sites, 20 structures, and 5 objects.
[14]PLGR and Trimble units were used to record GPS points. Approximately 300 locations were recorded in 1997, with two to three points recorded for large sites, widely spaced to define their boundaries. The 1998 existing conditions survey recorded sites on the valley floor in more detail. Although more accurate than previous location estimates, the mountainous relief of the Bremner Pass region constrained the horizon for tracking satellites and prevented ideal GPS operating conditions. Errors varied from 5.2m to 53m (radius), with an average error of 11.2m.
[15]The Asa C. Baldwin Collection includes a personal diary of the late-1940 and 1941 seasons, three reels of 8mm film taken during the operation of the Yellow Band Gold Mines Inc., and a number of survey maps.

CHAPTER II: ENVIRONMENTAL SETTING

Background Context

Until the late-nineteenth century, the recording of environmental conditions in the Copper River region was principally conducted by fur traders and mineral prospectors, in keeping with the general state of recording in Alaska.[1] After a number of prior attempts, the first successful survey of the region took place in 1885 with Lieutenant Henry Allen's 1,300-mile expedition up the Copper, Tanana, and Koyukuk Rivers. Compiling notes on Alaska Natives, climate, geology, minerals, and fauna, in addition to generating a topographic map, Allen's expedition provided the first publicly accessible geographic information about the region. Although later hailed as an expedition ranking with those of other great explorers (such as Alexander Mackenzie, Robert Campbell, and Lewis and Clark), the official report did not receive wide attention at the time.[2] Allen's report, nevertheless, encouraged later investigations in the Copper Basin. In 1898 and 1899, expeditions led by Captain William Abercrombie surveyed the area for a prospective "All American Route" to the Klondike gold fields, but also to substantiate news of gold and copper strikes in the Copper River.[3]

The systematic recording of environmental conditions in the Copper River region began in 1900 under the auspices of the United States Geological Survey (USGS).[4] Throughout the early-to-mid-twentieth century, the USGS investigated the mineral deposits and economic geology of Alaska as an aid to prospectors, a key consideration in the formation of the Division of Alaskan Mineral Resources in 1903. Reports detailed mineralogical, geological, and topographical information in non-technical language and often supplied general notes on hydrology, climate, flora and fauna, population, and transportation. The USGS first visited the Chugach area just before the discovery of gold deposits in the Bremner District. F. C. Schrader and A. C. Spencer's account for the 1900 season primarily addressed mineral deposits on the north side of the Chitina Valley; but a brief topographic survey was conducted in the Hanagita Valley, five miles north of the Bremner District.[5] USGS geologists Witherspoon and Moffit conducted detailed topographic and geological surveys in the Bremner District in 1911.[6] The USGS may have revisited the Bremner District, but the agency conducted few further studies on the area's geology.

Environmental conditions recorded by prospectors in the Bremner District included detailed information on mineralogical deposits as well as other environmental phenomena important to the productivity of mining operations. Asa Baldwin, manager of the Yellow Band Gold Mines, for example, measured stream flow with some regularity, noted timber resources and climate, and sent ore specimens to Fred Moffit for examination.[7]

Limited recording of environmental conditions took place in the Bremner District after 1942. In 1973, the Wild and Scenic Taskforce undertook a geochemical survey of streams in the Chugach range, including Golconda Creek (refer hydrology section). The National Park Service conducted botanical surveys of the district in 1996 and 1998.[8] These studies focused primarily in the pass region and identified upward of 100 plant species. Environmental conditions, including notes on flora and fauna, were also recorded haphazardly during archaeological surveys of the district throughout the 1990s.

Topography

The Bremner District is in the rugged Chugach mountain range in southcentral Alaska. Between 30 and 65 miles wide, the Chugach range joins the Kenai and Kodiak ranges to the northwest and St. Elias range to the southeast to form a mountain arc extending approximately 1,200 miles along the Alaska coast. Mountain peaks typically are between 6,000 to 7,000 feet above sea level, increasing in height toward the St. Elias range. The rugged topography of the Chugach Mountains derives primarily from the effects of extensive glaciation.[9] The conspicuous hallmarks of glaciation—straight-sided valleys with U-shaped profiles—formed in comparatively recent times (10,000 to 14,000 years ago), when the retreat of ice permitted greater glacial movement.[10] During that period, a 5,000-foot-thick glacier in the Chitina Valley partially overrode and smoothed the north ridge of the Hanagita Valley.[11]

The Bremner Historic District is in a mountain pass, extending 11 miles between the North Fork of the Bremner River and Monahan Creek. Trending southwest from Monahan Creek to the pass saddle, the valley jogs three miles in a southerly direction. At the confluence of Golconda Creek and Standard Creek, the valley reverts to a southwest orientation. In keeping with the highly glaciated environment of the Chugach range, the valley shows a clear U-shaped profile with straight-sided walls (figure 2.1). The floor of Bremner Pass rises from 3,500 feet above sea level at Monahan Creek to 4,300 feet at the saddle. The pass then descends to 1,500 feet at the confluence of Golconda Creek and the North Fork of the Bremner River (figure 2.2). The width of the pass varies from 1,500 to 3,000 feet, with the gradient most level at the pass saddle. Valley sides reach a gradient of 50° to 60° in places. Valley walls generally exceed 6,000 feet above sea level, with at least four peaks above 7,000 feet (the highest at 7,400 feet).

Geology

The Chugach range originated from the accretion and uplift of Pacific oceanic sediments against the Alaska subcontinent. Earlier episodes of tectonic activity formed other major mountain arcs in Southcentral and Interior Alaska, such as the Aleutian-Alaska Range, and created the considerable geological complexity of the southcentral region.[12]

The northern edge of the Chugach Mountains demarcates a plate boundary active in the Early Cretaceous period (100 million to 135 million years ago). Evidenced on the surface by an extensive faultline continuing intermittently through the Kenai, Kodiak, and St. Elias ranges, the passage of the "Border Ranges Fault" system through the Copper River region distinguishes two major rock groups, also termed terranes (figure 2.3).[13] The "Taku-Skolai" terrane found north of the Border Ranges Fault underlies much of the Chitina Valley. This is composed of sedimentary rocks formed during the Upper Mesozoic period (70 million to 135 million years ago). The activity of the Wrangell Mountains during the Cenozoic period (70 million years ago to present) capped the terrane with lava (Nikolai Greenstone).[14] South of the Border Ranges Fault, the deposits of the Chugach range (including the Bremner District) belong to the "Valdez Group."

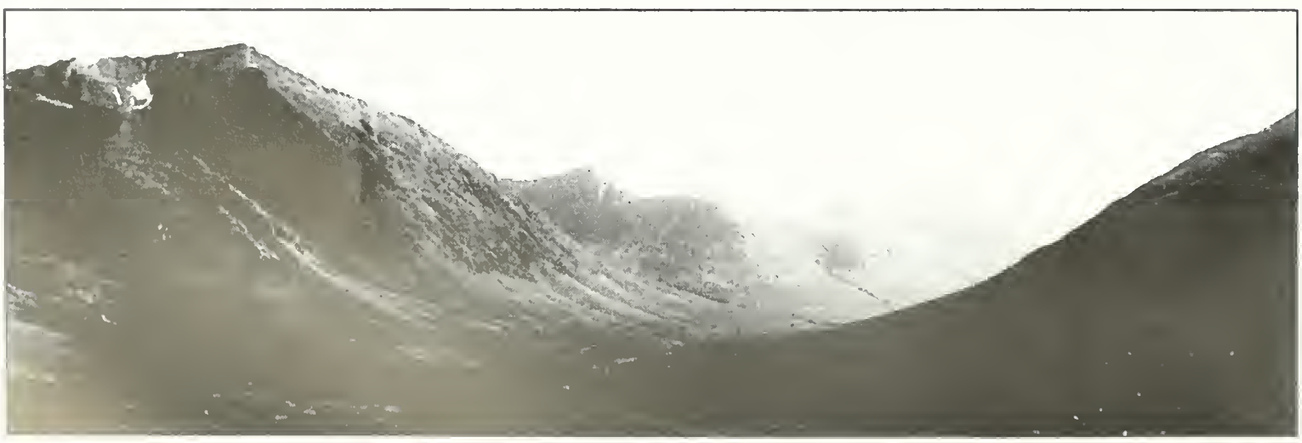


Figure 2.1. View south along Golconda Creek valley showing U-shaped profile characteristic of glaciation. Photo by author. MTU#26975-5

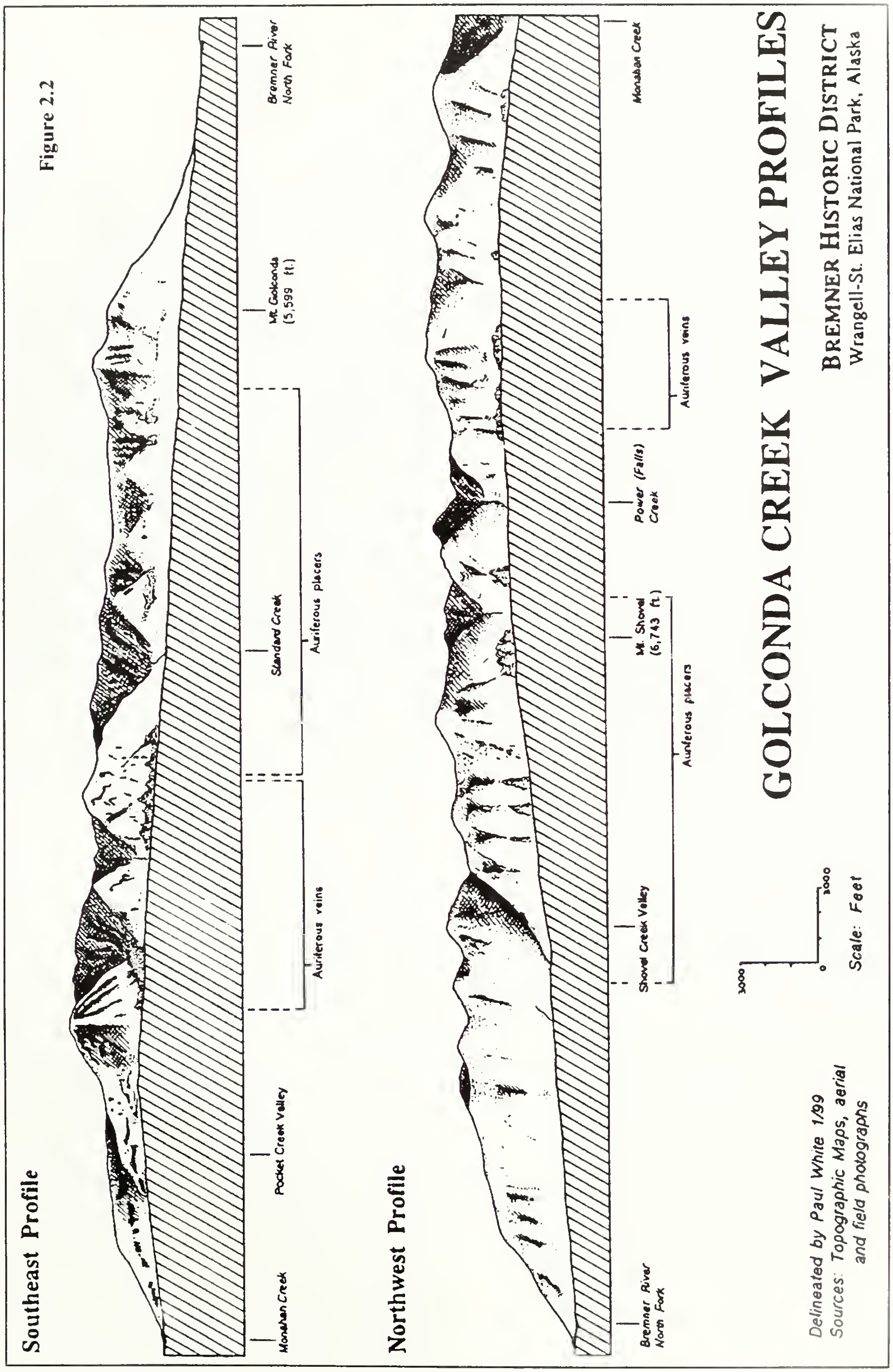


Figure 2.2
Southeast Profile
Monahan Creek
Pocket Creek Valley
Auriferous veins
Standard Creek
Auriferous placers
Mt. Golconda (5,599 ft.)
Bremner River North Fork
Northwest Profile
Bremner River North Fork
Shovel Creek Valley
Auriferous placers
Mt. Shovel (6,743 ft.)
Power (Falls) Creek
Auriferous veins
Monahan Creek
GOLCONDA CREEK VALLEY PROFILES
BREMNER HISTORIC DISTRICT
Wrangell-St. Elias National Park, Alaska
Delineated by Paul White 1/99
Sources: Topographic Maps, aerial and field photographs
0
1000
Scale: Feet

Figure 2.2.

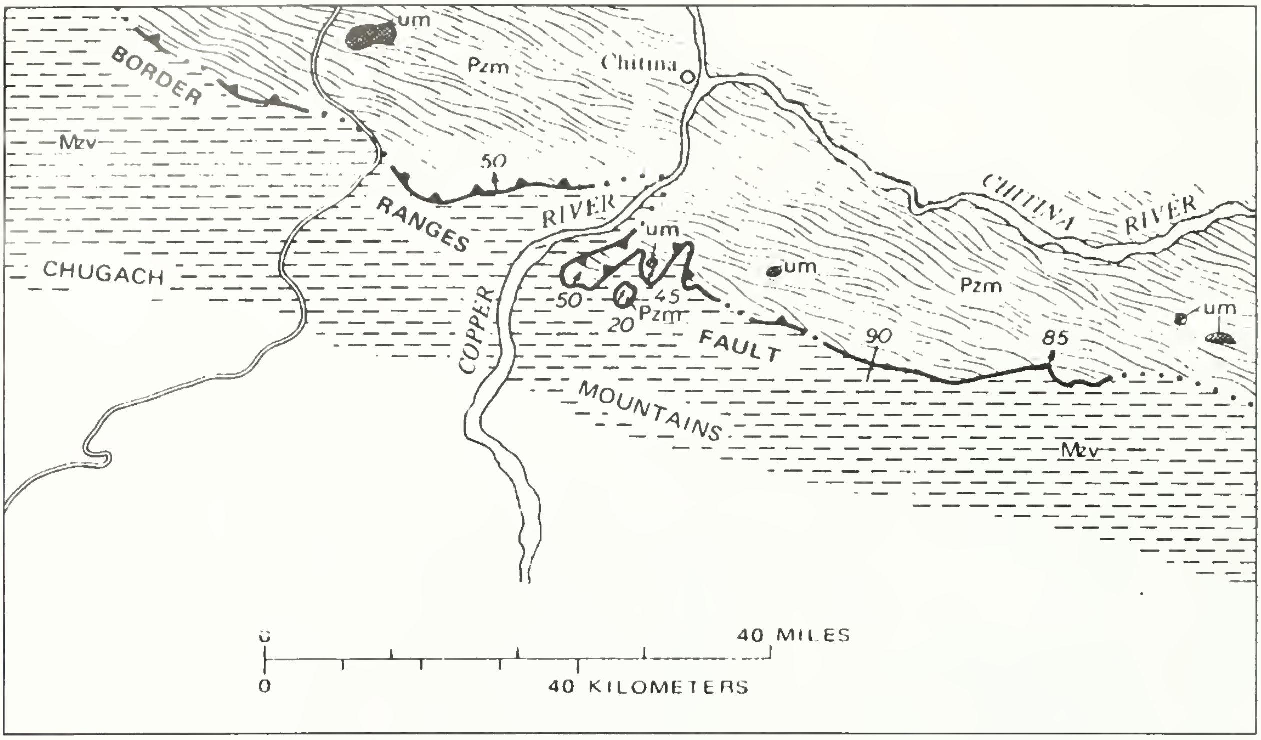


Figure 2.3. Generalized geological map of the Border Ranges Fault in the Chugach Range. The dashed lines indicate graywacke, argillite, and slate, and the curved lines predominantly metamorphic rocks. Source: MacKevett and Plafker. "The Border Ranges Fault in South-central Alaska," *Journal of Research USGS*, vol. 2, no. 3 (1974). 325.

Composed of graywacke, argillite, and slate, these sedimentary rocks formed, in all likelihood, during the Cretaceous period (70 million to 135 million years ago).[15]

The Bremner Historic District lies solely within a slate area. In the northern part of the valley the sedimentary bedding is horizontal, but the beds exhibit a southward dip farther south along Golconda Creek.[16] Heavily metamorphosed, the slate is hard, siliceous, and possesses schist-like qualities. As Moffit observed in 1911, "Perpendicular joints cause the slate to break into angular blocks and slabs and, as disintegration has not advanced far enough since the recent glaciation to soften the rock and make it crumble, great piles of these large slate fragments are seen on the dumps of the placer workings."[17]

Extensive folding and faulting in the Early Cretaceous period resulted in a partial mixing of the Valdez and Taku-Skolai terranes along the line of the Border Ranges Fault. As a consequence, sediments in the north part of the Valdez Group are permeated with igneous deposits. These occur predominantly as dikes and sills, respectively vertical and horizontal intrusions cutting through or lying between the bedding planes of host rock.

In the Bremner District, numerous dikes of fine-grained dioritic porphyry (also described as quartz monozite) and a number of quartz veins cut the slates (figure 2.4).[18] Geological observations were unable to ascertain whether the diorite and quartz intrusions occurred at the same time or were accidentally associated. Moffit classed the quartz veins as gash veins and fillings oc-

Figure 2.4. Exposed veins of dioritic porphyry at the Yellow Band. An open cut at photo right was driven in the mid-1930s by the Yellow Band Group. Photo by Patrick Martin, MTU #BL-10.33.98.

curring in the openings of joint planes and at the bends of folds.[19] Moffit noted further:

> Most of the quartz veins are short, pinching out within a few feet of strike, but some of them can be traced for considerable distances and are evidently connected with extensive fissures. By far the greater number are small, ranging in thickness from an inch or less to a rare maximum of several feet. Many such veins contain gold in amounts ranging from a trace to quantities large enough to make the veins commercially valuable as mining property . . . The veins commonly contain a small proportion of metallic sulphides, among which pyrite is predominant and galena and molybdenite are found.[20]

Veins worked in the 1940s by Yellow Band Gold Mines Inc. confirmed the presence of galena and an increasing proportion of a sulphur-arsenic form of pyrite (arsenopyrite).[21] Mining texts generalized the presence of these metallic sulph[illegible] as favorable, but fallible, indicators of good ore[illegible]

Placer deposits, a second form of mineral occurrence in the Bremner District, derive as a product of the weathering of mineral veins by glaciation, water- and wind-borne agencies. The greater density of gold compared with its host rock enabled erosion processes to deposit the metal into linear "paystreaks," generally at the level of bedrock. The Bremner District contains two commonly occurring types of placers. Creek placers, consisting of gravel deposits in the beds and floodplains of small streams, extend along Golconda Creek for one mile north and two miles south of the creek's confluence with Standard Creek. Historically, the creek placers on Golconda Creek were regarded as shallow, with only few instances exceeding eight feet in depth.[23]

Bench placers consist of gravel deposits located above the present course of streams (either in old stream channels or floodplains). In the Bremner District these parallel the distribution of creek placers. Both forms of placer deposits also exist at the mouth of Golconda Creek where it meets the North Fork of the Bremner River.

Creek and bench placers were intensively worked between 1900 and 1916, and to a lesser degree during the Great Depression and post World War II eras. Miners described gold recovered from Bremner District placers as "shot gold" (occurring as small pellets) with thin flakes being uncommon. Although a few specimens were worn smooth, most recovered gold was rough and little worn, an indication that it had not traveled far from its original source.[24]

Hydrology

Watersheds in the Bremner Historic District feed into the Chitina Valley and Bremner Valley drainage networks. Golconda Creek, the largest watercourse in the Bremner Historic District, originates south of the saddle and flows nine miles to the North Fork of the Bremner River, a total fall of 2,600 feet. In keeping with many streams in the Chugach Mountains, Golconda Creek begins on a broad gravel plain and cuts a narrow canyon in its lower course. Eight subsidiary streams emanating from steep mountain cirques also lie in the pass region, all but one tributary to Golconda Creek.

Pocket Creek, located north of the mountain pass and outside of the Golconda Creek watershed, originates from a glacial lake at the head of a narrow cirque east of the central valley. This creek flows approximately northeast for three miles before its confluence with Monahan Creek, a total fall of 1,600 feet. Streams in the Bremner District tend to run either northeast-southwest or northwest-southeast. This is in keeping with the rectilinear drainage pattern of the Chugach range, whose streams tend to parallel the Chitina or Copper Rivers.[25]

Due to the small size of watercourses in the Bremner District, seasons greatly affect flow rates. Some tributary streams likely freeze during the winter months, but field observations in the late summer indicate both Pocket Creek and Golconda Creek reach sufficient power in their lower reaches to hinder easy fording.[26] Although no official hydrological studies have been conducted in the Bremner Historic District, Asa Baldwin noted the discharge of Golconda Creek varied from 6 to 20 cubic feet per second for a period of four to five months in 1935, and recorded the outflow of a lake at the mouth of Pocket Creek in September 1940 as 10 to 12 cubic feet per second.[27]

In 1973, the Wild and Scenic Taskforce, under the direction of the U.S. Bureau of Outdoor Recreation, conducted geochemical studies of rivers in the Chugach region to determine the suitability of selected watercourses for inclusion in a proposed wild and scenic river system. The taskforce tested both the mouth of Golconda Creek as well as a location "Near Golconda Mine," near the headwaters of the creek (figure 2.5).[28]

Geologists Henning and Dobey considered the concentrations of copper, lead, and zinc anomalous compared with other streams tested. Because of the area's history of commercial gold deposits, the authors recommended its exclusion from the Wild and Scenic Rivers Act to allow for

Location	Au	Ag	Cu	Pb	Zn
Golconda Creek Mouth	n.d.	n.d.	15	30	10
Near Golconda Mine	n.d.	n.d.	75	40	165

Figure 2.5. Results of geochemical analysis of Golconda Creek sediments as tested in 1973 by the Wild and Scenic Taskforce. Source: Henning and Dobey, "Geologic and Mineral Evaluation of the Chitina and Bremner River Drainage Basins." *Alaska Division of Geological and Geophysical Survey Open File Report 25* (1973), 30.

the possible resumption of mining.[29] Although this study did not fully address water quality, a preliminary study of the Nabesna Mine—a small-scale gold mine on the north side of the Wrangell Mountains which operated contemporaneously with the Bremner District—did not indicate significant concentrations of mercury (used liberally in the milling process and occasionally in placer mining) in either stream sediments or water samples.[30]

Climate

The Chugach Mountains, together with the Kodiak, Kenai, and St. Elias ranges, form an effective barrier between the Gulf of Alaska and the Alaska Interior, penetrated only by the Copper River.[31] This has a major influence on the region's climatic patterns. Temperatures for the Alaska coast near the outlet of the Copper River average 0°F in winter months and 70°F in summer. Precipitation averages 130 inches of rain a year with snowfall exceeding 600 inches at higher elevations.[32]

Temperatures at McCarthy, in the Chitina Valley 30 miles northeast of the Bremner Historic District, exhibit greater variation, ranging between -70°F in winter and 80°F in summer months. McCarthy receives approximately 24 inches of rain and in excess of 50 inches of snow annually.[33]

Although no detailed climatic data exist for the Bremner Historic District, contemporary accounts indicate some moderation between the temperatures evidenced in the Chitina Valley and the Alaska coast. According to observations gathered from prospectors by the USGS in 1911, winter temperatures fell as low as 40°F to 50°F below zero with an average annual temperature of approximately 40°F.[34]

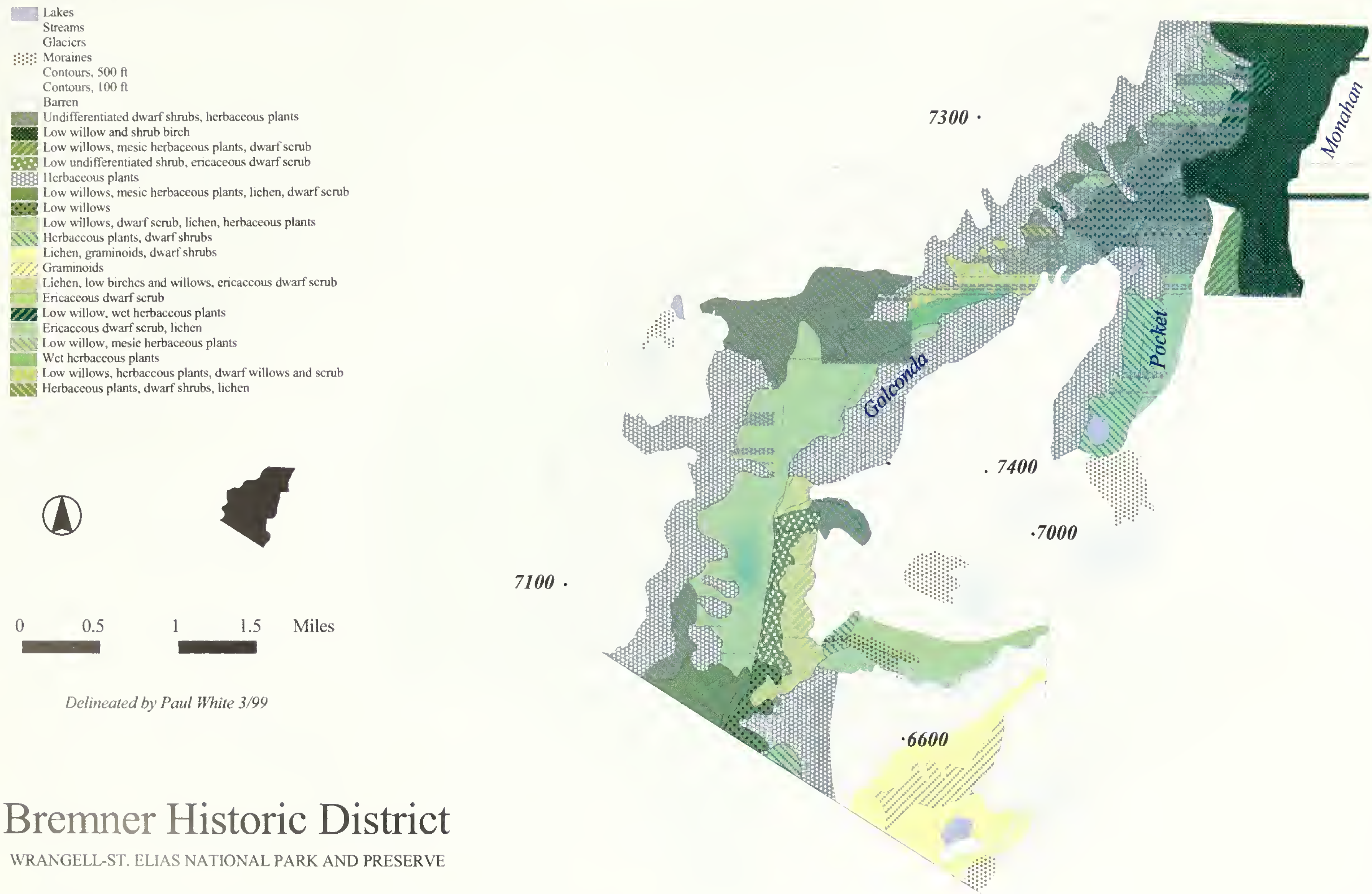
Flora and Fauna

The Bremner Historic District contains flora and fauna characteristic of the Chugach Range and Wrangell-St. Elias National Park and Preserve at similar elevations.

Plant species lie within the Pacific Coastal Mountain ecoregion, a broad zone extending from the Gulf of Alaska to the Chitina River. The recent glaciation of the Chugach Range and abundance of periglacial features (including glaciers, rock glaciers, and shallow, stony soils [lithosols]) has limited the growth of mature forest communities to the floors of major valleys below 3,000 feet. Species in the Bremner River and Hanagita River valleys of saw-log size include white spruce (*Picea glauca*) and balsam poplar (*Populus balsamifera*). In the Bremner District, these species are present near the confluence of Golconda Creek and the North Fork of the Bremner River.

The Golconda Creek valley area comprises principally subalpine and alpine plant communities dominated by patches of low willow and shrub birch scrub, ericaceous and willow dwarf scrub, with wet herbaceous meadows along streams (figures 2.6 and 2.7). Herb communities grow on alpine talus slopes, but practically no vegetation grows above 6,000 feet in the northern and 4,500 feet in the southern parts of the valley. The pass region includes low willows (*Salix lanata* and *S. pulchra*), ericaceous-lichen tundra, and dwarf scrub tundra composed principally of mountain heather species (*Cassiope tetragona* and *C. stelleriana*), crowberry (*Empetrum nigrum*) and bearberry (*Arctosatphylos*). Either side of the pass saddle, vegetation is characterized by low shrub birch and willow species. These two regions also contain a variety of edible plants, a number of which were often exploited by indigenous groups of the Southcentral region (Ahtna and Dena´ ina). Species identified include bog blueberry (*Vaccinium uliginosum*), cranberry (*V. vitis-idaea*), crowberry, rosehips, Alaska spring beauty (*Claytonia sarmentosa*), Eskimo potato (*Hedysarum alpinum*), and cow parsnip (*Heracleum lanatum*). Medicinal plants identified include wormwood (*Artemisia tilesii*), angelica (*Angelica lucida*), white spruce, balsam poplar, Labrador tea, willow bark, cow parsnip, and false hellebore. The only toxic plant presently identified in the district is death camass (*Zygadenus elegans*), although false hellebore is mildly toxic, and water hemlock may be present in marshes near the head of Golconda Creek.[35]

Fauna in the Bremner Historic District is dominated primarily by smaller mammals. This includes ground squirrels (*Spermophilus sp.*), primarily in the valley floor region and particularly around the pass saddle; pika (*Ochotona princeps*) occupying talus slopes on mountainsides; and marmots (*Marmota sp.*) on the valley floor and mountainsides. Larger mammals ranging through the area include grizzly and black bears (respectively *Ursus arctos horibilis* and *U. americanus*), moose (*Alces alces*), mountain goats (*Oreamnos americanus*), and wolves (*Canis sp.*). Birds include eagles (*Aquila sp.*) and ptarmigan (*Lagopus sp.*).



Bremner Historic District

WRANGELL-ST. ELIAS NATIONAL PARK AND PRESERVE

Natural Features Map *Northern section*

Figure 2.6

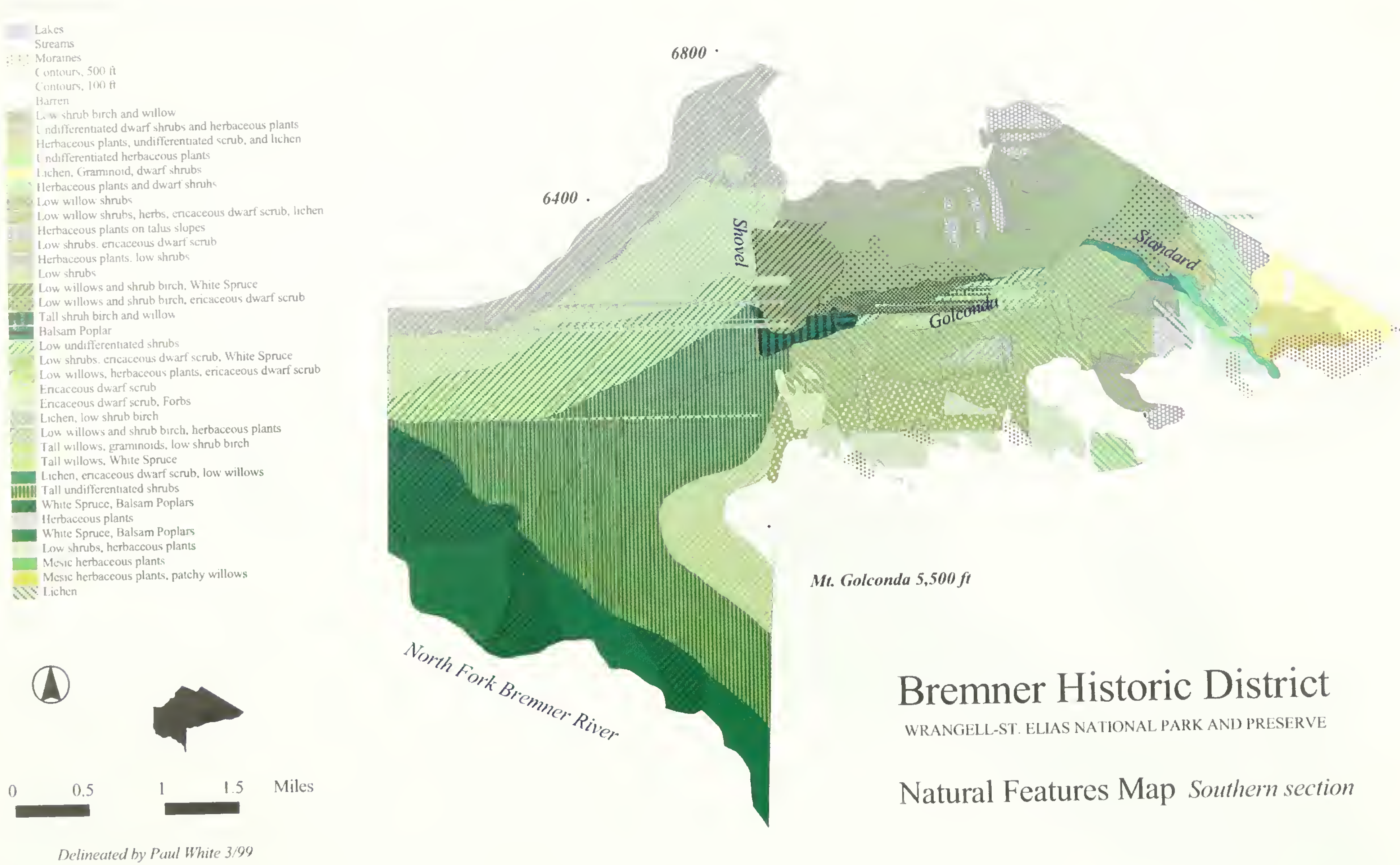

Bremner Historic District
WRANGELL-ST. ELIAS NATIONAL PARK AND PRESERVE
Natural Features Map Southern section
6800
6400
Shovel
Golconda
Standard
Mt. Golconda 5,500 ft
North Fork Bremner River
Lakes
Streams
Moraines
Contours, 500 ft
Contours, 100 ft
Barren
Low shrub birch and willow
Undifferentiated dwarf shrubs and herbaceous plants
Herbaceous plants, undifferentiated scrub, and lichen
Undifferentiated herbaceous plants
Lichen, Graminoid, dwarf shrubs
Herbaceous plants and dwarf shrubs
Low willow shrubs
Low willow shrubs, herbs, ericaceous dwarf scrub, lichen
Herbaceous plants on talus slopes
Low shrubs, ericaceous dwarf scrub
Herbaceous plants, low shrubs
Low shrubs
Low willows and shrub birch, White Spruce
Low willows and shrub birch, ericaceous dwarf scrub
Tall shrub birch and willow
Balsam Poplar
Low undifferentiated shrubs
Low shrubs, ericaceous dwarf scrub, White Spruce
Low willows, herbaceous plants, ericaceous dwarf scrub
Ericaceous dwarf scrub
Ericaceous dwarf scrub, Forbs
Lichen, low shrub birch
Low willows and shrub birch, herbaceous plants
Tall willows, graminoids, low shrub birch
Tall willows, White Spruce
Lichen, ericaceous dwarf scrub, low willows
Tall undifferentiated shrubs
White Spruce, Balsam Poplars
Herbaceous plants
White Spruce, Balsam Poplars
Low shrubs, herbaceous plants
Mesic herbaceous plants
Mesic herbaceous plants, patchy willows
Lichen
0 0.5 1 1.5 Miles
Delineated by Paul White 3/99

Figure 2.7

CHAPTER II: ENDNOTES

[1]Problems in understanding the basic geography of Alaska were not resolved until around 1900. Morgan B. Sherwood, *Exploration of Alaska 1865-1900* (Yale Univ. Press: New Haven, 1965), 9.
[2]Henry Allen, *Report of an Expedition to the Copper, Tanana, and Koyukuk Rivers in 1885* (Washington: GPO, 1887). Allen's abrupt writing style is one reason suggested for the general inattention to his 1887 account. Historian Morgan Sherwood also forwards that Americans, by the late-nineteenth century, believed the North American frontier had largely disappeared, and thus no longer required expeditions of any magnitude. Sherwood, *Exploration of Alaska*, 116-8 (see n. 1).
[3]Captain Abercrombie had previously attempted to investigate the Copper River in 1884, before Allen's expedition.
[4]Richard P. Emanuel, "Marking the Map's Void Spaces: USGS Geologists in Alaska," in *Alaska Geographic*, vol. 22 (1995), 5-28.
[5]F. C. Schrader and A. C. Spencer. "The Geology and Mineral Resources of a Portion of the Copper River District, Alaska." *USGS Special Publication* (Washington: GPO, 1901).
[6]Fred Moffit subsequently published the fieldwork results briefly in "The Taral and Bremner Districts," *USGS Bulletin 520-C* (Washington: GPO, 1912) and with more depth as "Geology of the Hanagita-Bremner Region," *USGS Bulletin* 576 (Washington: GPO, 1914). For the recording process, the USGS typically sent a topographical survey team and a geological team into a given region. Philip Holdsworth, mining engineer at the Nabesna Mine (80 miles north of the Bremner District) notes this procedure in the Copper Basin. "Each summer T. E. Fitzgerald with a small party of men and a string of pack horses covers a new section of the [Nabesna-White River] district and works out the topography. F. H. Moffit heads a similar party which works out the geology of the same section. The following summer in this manner the more promising mineralized areas are mapped as an aid to prospectors." Philip Holdsworth, *The Nabesna Gold Mine and Mill*, B.S. thesis (Univ. of Washington, 1937), 9.
[7]Stream measurements are mentioned in diary entries and survey maps. Asa Baldwin, *Diary* (September 1940-October 1941), Asa Baldwin Collection, Alaska State Library, Juneau; Asa Baldwin, *Yellow Band Gold Prospect, Golconda Creek, Bremner District, Alaska* (c. 1935 manuscript, courtesy of Sylvia Baldwin).
[8]Les Viereck and Eleanor Viereck, *Floristic Inventory Sites: Bremner Vicinity* (National Park Service, 1996, report on file at park office); Mary Beth Cook, *Vegetation Documentation for the Cultural Landscape Study*, WRST Management Report, No. 98-1 (National Park Service, 1998, report on file at park office).
[9]Moffit, "Geology of the Hanagita-Bremner Region, Alaska," 10 (see n. 6).
[10]T. D. Hamilton, "Late Cenozoic Glaciation in Alaska," in *The Geology of Alaska* [Geology of North America vol. G-1], (Geological Society of America: Colorado, 1994), 835.
[11]Moffit, "Geology of the Hanagita-Bremner Region, Alaska," 10 (see n. 6).
[12]George Plafker and Henry Berg (eds.), "Introduction," in *The Geology of Alaska* [Geology of North America vol. G-1], (Geological Society of America: Colorado, 1994), 12; Claus-M. Naske and Herman E. Slotnick, *Alaska: A History of the 49th State*, second edition (Univ. of Oklahoma Press, 1987), 4.
[13]The fault was first identified in E. M. MacKevett Jr. and George Plafker, "The Border Ranges Fault in South-Central Alaska," in *Jour. Research USGS*, vol. 2, no. 3 (1974), 323; E. M. MacKevett et al., "The Alaskan Mineral Resource Assessment Program: Background Information to Accompany Folio of Geologic and Mineral Resource Maps of the McCarthy Quadrangle, Alaska," *USGS Information Circular 739* (Washington: GPO, 1977), 8.
[14]MacKevett et al., "Alaskan Mineral Resource Assessment Program," 8 (see n. 13).

[15]The absence of fossils for the Valdez Group in the McCarthy Quadrangle means this terrane cannot be dated with certainty. Comparisons with other rocks in southern Alaska infer a Cretaceous age, although geologists also adopt "Jurassic(?) Cretaceous" to fit with prior geological assessments. Ibid., 6 (see n. 13).
[16]Moffit, "Geology of the Hanagita-Bremner Region, Alaska," 22 (see n. 6).
[17]Moffit, "Geology of the Hanagita-Bremner Region, Alaska," 45 (see n. 6).
[18]The "quartz" prefix denotes 10 percent quartz or greater. National Audubon Society, *Field Guide to North American Rocks and Minerals*, 15th printing (New York: Alfred A. Knopf, 1996), 703, 705.
[19]Moffit, "Geology of the Hanagita-Bremner Region, Alaska," 23 (see n. 6).
[20]Moffit, "Geology of the Hanagita-Bremner Region, Alaska," 44 (see n. 6).
[21]Operations at this stage were conducted at the Sheriff Mine. Asa Baldwin, *Diary*, entries 11 May, 6 June, 30 August, 28 September, 4 October 1941 (see n. 7).
[22]Refer Charles F. Jackson and John B. Knaebel, "Gold Mining and Milling in the United States and Canada: Current Practices and Costs," *US Bureau of Mines Bulletin 363* (Washington: GPO, 1932), 19.
[23]Moffit, "Geology of the Hanagita-Bremner Region, Alaska," 46 (see n. 6)
[24]Ibid.; Regarding the proximity of placer gold to its source, refer Jackson and Knaebel, "Gold Mining and Milling in the United States and Canada," 12 (see n. 22).
[25]Moffit, "Geology of the Hanagita-Bremner Region, Alaska," 10 (see n. 6). In all likelihood, drainage follows fissure patterns created by the Border Ranges Fault.
[26]Existing conditions survey, August 1997.
[27]*Yellow Band Claim Map, 1935*, Asa Baldwin Collection; Asa Baldwin, *Diary*, entry 3 September 1940 (see n. 7). Measurements were taken just below Jack Snipe Lake, located halfway along Pocket Creek (the lake's location is alluded to 21 July 1941). In addition, Baldwin later recorded (24 September 1940) a measurement of 6 cubic feet per second for "Power Creek," a Golconda Creek tributary so named for its employment to generate hydroelectric power for operations.
[28]"Near Golconda Mine" may refer to the Bremner Mining Camp (XMC-105) or Yellow Band Mining Camp (XMC-118) location.
[29]The authors recommended the headwaters of the Bremner River (including Golconda Creek) and the Little Bremner River, 40 miles west (also with a history of placer mining) for exclusion. Fieldwork initially planned for 60 points to be sampled in the Chugach area, but equipment restraints limited the sampling to 12. M. W. Henning and P. Dobey, "Geologic and Mineral Evaluation of the Chitina and Bremner River Drainage Basins," *Alaska Division of Geological and Geophysical Survey Open File Report 25* (1973).
[30]Mercury concentration ranged from less than 0.02 parts per billion to 0.56 and did not indicate quantities anomalous to background levels. R. G. Eppinger et al., "Geochemical Data for Environmental Studies at Nabesna and Kennecott, Alaska: Water Leachates, Stream Sediments, Heavy-Mineral Concentrates, and Rocks," *USGS Open File Report 95-645-A* (Washington: GPO, 1995).
[31]MacKevett and Plafker, "The Border Ranges Fault in South-Central Alaska," 323 (see n. 13).
[32]WRST, *Draft General Management Plan/Environmental Assessment Land Protection Plan, Wilderness Suitability Review* (Anchorage: National Park Service, 1985), 101.
[33]Ibid.
[34]Moffit, "Geology of the Hanagita-Bremner Region, Alaska," 12-3 (see n. 6). Asa Baldwin provided occasional temperature readings for 1941: 5 April: 42°F, 27 April: 20°F, October 8: 18°F, October 11: 12°F, and also recorded snow as late as July 28. Baldwin, *Diary* (see n. 7).
[35]Mary Beth Cook, *Vegetation Documentation for the Cultural Landscape Study* (see n. 8).

CHAPTER III: HISTORICAL CONTEXT

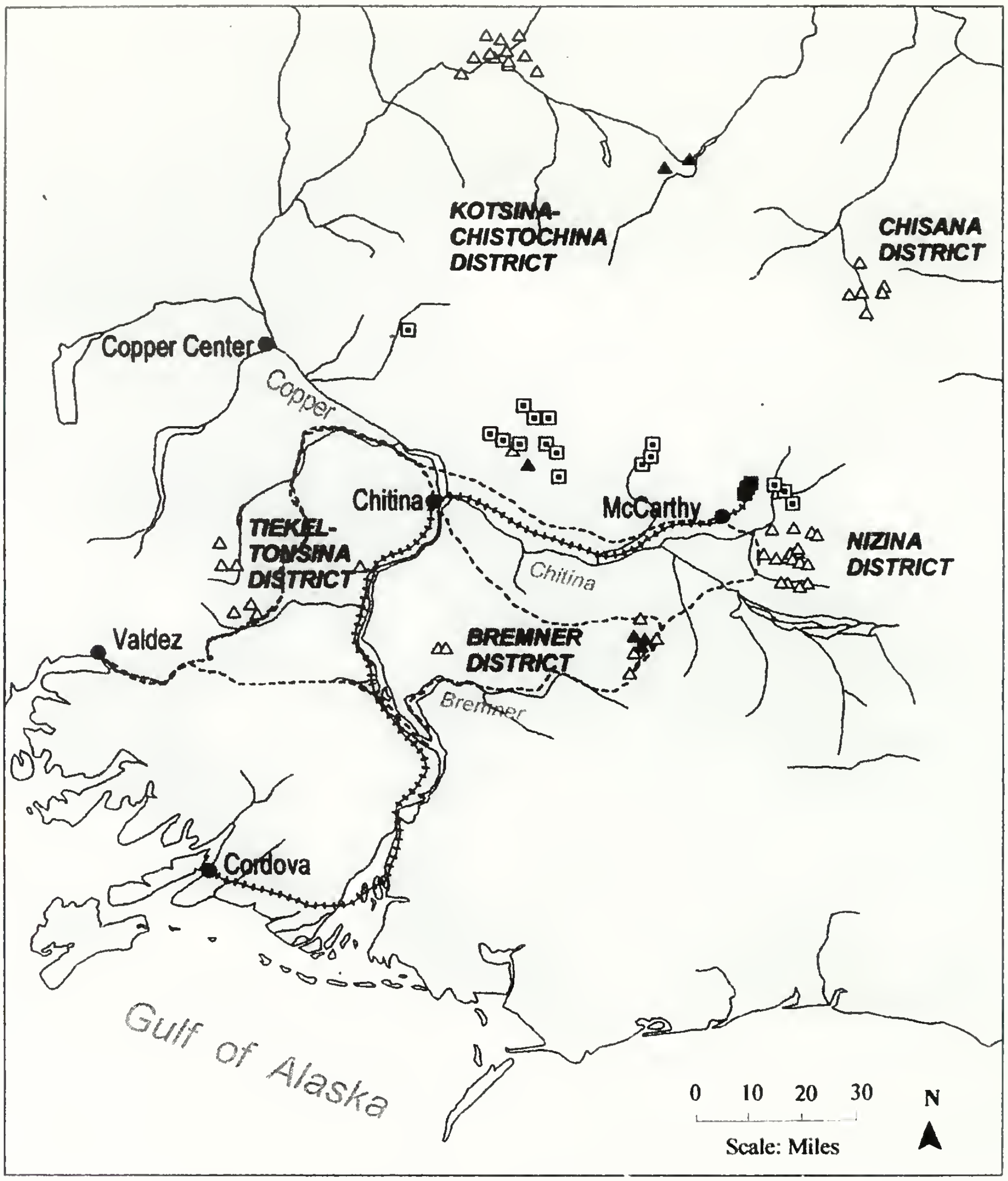
Mining in the Copper Basin, 1898-1998

The intensive search for mineral deposits in the Copper Basin began shortly after George Carmack's discovery of rich placer ground in the Yukon Territory in 1896.[1] In the rush to locate high-grade ground, the Klondike Stampede (1897-1914) encouraged prospectors to find expeditious routes to reach the gold fields. For those unwilling to take the popular Chilkoot and White Pass Trails, or the slower but less grueling passage by steamship up the Yukon River, the Copper Basin presented an appealing alternative—appearing, at least on maps, to offer a more direct line to the known gold strikes. As a further enticement, prospectors passing through this region would traverse untested ground.[2] Shipping lines were quick to promote a Copper Basin route and, taking advantage of the general dearth of information boosted and falsified its attractiveness. In 1897, for instance, the Pacific Steam Whaling Company announced service to Valdez from which Interior Alaska "could be easily reached"—in direct contradiction to what few reports had been published on the region. Other promotions even boasted the mineral wealth of the Copper Basin exceeded the value of the Klondike fields.[3]

Of the thousands of prospectors taking passage to Valdez in the 1898 and 1899 seasons, the aspirations of many were mired in the attempt to ascend the Valdez Glacier immediately north of the town (and at that time considered the only means to access the Interior). To those who succeeded, an easy route to the Interior still proved elusive. Hardships endured upon reaching the confluence of the Copper and Klutina Rivers (60 miles from Valdez) led many to lose their enthusiasm for the gold rush and turn back "completely disgusted and discouraged."[4]

Prospecting in the vicinity did, however, locate some promising prospects (figure 3.1). Miners discovered small gold deposits along the headwaters of the Tiekel and Tonsina rivers west of the Copper, and near Spirit Mountain, southeast of the confluence of the Copper and Chitina rivers.[5] A promising copper lode deposit, termed the "Billum lode," had also been found along the Kotsina River in the Chitina Valley, and by the end of the season, its ownership was hotly contested.[6]

Prospectors unsuccessful in their attempts to reach the Interior spent the 1898 and 1899 seasons in Valdez. Quickly exhausting the resources of the small settlement, the dire situation influenced further U.S. government investigations in the Copper Basin to survey a feasible All-American route to the Interior. In 1898, Captain William Abercrombie (who, as a lieutenant, had attempted unsuccessfully to ascend the Copper River in 1884) led the newly formed Copper River Exploring Expedition. In addition to cutting a trail from Valdez, the 1899 expedition employed USGS topographer and geologist Oscar Rohn, who planned to investigate mineral deposits in the Chitina Valley. Other prospectors traveling the Copper River route were like minded, with at least two groups—the Chittyna Company (comprising 11 prospectors) and a smaller group including prospectors Downey and Young—intending to stake the Billum prospect.[7] Although the Chittyna Company failed to reach the location in time, not all hopes of finding rich ground had been lost. Party members McClellan and McCarthy ventured to Taral (a Native settlement on the Copper River near Spirit Mountain) to persuade Chief Nicolai to show them a copper prospect seen by Lt. Henry Allen in 1884. They arrived in the village to find its inhabitants near starvation. Capitalizing on the situation, the prospectors offered their knowledge of a food cache on the Bremner River to Chief Nicolai for the location of the mine.[8] Led to a deposit of bornite (copper iron sulphide) 70 miles east of the Copper River by Taral Jack, the prospectors' initial assays indicated exceptionally rich ore, with copper values as high as 63 percent.[9] Within six months of staking the Nicolai claims, members of the Chittyna Company, working separately as the McClellan party, located even richer chalcocite



Mineral Development in the Copper Basin, 1900-1940

Principal Mining Districts and Main Periods of Operation

BREMNER DISTRICT, 1901-1942
Golconda Creek and headwaters
Monohan Creek
Little Bremner River

CHISANA DISTRICT, 1912-1914
Bonanza Creek
Big Eldorado Creek
Little Eldorado Creek

KOTSINA-CHISTOCHINA DISTRICT, 1898-1925
Kotsina River
Strelna Creek
Slate Creek
Chistochina River

NIZINA DISTRICT, 1899-1960
Bonanza Ridge (Kennecott)
Dan Creek
Rex Creek
Chititu Creek
White Creek
Young Creek

TIEKEL-TONSINA DISTRICT, 1898-1914
Fall Creek
Quartz Creek

NB. Mining locations and numbers generalized for illustration purposes. Source: based from USGS Bulletins (various years).

Mineral Development
- Copper lode prospects
- Copper lode mines
- Gold lode mines
- Gold placer prospects/mines

Transportation Networks
- Copper River and Northwestern Railway
- Chitina Valley prospector trails

Other Features
- Towns
- Glaciated areas

Figure 3.1

(copper sulphide) outcroppings on nearby Bonanza Ridge, 4,000 feet above the Kennicott Glacier. News of the mineral discoveries intensified interest in the region and, within a short period, prospectors and speculators had staked the entire length of the limestone-greenstone contact in which copper deposits were believed to exist. In keeping with the nature of prospecting during the rush period, most claims were staked in large blocks, a circumvention of mining law made possible by the abuse of power of attorney.[10]

Placer mining also met with considerable success. Dan Kane and Clarence Warner discovered extensive copper and gold placer deposits in 1901 on Dan Creek, approximately 15 miles southeast of the Bonanza Ridge copper claims. Farther south, prospectors panned gold from placers along Golconda and Monahan creeks in the Chugach range (later becoming the central part of the Bremner District). In 1902, Robert Blei and several prospectors staked placer ground close to the Dan Creek claims on Chititu, Rex, and White creeks in the Nizina District. The Nizina discoveries sparked a short-lived rush to the Chitina Valley in the 1902-3 seasons.

Prospectors traveling along the Copper River route north of the Chitina River panned promising gold indications on streams tributary to the Kotsina River. North of the Wrangell Mountains, several stampeders to the White River located promising gold veins at White Mountain. Forming the Royal Development Company, the prospectors set out to develop the property, and in 1906, brought in a small stamp mill. Operations continued into the 1910s. Farther east, prospectors investigated ground along the Chisana River, but few productive locations were discovered.

By the early 1900s, miners had cursorily investigated most of the future productive copper and gold districts in the Copper Basin (figure 3.1). While preliminary results indicated the Copper Basin indeed contained promising mineral deposits, working them had to overcome two principal difficulties. Climatic conditions limited the use of streams for mining and power generation to the summer months, with harsh winters occasionally delaying mining activity until July.[11] Coupled with the paucity of interior supply centers, operators necessarily imported foodstuffs adequate to last the entire working season (typically lasting 100-120 days). Despite climatic restrictions, prospectors remained active throughout the year. Miners spent the closed season seeking financial backers and conducting surface improvements on their claims (including the felling of timber and construction of mining equipment).

The freezing of rivers made many mining districts in the Alaska Interior more accessible in winter than during the summer months. Winter freighting over rivers and overland trails sharply reduced transportation costs to claims. Nevertheless, even with winter travel, mines in the Copper Basin suffered acutely from a lack of adequate transportation. Indeed, only two prospector trails crossed the region even in the mid-1900s. Miners could access the Chitina Valley by traveling the Copper River Exploring Expedition trail (which led east from Valdez over Thompson Pass) until reaching the mouth of the Tonsina River. A ferry service established near the river mouth enabled prospectors to cross the Copper River. (As the ferry was only a small-scale operation, horses were made to swim across, and a few were lost to the swift current.[12]) From the east bank of the Copper, a trail, known as the McClellan Route, traversed the north side of the Chitina Valley. This connected to prospects in the Kotsina-Chistochina region, Nizina District, and continued northeast over Skolai Pass to the Klondike fields. Mining companies and government agencies improved sections of the trail by constructing bridges across less-easily forded rivers.[13] An alternative and lesser used variant of the Chitina Valley route crossed the Copper River by cable near the village of Taral. From the east bank, prospectors followed a trail through the Hanagita Valley, which eventually connected to the Nizina fields.

The second principal route followed the Copper River to its headwaters north of the Wrangell Mountains and continued north and east to the gold fields of the Yukon. Prospectors used this trail primarily in the early period of the rush, but the route also found later use by miners venturing to the Chistochina, Nabesna, and Chisana districts.

The generally poor condition of trails into the Chitina Valley not only ensured high freight charges, but a significant investment in time and labor to transport supplies to claims. Ocha Potter, a prospector who traveled the McClellan Route in 1905, recollected:

> Over half of our supplies leaving Valdez consisted of horse feed as none could be bought after leaving the coast and it was necessary to feed the horses four months until mid June after which they could live on the wild sweet yellow pea vines on the river bars in the valleys. That meant we had to relay our outfit from the coast. We stayed in Valdez and each day moved two sleigh loads out about ten miles and piled it along side the trail in an unguarded cache and returned to town for the night. . . . The next seventy days were a monotonous grind. Pushing our loads ahead ten miles until only the camp outfit was left. Then a twenty mile move and a new camp. Bringing up our supplies to camp and then pushing them on ahead another ten miles. That was the routine.[14]

Although the isolation of many mining regions in Alaska did not hinder prospecting activities, it did impact the nature of mining significantly.[15] High transportation costs favored the exploration of rich placer deposits, capable of turning quick profits in remote regions. High costs, nevertheless, often prevented the extensive development of claims beyond assessment work.[16] Although the situation aggravated mine developers, it was amenable to speculators who exaggerated claim values while faulting economic conditions for the lack of development.[17] Since the Copper Basin did not attract the same numbers of prospectors as other mining regions, the chances that the mining of selected placers would suffice to bring vast improvements to the region's infrastructure were slim.

Significant improvements to the Copper Basin's accessibility, in fact, derived from the development of the lode deposits on Bonanza Ridge. From 1907-11, the Alaska Syndicate invested $25 million in the development of the Kennecott Mine (named through a misspelling of the nearby Kennicott Glacier). Approximately 80 percent of the funds were expended in the construction of a 196-mile-long railroad, linking the mine with the port of Cordova. Between 1907 and 1911, three sternwheelers built by the company operated between the Tasnuna River, Copper Center, and the mouth of the Nizina River. These assisted in railroad construction and also served other mines in the Chitina Valley. Even before its completion in March 1911, however, the Copper River & Northwestern Railway had shifted the Copper Basin's primary distributive center from Valdez to Cordova and dominated the conveyance of supplies, equipment, and workers into the Chitina Valley—although earlier systems of packing and freighting were still required to pack supplies from the railroad to claims (figure 3.2).

Figure 3.2. The development of the Bonanza Ridge copper deposits by the Kennecott Copper Corporation between 1900 and 1938 brought significant improvements to the region's infrastructure, facilitating the development of mineral claims by small operators throughout the Copper Basin. This photograph, taken circa 1912, shows the mill town at the terminus of the Copper River & Northwestern Railway, 4,000 feet below the copper outcrop of the Bonanza Mine. Shrock Album, No. 84-80-101N. Courtesy of Alaska and Polar Regions Dept., Univ. of Alaska, Fairbanks.

By facilitating the movement of heavy mining equipment and reducing the expense of transportation, the railroad reinvigorated interest in the mineral prospects of the Copper Basin. In addition to renewed prospecting, operators in the Nizina and Chistochina districts brought in larger hydraulicking plants to mine deposits at greater economies of scale (including the profitable working of low to moderate grade placers). The Copper Basin also saw a revival of interest with the staking of rich placers on Bonanza and Little Eldorado Creeks in the Chisana District in 1913 and 1914.[18]

Reduced costs also improved the feasibility of developing lode deposits, and copper and gold lode prospects in close proximity to the railway saw particularly active development. Prospecting in the lower Copper River region (also encompassing the Tiekel and Tonsina districts) included at least two properties with some underground development: a tunnel near mile 109 on the railroad, and an adit driven on a claim near Eagle Creek, east of the Copper River.[19] More significant developments took place in the investigation of copper lodes in the Kotsina-Chistochina District, where underground work conducted by the Alaska Consolidated Copper Company, Great Northern Development Company, and Hubbard Elliot Company approached 8,500 linear feet by 1914.

Labor shortages and rising equipment costs affected mining operations during World War I. Throughout Alaska, many operations closed until the war's end and prospecting virtually ceased. The government, nevertheless, provided some relief by waiving the requirement of annual assessment in order to maintain rights to unpatented claims. Placer and lode mining continued in the Kotsina-Chistochina and Nizina districts, and the Kennecott Mine profited from the increased wartime demand for copper (elevated copper prices made 1916 Kennecott's most profitable year of operation).[20] Placer miners in the Chisana District continued to work claims during the war period, although generally at a reduced scale.

After World War I, much of the excitement in Alaska's mineral wealth generated by the Klondike discoveries had waned. Placer mining continued to represent the "kind of work in which a person without much money can probably make as comfortable a living as can be made in the States," but the reduced chance of finding high-grade deposits dissuaded the inexperienced prospector. [21] The Nizina placers remained productive, with claims worked by large companies (the largest being the Dan Creek Mining Co.) as well as by small operators, although little new equipment had been installed.[22]

Lode mining also persisted in the Copper Basin throughout the 1920s. The Kennecott Copper Corporation continued operations on Bonanza Ridge with greater gross production than in the pre-war period. Copper lode mines in the Kotsina-Chistochina District also continued development work through the 1920s. The North-Midas property on Berg Creek, initially staked for its copper deposits and later found to have higher gold and silver values, produced upwards of $26,000 in gold before its closure in 1924.[23]

In 1922, Carl Whitham, a self-taught miner and veteran of the Chisana stampede, investigated the White Mountain area and discovered an unworked gold vein approximately 500 feet above the abandoned workings of the Royal Development Company. After several years spent in assessing the deposits, in 1929 Whitham formed the Nabesna Mining Corporation and set out to find the necessary funds for property development.

The opening of the Nabesna prospect coincided with improved national economic conditions for gold mining following the 1929 stock market crash. Although the increased conservatism of investors hindered the start-up of mining operations, reductions in equipment and supply costs reduced operating overheads significantly.[24] The growing use of aerial transportation to move equipment, supplies, and workers cheaply to mine sites also advantaged operations in Alaska, where many mines did not enjoy all-season access roads.[25] Significant support also came from government efforts to revitalize the national economy. State agencies, such as the Alaska Road Commission (ARC), assisted mining companies by subsidizing airstrips and mine roads and providing workers and expertise for their con-

Figure 3.3. The Nabesna Mine, located on the north flanks of the Wrangell Moutnains, operated contemporaneously to operations in the Bremner District. By 1943, Nabesna Mine directors collectively held a 20 percent interest in Yellow Band Gold Mines stock. Photo likely dates to the late 1930s. Courtesy of Candy Waugaman.

struction.[26] After 1932, the U.S. Congress once again relieved owners of having to conduct annual assessment work, except those who were required to pay federal income tax.[27]

The gold mining industry prospered especially from policies directed at replenishing precious metal reserves. On April 19, 1933, Congress abandoned the gold standard (that had moderated the selling price of gold to around $26 per fine ounce) and, over the next few months, the value of gold rose steadily. The signing of the Gold Reserve Act in November 1934, followed quickly by a presidential proclamation, set a new selling price of gold at $35 per fine ounce.[28] Since the Roosevelt administration required the treasury to purchase all nationally produced gold, a stable market for mining enterprises was ensured. Existing gold mines responded by increasing production, but the favorable conditions also extended the feasibility of gold mining to small-scale operators. Small mines opened in all historically productive gold mining regions in the United States and reworked old prospects or developed new locations of ore bodies considered too limited to warrant large-scale expenditure.[29] Many operations were run by trained mining engineers, but financed with considerable local support. In the Copper Basin, the Bremner, Chisana, and Nabesna districts saw particularly intensive prospecting for lode gold deposits in the 1934 season. Only at Bremner and Nabesna, however, were auriferous (gold-bearing) veins considered rich enough to continue development. The construction of a road to the Nabesna Mine in 1933 (completed by the ARC and the Nabesna Mining Corporation) enabled the company to truck rather than fly concentrates to a port facility. Savings by the truck road proved so great that, by 1936, Nabesna Mine operators could ship in first-grade fir lumber from Seattle for lower cost than cutting and hauling native logs (figure 3.3).[30]

Although improvements to transportation affected both placer and lode mining operations, the general exhaustion of high-grade placers by the 1920s limited the scale of placer mining in the Copper Basin during the Depression Era. In the 1935 season, for instance, the Chisana District employed 20 miners in 10 operations; and the Chistochina District ran 5 placer operations, employing a total of 28 miners.[31]

The copper mining industry fared poorly during the 1930s as the price of copper plummeted to five cents per pound. Faced with a depressed economic market and dwindling ore reserves, the Kennecott Mine temporarily closed operations in 1932. The corporation reopened the mines in 1935 in response to revived copper prices, but hopes to find additional ore deposits on the ridge continued to meet with no success (no sizable new deposit had been found since 1924). The company exhausted its reserves in 1938. In less than 30 years, the Kennecott Mines had produced upward of $200 million in copper, with at least half realized in net profits.[32] Throughout its operation, Kennecott was recognized as Alaska's unrivaled copper producer and, after the mine's closure, Alaska's copper production relapsed to that derived as a byproduct of gold and silver mines (the Nabesna Mine among those listed).[33] Since the Kennecott Copper Corporation had invested its profits in other mining properties (including the Bingham Mine, Utah, and the Braden Copper Mine, Chile), the closure of operations on Bonanza Ridge did not dramatically affect the company's finances.[34]

The closure of Kennecott did, however, have important social and economic repercussions to the Chitina Valley. Without its major client, the Copper River & Northwestern Railway closed within a few weeks of Kennecott's abandonment. Although smaller operations had widely adopted aerial transportation, the railway had still found employment in bringing heavy equipment and workers into the Chitina Valley. The Kennecott Mines and railway provided the impetus for the development of subsidiary business in the Chitina Valley; but with the closures, the towns of Chitina, Kennecott, and McCarthy were practically deserted.[35]

In response to the threatened inaccessibility of the area, Chitina Valley residents rallied for the conversion of the disused railbed into a roadbed and the construction of a permanent bridge over the Copper River (the Copper River bridge had only been temporary).[36] Government officials were initially sympathetic, and Ernest Gruening proposed the "Kennicott National Monument" as one solution to prevent the local economy from collapsing.[37] With the outbreak of World War II, however, the proposal lost its urgency, and the government opted instead to provide vehicles modified for rails and erected a hand tram over the Copper (figure 3.4). The Alaska Road Commission continued to subsidize the construction and improvement of airstrips, but mining expenses increased unavoidably.

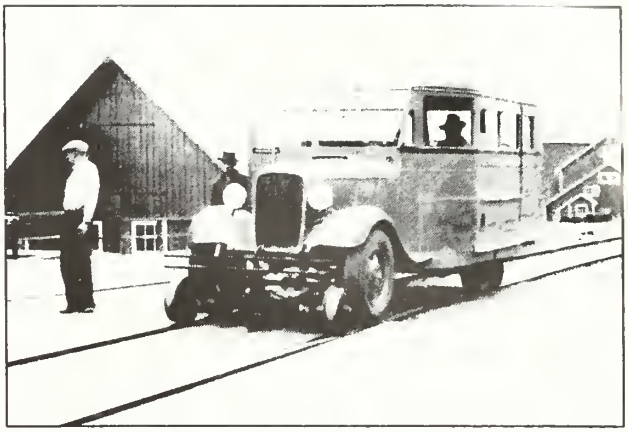


Figure 3.4. The general unwillingness of the government to develop a road along the former Copper River & Northwestern Railway route after the closure of the Kennecott Mines severely limited transportation options available to remaining Chitina Valley residents. While "Auto Railers," as pictured above, existed during Kennecott's operation, the railbed quickly fell into disuse after 1938, limiting access into the valley to either aircraft or winter sledding. Photo 000340, courtesy of McCarthy-Kennicott Historical Museum.

For mines outside of the Chitina Valley with access to other transportation networks, the effects of Kennecott's closure were less severe. The Nabesna Mine, for instance, had only used the Copper River & Northwestern Railway as an alternative route in the winter months when the closure of the road to Valdez at Thompson Pass prevented the movement of ore concentrates by trucks. In response to the railroad's closure, the company now stockpiled concentrates until the summer season.[38] The Nabesna Mining Corporation continued its operations on White Mountain until the exhaustion of its ore body in 1940. A good example of a profitable small-scale mining venture, the Nabesna location turned more than $1,800,000 in gross profits within 10 years. Having purchased other claims in the local vicinity, the company turned its attention to developing the Golden Eagle property.[39]

At the close of 1940, mining had worked out the Copper Basin's two most productive ore bodies. The wartime economy made labor more scarce and, with declining investment in the region, caused mining expenses to rise. The situation showed signs of improvement with the passing of Preference Rating Order P-56 in December 1941, enabling mining companies to gain preference for the delivery of the minimum equipment necessary for efficient operation.[40] Less than a year later, however, Limitation Order L-208 of the War Production Board declared gold and silver mining a "nonessential wartime industry."[41] Unless issued with a permit, any gold or silver mine producing more than 100 tons of ore per month was then prohibited from mining new ore within seven days of the act, or transporting and milling ore after 60 days. Since few gold mines could operate profitably under these restrictions, many closed indefinitely. In keeping with national trends, Alaska's gold production dropped dramatically from $17 million in 1942 to less than $3.5 million in 1943.[42] In the Copper Basin, the Nabesna Mining Corporation suspended its development work on the Golden Eagle claims (which had not yet entered significant production), and no lode-gold mines operated in the region during the World War II era. Placer mining fared slightly better than lode mines since smaller operators had less overhead. Consequently, a few prospectors continued to mine placers in the Copper Basin, although the overall production during wartime was minimal.

When the limitation order was rescinded in 1945, the mining industry did not rebound quickly, as important changes to the national economy impeded the reopening of mines. Although labor was available, Alaska mines competed with high wages offered by government defense projects in the territory.[43] Equipment and supply costs, as well as taxes, had also risen, but the purchase price of gold remained fixed at $35 per fine ounce. Placer mining continued to defray costs by working high-grade sections of ore deposits and improving operative efficiency.[44] Lode mining operations, however, had little option but to continue to suspend operations until the situation showed signs of improvement. These conditions persisted through the 1970s.

Placer mining in the 1950s generally employed two or three miners and utilized more mechanized equipment (such as bulldozers). Some work occurred in the Chisana, Chistochina, and Nizina districts. In 1957, the C & P Mining Company, employing 20 miners, worked placers in the Nizina District, but did not return the following season.[45] In 1965 the Consolidated Wrangell Mining Company acquired the surface rights to the Kennecott Mine claims and proceeded to work slide debris below the Bonanza Mine for approximately the next five years.[46]

In 1967, the U.S. government abandoned the $35 per fine ounce purchase price for gold. During the following decade, the price of gold rose quickly, exceeding $300 per fine ounce in 1979, and nearly doubling the following year.[47] Although rapid increases in gold prices rekindled interest in placer and lode deposits, the future of mining in Alaska became increasingly uncertain as disputes escalated over the ownership of public lands. With the granting of statehood in 1959, the Alaska state government had 25 years to select 103,500,000 acres from federal lands. Complications arising from growing tensions between the state and Alaska Natives—most notably over the proposed Rampart Dam in the Yukon Flats region—led to the "freezing" of state acquisitions in 1966, and the passing of the Alaska Native Claims Settlement Act (ANCSA) in 1971.[48] Under ANCSA, Native interests were given four years to select 44 million acres from federal holdings. Under clause (d)(2) of the act, the federal government was also entitled to reserve up to 80 million acres for parks, wildlife refuges, and forests as "national interest lands." In outrage, the state of Alaska proceeded to sue the federal government.[49] Throughout the land disputes of the 1970s, miners were given little assurance of their future. When the Alaska National Interest Lands Conservation Act (ANILCA) in 1980 formed the Wrangell-St. Elias National Park and Preserve, few mining properties were active in the Copper Basin. Since legislation permitted only those miners working claims before the "d2" period to continue operations inside park boundaries, mining was largely eliminated from the Chitina Valley region—albeit continuing surreptitiously in the present at a reduced scale by occasional miners and park visitors.

Gold Mining Techniques

From the late-nineteenth to mid-twentieth century, during the Alaska Gold Rush and Great Depression eras, the metal-mining industry underwent significant changes. Driven, in part, by the widespread exhaustion of high-grade deposits, the mining industry gradually adopted techniques and practices applicable to the cost-efficient working of low-to-moderate grade ores. Most notably, this was seen in the development of mass-mining technologies and in the employment of a highly specialized workforce.[50]

While the transformation of work predominantly changed the practice of large-scale mines, smaller operators were also affected. By the 1930s, for instance, university-trained engineers had largely replaced self-taught entrepreneurs as mine managers, irrespective of scale. Traditional mining methods, however, typically prevailed at the small mines—due, in part, to the limited size of ore bodies worked as well as limited finances. The following section reviews dominant mining techniques utilized by small-scale gold miners from the early-to mid-twentieth century, contemporaneous with operations in the Bremner District.

Placer Deposits

The most ubiquitous placer prospecting technique (and also the simplest) centered on the use of a metal pan, usually 10 or 16 inches in diameter and 2 to 3 inches deep. To work a deposit, a prospector filled two-thirds of the pan with a sample of the deposit. Holding the pan underwater, the prospector first mixed sample by hand to remove fine sediments and large stones and, raising the pan just below the surface of the water, next shook it vigorously in either a circular or sideways motion (or both), enough to agitate all the sediments and allow the denser particles to settle. The prospector occasionally raised the pan above the water to further shake the material and with his thumb remove lighter sediments from the lip. When only the denser particles remained in the pan (1-2 tablespoons), iron sand was removed from the sample using a magnet, and gold or other valuable minerals were picked out by hand.[51] (New pans were sometimes seasoned with grease to darken the pan and improve the visibility of colors.[52])

For prospectors with the time, labor, and capital to invest in a deposit, the thorough testing of claims was critical. The digging of shafts was a low-cost method well suited to inaccessible areas and areas where pans indicated coarse gold. Shafts were particularly effective in arctic regions as the occurrence of permafrost generally negated the additional expense of pumps to drain the workings.[53] A windlass (a crank device) erected over the shaft enabled the miner to move excavated material in buckets from the shaft to the surface. Material was then processed by panning or a rocker box (refer below). Placer mining shafts were not sunk beyond the bedrock. Ideally, the pit sides were kept straight to ease the calculation of ore per volume. Although time consuming, shafts yielded essential information on the composition of the overburden (such as the frequency and character of boulders), as well as the depth of the paystreak. Shafts also occurred on claims worked by individual operators as it allowed the prospector to work through the winter season.

A more thorough method of testing claims involved drilling core samples. Drilling enabled prospectors to assess values over a wide area of the claim in less time than similar area prospecting by shafts.[54] Drilling was a particularly useful technique in areas of thawed ground and where gold was more uniformly distributed (or paystreaks not easily discernible). The weight of drilling apparatuses, however, tended to limit operators using steam- and gasoline-powered drills to easily accessible areas. For the more remote regions, a hand drilling outfit—weighing close to 1,000 pounds if equipped to drill to a maximum depth of 30 feet—could be packed in to test claims. Hand drilling required a crew of five to seven workers and one horse to operate.[55]

Techniques for mining placer claims varied considerably in start-up cost, but most equipment could be cheaply replicated using resources on hand.[56] Furthermore, few placer mining methods were technically complicated and most exhibited flexibility in operation, or at least utility, at

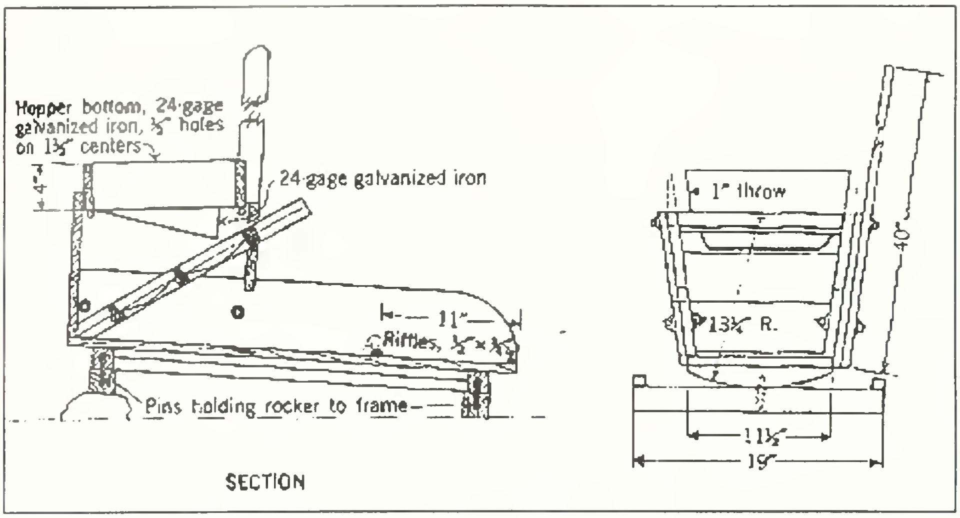


Figure 3.5. A rocker box. Owing to cheap cost and portability, the rocker was a common technology used for the prospecting of placer and lode deposits. Source: E. D. Gardner and C. H. Johnson, "Placer Mining in the Western United States: Part I," *US Bureau of Mines Information Circular 6786* (Washington: GPO, 1934), Figure 3, 50-1.

differing scales of extraction and phases of property development. These factors were particularly beneficial to small-scale operators since they enabled concurrent prospecting and mining.

Since panning required only a pick and shovel as additional tools, it remained an attractive technique for small-scale mining in isolated areas. In the Copper Basin, prospectors panned deposits principally during the rush period, when aspirations of finding bonanza deposits focused attention on the search for high-grade placers. (The use of panning has also boomed in recent years with the growth of recreational mining.) Although inexpensive and lightweight, panning is slow and laborious. An experienced prospector could, for instance, work 100 16"-diameter pans in a 10-hour shift, with 176 pans equivalent to processing one cubic yard of deposit (for a 12" pan, 400 pans would be required).[57]

With minimal additional investment, prospectors could improve the speed of investigating a claim by the employment of a rocker. This simple apparatus accommodated a hopper, screen box, canvas apron, and riffles (raised slats) within a wooden box. Two semi-circular wooden discs, attached to the base of the rocker and fixed by pins to a wooden frame, enabled the box to be rocked in a sideways motion (figure 3.5).[58] After introducing water at the top of the box, the prospector rocked the box using an attached handle until the water issuing out the bottom end ran clear. Gravels left on the screen were examined for large nuggets and then discarded. Concentrates on the canvas apron and riffles were cleaned several times a day, with gold recovered by panning. Although predominantly a prospecting technique, small-scale operations working high-grade deposits often employed rockers in combination with panning with good results.[59] The efficiency of the technique improved considerably where a second miner was available to rotate the tasks of moving gravel and operating the rocker. To enhance recovery, the overflow from the rocker was sometimes impounded to permit a second panning. Under good conditions, and provided the riffles were cleaned regularly, a rocker worked by two operators could process 3-5 cubic yards of deposit efficiently in a 10-hour day.[60]

The long tom provided an alternative low-cost technique for working placers (figure 3.6). This apparatus consisted of a series of open boxes 6-12 feet long set on an incline, with a drop and slight overlap between each box. A screen at the lower end of the second box allowed fines to pass down to a third box fitted with riffles. Water introduced at the top of the upper box sorted gravels over the screens and aided the entrapment of gold on the riffles. A two-man operation using the long tom to work loose gravel could process up to 6 cubic yards in a 10-hour day.[61] Although common during the early gold rushes, long toms were rarely employed in the United States by the 1930s and were not employed significantly in the Copper Basin.

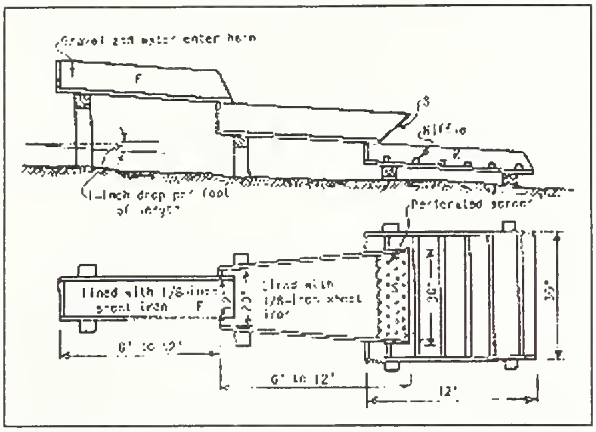


Figure 3.6. Although the long tom was somewhat outmoded by the 1900s, its cheap cost and simple construction still made this an attractive technology to many prospectors. Source: E. D. Gardner and C. H. Johnson, "Placer Mining in the Western United States: Part I." *US Bureau of Mines Information Circular 6786* (Washington: GPO, 1934), Figure 4, 50-1.

In place of long toms, sluicing was widely adopted wherever the water volume and bedrock gradient were sufficient to enable the force of water to sort gravel deposits. In Alaska, climatic conditions generally limited sluicing to a four to five month period during the summer months. Although sluicing practices differed, all methods centered on the use of a sluice box to sort the gravels. A typical box section measured approximately one foot wide by one foot high and 12 feet long, with the sluice formed from a series of abutting or telescoping sections (the latter particularly easier for transportation). In principle, the sluice replicated and enhanced the natural process of gold entrapment (wherein gold, by virtue of its density, is deposited in the recesses and cracks of streambeds). Sluice boxes were set at a slightly lesser gradient than the bedrock slope to diminish stream velocity and induce the deposition of heavier sediments.[62] Riffles fitted to the sluice box floor also acted to retard the flow of water, create turbulence and, most importantly, provide a means to catch denser particles. Riffle designs were far from standardized—as much a reflection of individual preference as available materials on hand. Some common forms included wooden slats or poles laid transverse or longitudinally, stones, log ends, and wooden blocks, or a combination.[63] To prevent large stones from entering the sluice (where they would increase the wear on riffles and potentially dislodge trapped gold) miners often propped a sluice fork (a form of pitchfork with widely spaced tines) or a grizzly (a set of bars) at the entrance to the sluice. The recommended length of a sluice depended on the nature of the ore worked. Short sluices (approximately 30-40 feet) were adequate for areas with coarse gold, or for temporary operations that aimed to recover only high-grade ore. For the capture of finer ore sizes, long sluice boxes fared better, since their greater length provided more opportunity for sediment deposition.[64] Miners also enhanced the recovery of smaller ore sizes by distributing mercury to the upper sections of the sluice to allow the formation of a gold-mercury amalgam. After collection, the amalgam was retorted, distilled by heat, at the vaporization point of mercury (675°F) to leave a gold sponge. Some retorting techniques approached the dangerously lax (such as burning off the amalgam on the back of a spade over an open fire); but retorting furnaces, which lessened the chances of inhaling toxic fumes and enabled the mercury to be distilled and reused, were also common.[65]

Placer miners throughout the early-to-mid-twentieth century practiced at least four common methods to transport gold-bearing material to sluice boxes. Ground sluicing was generally employed for the small-scale working of creek and gravel placers. This used ditches and cuts to direct water through the workings to the sluice box (applied to the prospecting of claims, miners dug narrower ditches). To form the cut, miners used picks, pry bars, shovels, and sluice forks. This process removed large stones while leaving gravels behind in the trench. (Dynamite often assisted breaking up boulders too big to be pried from the diggings.) Miners generally piled or stacked the larger stones into dry walls at the sides of the trench where they could also assist in channeling water through the workplace. To prevent high water levels from damaging the workings, ground-sluicing sites often included ditches around the perimeter of the placer and wing dams to deflect water into overflow channels.[66] After a ditch had been ground sluiced to bedrock, water under pressure (generally by way of a hose from a dam) cleaned the floor of the cut, and directed remaining material to the sluice. Miners cleaned small cracks and crevices in the bedrock by hand. With a crew of two or three miners, ground sluicing could process approximately 20-30 cubic yards per day (or from 2.75 to 18 cubic yards per worker).[67]

Where waterpower was limited, miners could supplement ground sluicing operations with the construction of "boomer dams," a form of temporary water storage designed to release water in surges (figure 3.7). After the release of the "boom," boards and ditches directed the water through the workings toward the sluice box. Boomer dams could be triggered manually (by lifting up the gate) or by an automatic mechanism. The automatic trigger comprised a pivoted lever arm attached at one end to the dam gate, and at the other end to a counterweight (such as an open bucket perforated with holes). A sluice directed dam overflow to the counterweight, which, as it filled and lowered, caused the lever to raise the gate (often a flap made from canvas and wooden slats fitted over a mouthpiece). Holes in the water bucket allowed it to drain, returning the lever arm to its closed position.[68] The frequency and duration of booms depended largely upon location.

A small survey of placer mining operations conducted in the mid-1930s by mining engineers E. D. Gardner and C. H. Johnson, for instance, indicated boomer dams released from 2-24 booms per day, with the surge lasting from 1.5-30 minutes.[69]

In areas of rich placer ground (including gravel deposits concentrated by ground sluicing and booming), miners manually dumped material into sluice boxes and then channeled in water to flush the box. This "shoveling-in" technique processed approximately 3-12 cubic yards per day.[70] The low cost and adaptability of ground sluicing, booming, and shoveling-in to different settings made these techniques popular in the Copper Basin throughout its history of mineral exploration.

If greater capital were available, miners could work gravel deposits using water directed under high pressure (hydraulicking). In order to pressurize the water, ditches and flumes delivered water first to a penstock above the workings and then by a tapered pipeline to the workplace. The hydraulicking apparatus consisted of a tapered nozzle (termed a monitor or giant) attached to the end of the water pipe, fitted so that it could swivel 360°. A counterweight at the back of the nozzle improved its stability. According to conventional practice, one or two monitors were directed at the gravel face, with a third monitor

Figure 3.7. Boomer dam on Golconda Creek, circa 1911, looking northeast. A wooden flume (visible at center right) directed overflow into a bucket attached to the wooden arm on the downstream (right hand) side of the dam. When the bucket lowered, the arm raised up sluice gates, and the water "boom" aided the sorting of placer gravels. Note high bar deposits in background. Fred Moffit Collection, 509, United States Geological Survey.

employed to flush eroded gravel into the sluice. As the gravel face retreated, the monitors and sluices would be moved into a new position. A modification of this technique, devised by the Dan Creek Mining Company in the Nizina District, involved first digging a ditch into the gravel deposit and then using the monitors to work the deposit back to the sluice box (figure 3.8).[71] This

Figure 3.8. Hydraulic mining operations on Dan Creek in the Nizina District, circa 1916. Work by the Dan Creek Mining Company, seen in foreground, differed from conventional practice by eroding gravel banks in the same direction as bedrock drains and sluice boxes (outside of photo), yielding slight improvements to overall operational efficiency. Photo MR 16129, courtesy of University of Washington.

not only lessened the need to continuously move monitors and sluice boxes but also enabled the eroded gravel to be directed into the sluice boxes with greater force.

Like ground sluicing, hydraulicking required a good bedrock slope, ample supply of water, and sufficient space for tailings disposal.[72] It could also be run with relatively few workers. Hydraulicking, however, did represent a vast improvement in the speed of mining, with an ability to work from 100-675 cubic yards per 10-hour shift.[73] Although typically applied to the working of thick gravel deposits and benches, mining operations in Alaska also employed hydraulicking, under considerably reduced pressure, for working placers located only slightly above creek level.[74] The greater economy of scale afforded by hydraulic mining enabled companies to work less productive ground at substantial profits.[75] The scale of hydraulicking operations in the Copper Basin increased with the construction of the Copper River & Northwestern Railway, since improved accessibility and reduced transportation charges facilitated the importation of heavy equipment.

From the 1940s till the park's formation, sluicing continued as the dominant placer mining technique. Some widespread modifications included the adoption of mechanical equipment, such as bulldozers and backhoes, capable of rapidly excavating ditches and crosscuts without great expenditure on labor. "Suction dredging" (alternatively termed "gold diving"), an unusual variation of sluicing, also appeared during this period (and indeed persists to this day). Ordinarily a small-scale operation, suction dredging uses scuba diving equipment, hoses, and pumps, as well as standard pans and sluices. In execution, the miner siphons gravel pockets from behind boulders and within recesses in the streambed. Excavated material pumped to the surface is directed through a sluice typically mounted on a pontoon.[76]

Placer mining techniques in the Copper Basin progressed from methods applicable to the working of rich placers (panning and sluicing) to moderately rich and poor placer ground (hydraulicking). Although more expensive technologies (such as hydraulicking) could be used for claim prospecting, the most efficient exploration methods formed a logical progression from prospecting, to small-scale, and then large-scale techniques. The eagerness of many operators to acquire quick fortunes, however, often led to disregard for the conservative development of claims, and the early use of large-scale excavation techniques, an occurrence also seen in the Copper Basin.[77]

Lode Deposits

The examination of lode deposits involved three principal stages. In the prospecting stage, miners obtained clues on the whereabouts of lodes from the presence of placer deposits and float (pieces of ore eroded from the outcrop). Using equipment identical to prospecting placers, lode veins could be located by the systematic panning of slide debris uphill, and, where no outcrop was immediately visible, digging a trench at the point where no further colors were panned.[78] Due to the great expense and commitment required in mining a lode prospect, the accurate calculation of the claim's worth was critical. Prospects, therefore, needed particularly careful assessments of the quality, composition, variability, and size of the ore body, as well as knowledge of the host rock. Surface work, typically involving driving open cuts into ore exposures and sinking shallow pits into the exposed face of a vein, could provide some of this information at low cost since hand tools, such as picks, shovels, and hammers, as well as dynamite, were usually sufficient. Assaying equipment on site aided the determination of the ore body's characteristics, although prospectors also sent ore specimens to specialists for more accurate assessments. Since the oxidation of rock close to the surface tended to enrich ores, the careful assessment of lode claims required more than the sampling of surface specimens. While numerous geophysical prospecting techniques were also available by the 1930s, the most accurate information on an ore body derived necessarily from underground excavation.

Sinking shafts and driving tunnels to block ore preparatory to mining characterized the *development* of lode prospects.[79] Although initial work often used hand drills and picks to excavate ore, the mining of more refractory material (often encountered as the workings progressed further underground) tended to limit the effectiveness of these techniques. Development work responded by shifting to the use of powered drills, capable of excavating approximately three times the quantity of rock for the same cost as hand drilling.[80] For small-scale mines, development work generally followed the vein into the hillside with a drift (an underground cut working into the vein). Crosscuts (tunnels across veins) were seldom required unless more than one vein was worked at a time. As a further cost saving measure, development tunnels were cut as small as practical, and typically did not exceed six feet in height and four-and-one-half feet in width.[81]

Development work expanded the number of tasks required at the mine location. In addition to the miners involved in working the vein, other tasks included running the drill compressor, blacksmithing and sharpening drill steels, moving the ore and waste from the work face (respectively tramming and mucking), and timbering passages. In addition, property development commonly involved surface improvements, including the construction of aerial tramways, accommodations, and power systems. Although mining texts considered hydroelectric power plants "rarely warranted for an individual mill of short or unknown life," because of the heavy expense required for storage reservoirs, they proved a popular technology for mines with sufficient waterpower to last the standard working season.[82] Diesel generators were also popular, permitting mines to operate throughout the winter season. More limited power at the workplace could also be generated by the reuse of automobile engines.[83]

In *extraction* mode, mines excavated ore pockets blocked out during claim development. If not employed earlier during development, underground workings generally required some form of support timbering. A typical timber set involved the construction of a three-piece frame, comprising a cap supported by two posts, with smaller timbers (lagging) fixed between the sets (providing miners with a measure of protection against loose rock). Timbering forms differed on the type of underground excavation. Crosscuts were generally timbered lighter than drifts, because of their short length, greater stability, and lesser importance. Raises could be supported with stulls (round timbers) and lagging or square-sets.[84]

As small-scale mines rarely had the scale of operation to permit the wholesale removal of veins and surrounding host rock, the excavation of ore occurred by stoping on the vein. However, unless the ore vein was particularly wide, extraction and development also required the movement of waste rock (stripping) to access the vein. To save milling costs, small-scale mines typically separated ore from waste rock at the mine site (a procedure termed "clean mining").

Similar to the experience of mining placer deposits, lode mining rarely involved the prospecting, development, and extraction of deposits as immutable activities. Small-scale mines, in particular, often pursued the development and extraction of vein material simultaneously, in part, to reduce the chance of losing the ore body, but also to generate working capital from an early stage.[85]

With the need to accurately determine the characteristics of an ore body at all stages of mine work (from the ore body itself, to recovery levels in the mill), almost all lode mines had on-site assaying facilities. Small-scale assaying labs could be constructed fairly cheaply and could also be employed for the total processing of ore (reducing the ore to gold bricks) in cases where a mill's daily tonnage would not create excessive backlogs.

Few mines worked ores either rich enough or in close enough proximity to a smelter to forgo pre-smelter treatment and, consequently, the construction of a milling plant was a frequent undertaking in mine development (particularly common for regions with poorly developed infrastructure). Although mills were not pivotal to the success of mining enterprises, their efficient and economic operation played an essential part in the success of the venture as a whole. Gold mining operations tended to construct milling facilities earlier in mine development than the mining of base metals since gold could be reduced to a bullion by relatively simple processes.[86]

Influenced by topography as well as economy, mills in Alaska were typically constructed on sloping sites. By using gravity as a primary force in moving material between machines, sloped mills could reduce power consumption considerably.[87] Characteristics of the ore ultimately determined the milling technology appropriate for a location. However, operations with limited capital tended to select for the cheapest initial expenditure, so available finances obviously influenced the size and type of plant constructed.[88] After the concentration and sorting of ore into milling sizes by crushers—a procedure common to all mills—three different methods were available in the early-to-mid-twentieth century to treat gold ores.

The amalgamation process (similar in principle to the use of mercury in sluices) suited mines with high percentages of free gold, as well as small mines because of its "relatively low plant cost, simplicity, flexibility, and cheapness of operation in small units, and good recovery from variable grade and volume of feed."[89] The amalgamation process recovered gold-mercury amalgam by three principal methods. Early mills introduced mercury to stamp batteries (a form of crushing device largely outmoded by ball mills). Amalgamators increased the exposure of milled ore to mercury by mixing. Although relatively uncommon in mills before the 1930s, amalgamators held the double attraction of being small and portable and were thus highly suitable for isolated mining regions. A third alternative piece of equipment involved mercury-coated copper plates, over which the ore would be passed. (As it was always good economy to remove any free gold early in the milling process, mercury was also applied liberally to most equipment, including crushers.) After machinery for chemical entrapment, amalgamation mills often included concentration equipment, such as shaking tables and blankets, as a final measure to catch gold before the disposal of the mill feed as tailings. The two principal products, amalgam and concentrates, could then be shipped to the smelter, or the concentrates reintroduced into the milling circuit to improve the production of amalgam (figure 3.9).

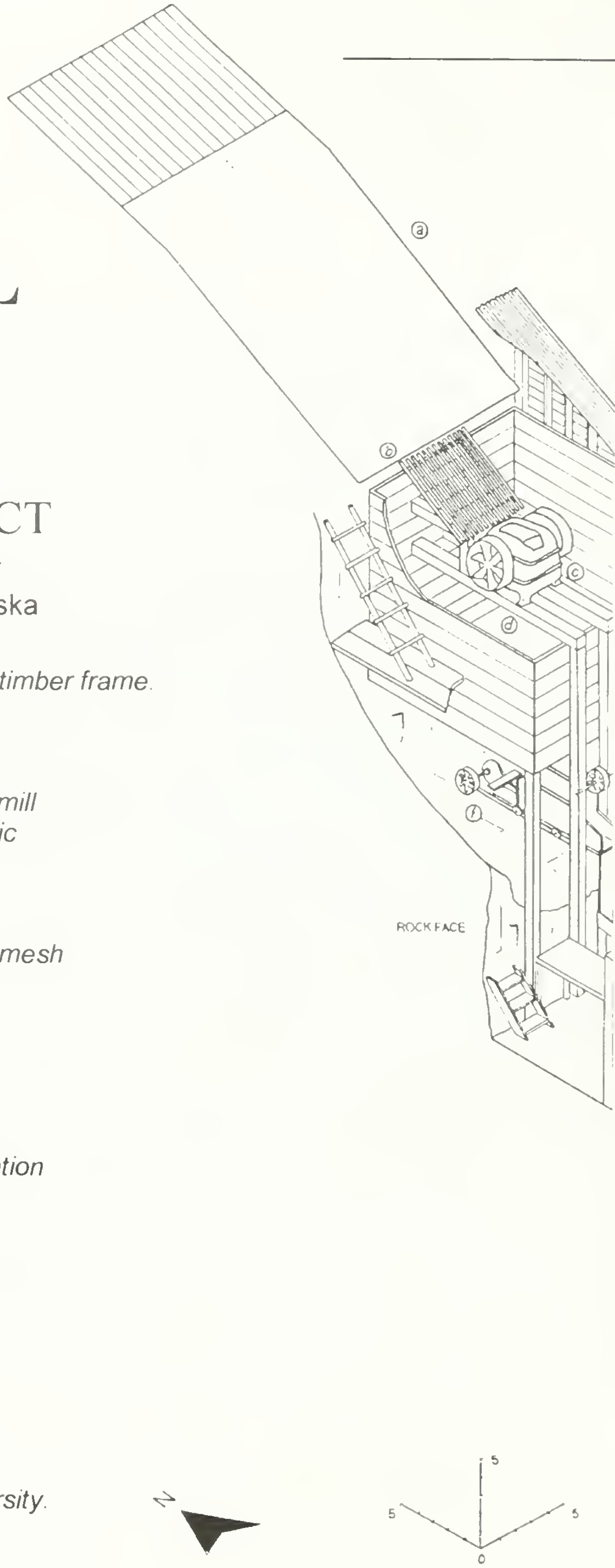
Figure 3.9 (overleaf). Reconstruction of the Lucky Girl Mill, Bremner Historic District. This pilot mill, first operable in 1935, employed both amalgamation and concentration equipment to capture gold. Modifications to the original plant by 1941 included installing an ore bin, a finer screen on the ball mill, and corduroy blankets. As a further improvement to recovery rates, concentrates from the Wilfley table were reintroduced into the milling circuit for further grinding and amalgamation.

LUCKY GIRL MILL CIRCA 1941

BREMNER HISTORIC DISTRICT

Wrangell-St. Elias National Park and Preserve, Alaska

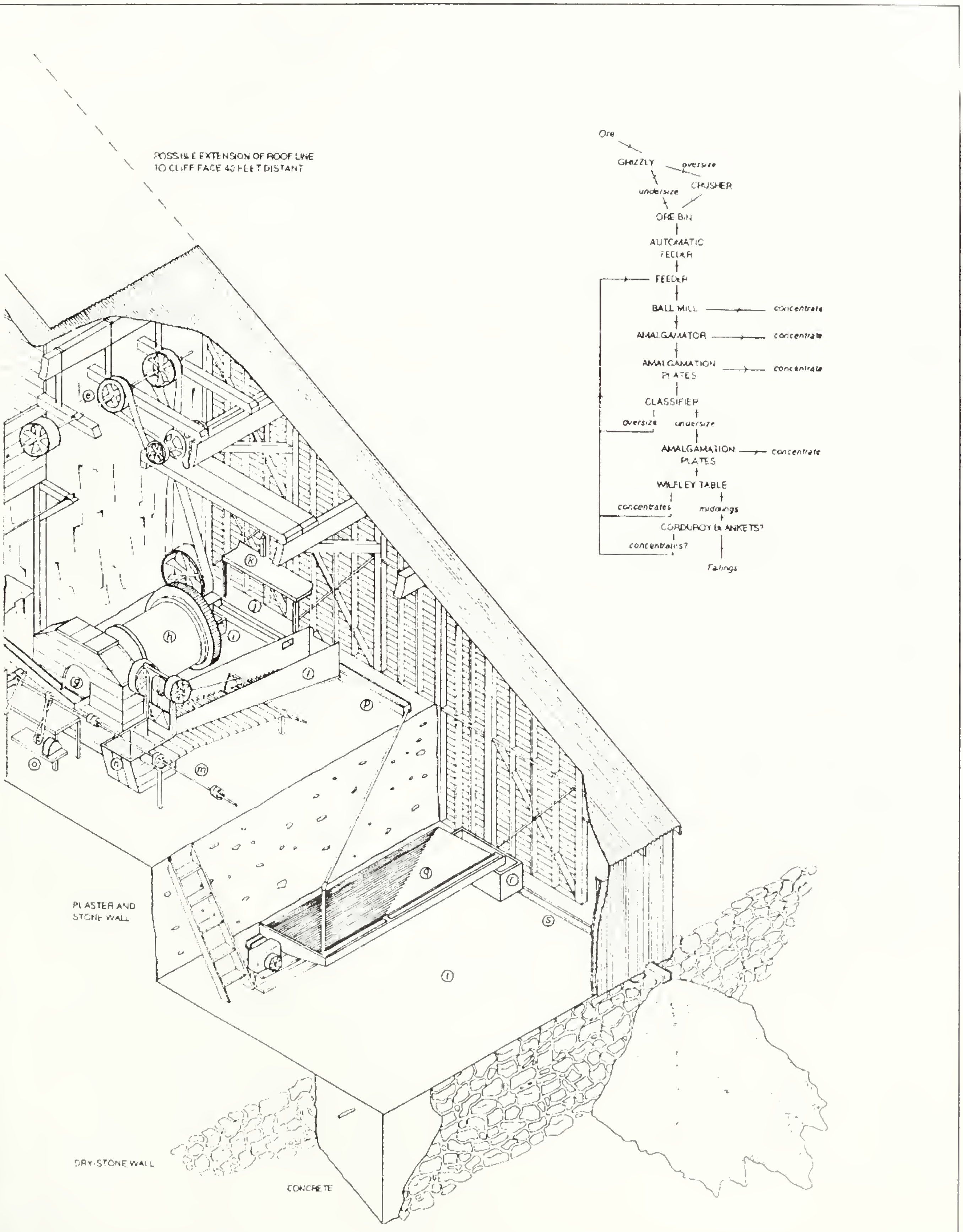
a Ore chute, constructed of flattened drums over timber frame.
b Grizzly, 13 bars with 1 ¾ inch spacing.
c Telsmith- Wheeling Jaw Crusher.
d Ore Bin.
e Line shaft for crusher, automatic feeder and ball mill Powered by 50 horsepower Westinghouse electric Motor.
f Telsmith Automatic Feeder.
9 Feeder to ball mill.
h Number 54, 50-ton Marcy Ball Mill, fitted with 80 mesh screen.
I Clark-Todd Amalgamator.
j Launder with three amalgamation plates.
k Table and small press for cleaning plates and consolidating amalgam.
I Dorr Classifier.
m Line shaft for pulverizor, classifier, and concentration table. Powered by 5 horsepower Westinghouse electric motor (not illustrated).
n Bin for oversize classifier product.
o Pulverizor.
p Launder with three amalgamation plates.
q Number 6, Wilfley Table.
r Table concentrate bin.
s Tailings launder.
t Likely location of corduroy blankets.



Delineated by Paul White, Michigan Technological University.
Based on 1998 existing conditions survey.
Recorders: Pat Martin and Paul White.

Scale. Feet

Axonometric Projection


POSSIBLE EXTENSION OF ROOF LINE TO CLIFF FACE 40 FEET DISTANT
Ore
GRIZZLY
oversize
undersize
CRUSHER
ORE BIN
AUTOMATIC FEEDER
FEEDER
BALL MILL
concentrate
AMALGAMATOR
concentrate
AMALGAMATION PLATES
concentrate
CLASSIFIER
oversize
undersize
AMALGAMATION PLATES
concentrate
WILFLEY TABLE
concentrates
middlings
CORDUROY BLANKETS?
concentrates?
Tailings
PLASTER AND STONE WALL
DRY-STONE WALL
CONCRETE

The flotation technique recovered gold by agitating finely crushed ore with chemical reagents in flotation cells. Pressurized air and mechanical agitation introduced to the flotation cell created turbidity and the formation of a surface froth. Small ore particles adhering to the oily froth could then be skimmed into launders, with waste material (gangue) discharged at the end of the cell.[90] This technique found increasing use in metal mining, although patent disputes delayed its widespread use until the 1920s.

The introduction of a cyanide leaching process for gold ores revolutionized milling practice in the 1880s. This process dissolved ore using weak solutions of sodium cyanide or potassium cyanide. After separating the "pregnant" (gold-bearing) solution from the pulp through the use of thickening, filtration, and clarification tanks, the gold was precipitated out using zinc or aluminum dust.[91]

In terms of cost, amalgamation, flotation, and cyanidation mills represented increasingly expensive technologies. In general, mines invested in more costly milling technologies as increases in production warranted. The Nabesna Mining Corporation, for instance, constructed an amalgamation-concentration plant in 1931, adding flotation cells in 1933, and a cyanidation facility in 1935.[92] Expense, however, did not necessarily signify increasing effectiveness. Sulphide ores, for instance, improved flotation recovery rates (because of a tendency to stiffen the foam), but soluble sulphides diminished the effectiveness of cyanidation by excessive cyanide consumption.[93] By using two or all processes in a milling operation, mines could often recover gold more effectively than by one process alone. This also enabled mills to cope with changes to the ore body without dramatic losses to productive efficiency.[94]

Summary

While interest in the mineral wealth of the Copper Basin stemmed largely from the Klondike Stampede, the region maintained a significantly active mining industry through to the 1940s. The exceptionally rich deposits worked by the region's (and indeed Alaska's) most profitable mine, Kennecott, were primarily responsible for sustaining the considerable attention mining engineers and government geologists devoted to the region. For the bulk of operators in the Copper Basin, however, mining worked low-to-moderate ore grades at a considerably reduced operative scale.

Techniques available to gold miners in the early- to mid-twentieth century varied considerably in cost and portability. While operators in the Copper Basin used a wide range of techniques, most companies (likely influenced by problems of access and meager working capital) tended to select for more portable and rudimentary technologies.

Although the region saw major improvements to accessibility (such as the railroad and commercial development) throughout the early- to mid-twentieth century—a trend also seen in the selection of mining equipment, these developments were tightly connected to operations at Kennecott. After the closure of the Kennecott Mines, the Copper Basin's dispersed small-scale industry lacked the "critical mass" to sustain transportation improvements and subsidiary businesses. However, the general demise of mining activity from the 1940s not only reflected the general depletion of high-grade ore deposits (at least those easily accessible) and abandonment of the Kennecott Mines, but external influences operating at the state and national levels as well. As the costs of mining increased and the ownership of the Wrangell-St. Elias region became hotly contested, mining in the Copper Basin became an increasingly marginal activity.

CHAPTER III: ENDNOTES

[1]For early accounts of exploration on the Copper River, refer Lt. Henry T. Allen, *Report of an Expedition to the Copper, Tanana, and Koyukuk Rivers in 1885* (Washington: GPO, 1887); H. W. Seton Karr, *Shores and Alps of Alaska* (London: Sampson Low, Marston, Searle, & Rivington, 1887).

[2]Reports of the Copper Basin's potential wealth were generally positive. An 1898 article in *Mines and Minerals* noted, "The Copper River has long been known to contain gold, and marvelous Indian stories of its richness are extant, but, little prospecting has as yet been done." Arthur Lakes, "Alaska and its Mineral Resources: The Geographical Situation of the Several Mining Districts," in *Mines and Minerals* (March 1898), 340. A government report published the same year viewed the headwaters of the Copper and White Rivers as possessing "great possibilities in the way of mineral development," although, as the author noted cautiously, "from all accounts it is a region difficult to access, and it may well be questioned whether it is advisable to attempt its exploration until facilities for travel and obtaining supplies on the Yukon region have been increased, as they undoubtedly will be in the near future." S. F. Emmons, *Map of Alaska: Showing Known Gold Bearing Rocks* (Washington: GPO, 1898).

[3]Newspapers soon denounced the unnamed shipping company that made the claim. Refer "Experts Denounce the Copper River Scheme," *San Francisco Chronicle*, 20 October 1897; Carolyn Jean Holeski and Marlene Conger Holeski, *In Search of Gold: The Alaska Journals of Horace S. Conger, 1898-1899* (Anchorage: Alaska Geographic Society, 1983), xxi.

[4] The swift flow of the Klutina River capsized rafts, claiming supplies as well as the lives of a few prospectors. Horace Conger, Diary entries 25 and 30 June 1898, in Holeski and Holeski, *In Search of Gold*, 103-5 (see n. 3).

[5]By March 1901, the entire production of Fall Creek and Quartz Creek, respectively tributaries of the Tonsina and Tiekel rivers, was estimated to not exceed $1,200. A few years later, W. C. Mendenhall noted "practically no work has been done in these localities." Walter C. Mendenhall, "Geology of the Central Copper River Region, Alaska," *USGS Professional Paper 41* (Washington: GPO, 1905) 121; Frank C. Schrader and Arthur C. Spencer. *The Geology and Mineral Resources of the Copper River District, Alaska* (1901), 90.

[6] Lone Janson, *The Copper Spike*, eighth printing (Anchorage: Alaska Northwest Publishing Company, 1995 [1975]), 7.

[7] Ibid., 7-8.

[8] Ibid., 8.

[9]William Hunt, *Mountain Wilderness: Historic Resource Study for the Wrangell-St. Elias National Park and Preserve* (Anchorage: National Park Service, 1991), 41; Elizabeth A. Tower, *Ghosts of Kennecott: The Story of Stephen Birch* (privately published, 1990), 12.

[10] Mining law stipulated the size of a single claim could not exceed 20 acres, but did not restrict the number of claims that could be staked by an individual, provided the owner conducted annual assessment work (amounting to $100 per year) for each claim. Using power of attorney, however, miners could stake claims on the behalf of others. This enabled an individual miner to stake up to 160 acres in the interest of a group, without any difference in the amount of assessment work required. Although this practice was legally permitted, it did require all members of the party to enter into a prior agreement (when in fact, many "party members" were unaware of their involvement). The mining community also discouraged this practice for its lack of fair play. Curtis H. Lindley, *A Treatise on the American Law Relating to Mines and Mineral Lands Within the States and Territories Governing the Acquisition and Enjoyment of Mining Rights in Lands of the Public Domain* (San Francisco: Bancroft-Whitney Company, 1903, second edition), section 450, 779-801.

[11] Fred Moffit, "Mining in the Chitina District," in A. H. Brooks et al., "Mineral Resources of Alaska: Report on the Progress of Investigations in 1909," *USGS Bulletin 442* (Washington: GPO, 1910), 162.

[12] Fred Moffit and A. G. Maddren, "The Mineral Resources of the Kotsina and Chitina Valleys, Copper River Region," in A. H. Brooks et al., "Mineral Resources of Alaska: Report on the Progress of Mineral Investigations in 1907," *USGS Bulletin 345* (Washington: GPO, 1908), 129.

[13] Ibid., 129-30.

[14]Ocha Potter, *Sixty Years* (manuscript on file at NPS Alaska Support Office, 1950), 32-3. Potter's 1905 expedition to Chitina Valley focused on assessing the quality of a copper prospect staked the previous season. Although the worth of the claim would prove disappointing, Potter returned the following season and staked the Mother Lode group of claims on the east side of Bonanza Ridge, later to become incorporated as part of the immensely successful Kennecott Mine. (Potter, however, profited little from any of his investments in the Chitina Valley.)

[15] Indeed, government reports informed prospectors that the working of prospects in Alaska required an investment of at least three years, the first year spent in reaching the claims, the second in opening claims, and the third in the winning profits. Arthur Lakes, "Alaska and Its Mineral Resources," 341 (see n. 2).
[16] Fred Moffit and A. G. Maddren, "The Mineral Resources of the Kotsina and Chitina Valleys," 127-8 (see n. 12).
[17] Fred Moffit, "Mining in the Chitina District," 159 (see n. 11).
[18] Geoffrey Bleakley, *A History of the Chisana Mining District*, National Park Service Resources Report NPS/AFARCR/CRR-96/29 (Anchorage: National Park Service, 1996).
[19] Fred Moffit, "Geology of the Hanagita-Bremner Region, Alaska," *USGS Bulletin 576* (Washington: GPO, 1914), 49-53.
[20] Fred Moffit, "Mining in Chitina Valley," *USGS Bulletin 714-C* (Washington: GPO, 1921), 189.
[21] A. H. Brooks, "Mineral Resources of Alaska, 1924," in A. H. Brooks et. al., "Mineral Industry of Alaska in 1924," *USGS Bulletin 783* (Washington: GPO, 1926), 10.
[22] Fred Moffit, "Mining in Chitina Valley," 196 (see n. 20).
[23] Philip S. Smith, "Past Lode-Gold Production From Alaska," *USGS Bulletin 917-C* (Washington: GPO, 1941), Table 5, 186-7.
[24] Philip S. Smith, "Mineral Industry in Alaska in 1932," in Philip S. Smith et al., "Mineral Resources of Alaska: Report on Progress of Investigations in 1932," *USGS Bulletin 857-A* (Washington: GPO, 1934), 23.
[25] Refer Ernest Patty, "The Airplane's Aid to Alaskan Mining," in *Mining and Metallurgy*, vol. 18, no. 362, 92-4; See also Lone Janson, *Mudhole Smith, Alaskan Flier* (Anchorage: Alaska Northwest Publishing Company, 1981).
[26] Philip Holdsworth, *The Nabesna Gold Mine and Mill* (BS thesis: Univ. of Washington, 1937), 5-7.
[27] Alaskan mines were not exempt in 1936 and 1937. Charles Miller, *The Automobile Gold Rush and Depression Era Mining* (Moscow, Idaho: Idaho Univ. Press, 1998), 76.
[28] The Gold Reserve Act passed Congress on 30 January 1934. The next day, President Roosevelt, acting under Title 3 of the Act, issued a proclamation fixing the gold price at $35 per fine ounce. Chas. W. Henderson, "Gold and Silver," in *Minerals Yearbook 1934*, Part II: Metals (Washington: GPO, 1934), 25-34.
[29] E. D. Gardner and Chas. H. Johnson, "Mining and Milling Practices at Small Gold Mines," *US Bureau of Mines Information Circular 6800* (Washington: GPO, 1934).
[30] Phil Holdsworth, *The Nabesna Gold Mine and Mill*, 7 (see n. 26).
[31] Fred Moffit, "Recent Mineral Developments in the Copper River Region, Alaska," *USGS Bulletin 880-B* (Washington: GPO, 1937), 104-5.
[32] William C. Douglass, *A History of the Kennecott Mines, Kennecott, Alaska* (Manuscript, 1964, on file at NPS Alaska Support Office, Anchorage), 11.
[33] Philip S. Smith, "Mineral Industry of Alaska in 1939," in Smith et al., "Mineral Resources of Alaska: Report on Progress of Investigations in 1939," *USGS Bulletin 926-A* (Washington: GPO, 1942), 78-80.
[34] Melody Webb Graumann, *Big Business in Alaska: The Kennecott Mines, 1898-1938* (Occasional Paper No. 1, Cooperative Park Studies Unit, Fairbanks: Univ. of Alaska, 1977).
[35] Michael Lappen, *Whose Promised Land?: A History of Conservation and Development Management Plans for the Wrangell and Saint Elias Mountains Region, Alaska 1938-1980* (MA Thesis, Univ. of California, Santa Barbara, 1984).
[36] The mood is reflected in a location map in the first annual report of the Yellow Band Gold Mines indicating a "proposed new highway" following the rail grade. Asa Baldwin, *Yellow Band Gold Mines: President's First Annual Report to Stockholders* (1938), courtesy of Sylvia Baldwin.
[37] John D. Coffman and Harry J. Liek, *Report on Proposed Alaska National Park* (National Park Service Report, 1938), on file at park office; Michael Lappen, *Whose Promised Land?* (see n. 35).
[38] Nabesna Mining Corporation, *Ninth Annual Report to Stockholders, 1938*, abstracted in Chas. W. Henderson, "Gold, Silver, Copper, and Lead in Alaska," *Minerals Yearbook 1939* (Washington: GPO, 1939), 109.
[39] Nabesna Mining Corporation. *Annual Report to Stockholders, 1941*. Courtesy of Sylvia Baldwin; Philip Smith et al., "The Mineral Industry of Alaska in 1940," *USGS Bulletin 926-A* (Washington: GPO, 1942), 24.
[40] U.S. Congress, Section 982.1, Part 982—Mines, Title 32: National Defense, Chapter 9, Office of Production Management (Washington: GPO, 1941), 3031-5.
[41] Limitation Order L-208 passed in October 1942. C. E. Needham, "Gold and Silver," in C. E. Needham (ed.), *Minerals Yearbook 1942* (Washington: GPO, 1944), 80-1.
[42] Chas. W. Henderson and R. V. Cushman, "Gold, Silver, Copper, and Lead in Alaska," in *Minerals Yearbook 1943* (Washington: GPO, 1945).

[43] Phil Holdsworth, *Report of the Commissioner of Mines for the Biennium Ended December 31,1952*. Territory of Alaska Department of Mines (Juneau: 1952).
[44] Ibid.
[45] Phil Holdsworth, *Report of the Commissioner of Mines for the Biennium Ended December 31,1958*. Territory of Alaska Department of Mines (Juneau: 1958).
[46] National Park Service, *Kennecott Pre-Acquisition Environmental Site Assessment* (Alaska: National Park Service, 1996), 28-9.
[47] Jim Lucas, "Gold," in *Minerals Yearbook, 1980* (Washington: GPO, 1981), 347.
[48] The Rampart Dam project, as proposed, was of an immense scale, intending to trap on the order of 10,000 square miles of water. Michael Lappen, *Whose Promised Land?*, 72-3 (see n. 35).
[49] Ibid. (see n. 35)
[50] For further discussion regarding changing mining practices, refer Harold Barger and Sam H. Schurr, *The Mining Industries, 1899-1939: A Study of Output, Employment and Productivity* (New York: National Bureau of Economic Research, Inc., 1944); Logan Hovis and Jeremy Mouat, "Miners, Engineers, and the Transformation of Work in the Western Mining Industry, 1880-1930," in *Technology and Culture*, vol. 36, no. 3 (1996), 429-56; Eugene McAuliffe, "The Engineer as Manager," in *Mining and Metallurgy*, vol. 13, no. 305 (1932), 217-8; Clark C. Spence, *Mining Engineers and the American West: The Lace-Boot Brigade*, 1849-1933, New Haven: Yale Univ. Press, 1970.
[51]Charles F. Jackson and John B. Knaebel, "Small-Scale Placer-Mining Methods," *US Bureau of Mines Information Circular 6611R* (Washington: GPO, 1932).
[52]This practice, noted by Ernest Wolff [*Handbook for the Alaskan Prospector* (Fort Collins, Colorado: Burnt River Exploration and Development Co., 1964), 314], contradicts textbook descriptions which considered "inner surfaces must be smooth, bright, and free from grease and rust." James F. McClelland, "Prospecting, Development, and Exploitation of Mineral Deposits," in Robert Peele (ed.), *Mining Engineers' Handbook* (New York: John Wiley & Sons, 1918), 755.
[53] John P. Hutchins, "Prospecting and Mining Gold Placers in Alaska," in Alfred H. Brooks et al., "Mineral Resources of Alaska: Report on Progress of Investigations in 1907," *USGS Bulletin 345* (Washington: GPO, 1908), 66.
[54] Ibid., 67.
[55] John P. Hutchins, "Prospecting and Mining Gold Placers in Alaska, 61 (see n. 53).
[56] Sluice boxes, for instance, were typically made from local timbers In the absence of the standard prospecting pan, almost any pan, including fry pans, could be substituted.
[57] James McClelland, "Prospecting, Development, and Exploitation of Mineral Deposits," 575 (see n. 52);
[58] E. D. Gardner and C. H. Johnson, "Placer Mining in the Western United States: Part I. General Information, Hand-Shoveling, and Ground Sluicing," *US Bureau of Mines Information Circular 6786* (Washington: GPO, 1934), 49-50.
[59]Ibid. Charles F. Jackson and John B. Knaebel, "Small-Scale Placer-Mining Methods," 23 (see n. 51); Ernest Wolff, *Handbook for the Alaskan Prospector*, 314 (see n. 52).
[60] C. W. Purington, "Methods and Costs of Gravel and Placer Mining in Alaska," *USGS Bulletin 263* (Washington: GPO, 1905), 56.
[61] Eugene B. Wilson, *Hydraulic and Placer Mining*, second edition, (New York: John Wiley & Sons, 1912).
[62] The drop between the end of the sluice box and the bedrock also prevented the accumulation of tailings from backing up water in the sluice. Jackson and Knaebel, "Small-Scale Placer-Mining Methods," 26-7 (see n. 51).
[63] E. D. Gardner and C. H. Johnson, "Placer Mining in the Western United States: Part II. Hydraulicking, Treatment of Placer Concentrates, and Marketing of Gold," *US Bureau of Mines Information Circular 6787* (Washington: GPO, 1934), 70-3.
[64] James McClelland, "Prospecting, Development, and Exploitation of Mineral Deposits," 781 (see n.52); Eugene B. Wilson, *Hydraulic and Placer Mining* (see n. 61).
[65] Gardner and Johnson, "Placer Mining in the Western United States: Part II," 81 (see n. 63).
[66] James McClelland, "Prospecting, Development, and Exploitation of Mineral Deposits," 769-71 (see n. 52).
[67] Gardner and Johnson, "Placer Mining in the Western United States: Part II," 67-73 (see n. 63).
[68]McClelland, "Prospecting, Development, and Exploitation of Mineral Deposits," 760 (see n. 52); "Placer Mining in the Western United States: Part I," 65 (see n. 58).
[69] The five boomer operations recorded came from Montana, New Mexico, and Nevada. E. W. Gardner and C. H. Johnson, "Placer Mining in the Western United States: Part I," 73 (see n. 58).

[70] C. W. Purington, "Costs of Placer Mining in Alaska," 59 (see n. 60).
[71] Fred H. Moffit and Stephen R. Capps, "Geology and Mineral Resources of the Nizina District," *USGS Bulletin 448* (Washington: GPO, 1911), 106. Conventional practice faced the monitors toward the embankment, away from the sluices.
[72] Jackson and Knaebel, "Small-Scale Placer-Mining Methods," 30 (see n. 51).
[73] Ibid., 29-30 (see n. 50); Cosmos Coroneos, "Why is That Hole so Big? An Analysis of Expenditure Versus Gain in Alluvial Gold Mining," *Australasian Historical Archaeology*, vol. 13 (1995), 24-30
[74] Jackson and Knaebel, "Small-Scale Placer-Mining Methods," 30 (see n. 51).
[75] Coroneos, "Why is That Hole so Big?" (see n. 73).
[76] Warren Yeend and David Shawe, "Gold in Placer Deposits," *USGS Bulletin 1857-G* (Washington: GPO, 1989), 5-6.
[77] Fred Moffit and A. G. Maddren encountered only one instance along Dan and Chititu creeks in 1916 where the original claim locators had developed the property according to conservative practice. "The Mineral Resources of the Kotsina and Chitina Valleys," 173 (see n. 12).
[78] Charles F. Jackson and John B. Knaebel, "Gold Mining and Milling in the United States and Canada: Current Practices and Costs," *USGS Bulletin 363* (Washington: GPO, 1932), 36-7.
[79] Ibid., 49.
[80] Gardner and Johnson, "Mining and Milling Practices at Small Gold Mines," 5 (see n. 29). Power drills became popular from the 1870s, with drills driven by compressed air widely adopted from the 1910s. Hammer drills, capable of striking 1,500 to 2,000 blows per minute, were the most popular form of automatic drill in the 1930s (and a significant improvement on an earlier and heavier automatic piston drill that delivered 300-600 blows per minute). The hammer drill had three principal variants: the drifter, employed for general mining purposes (as the heaviest of the drill types, it required mounting on a column or a bar next to the face); the stoper, developed for work in narrow places; and the sinker, capable of being held in the hand, of particular use in the sinking of shafts. Robert S. Lewis, *Elements of Mining* (New York: John Wiley & Sons 1941), 134-7; Lucien Eaton, "Seventy-five Years of Progress in Metal Mining," in A. B. Parsons (ed.), *Seventy-five Years of Progress in the Mineral Industry, 1871-1946* (New York: American Institute of Mining and Metallurgical Engineers, 1947), 64.
[81] Gardner and Johnson, "Mining and Milling Practices at Small Gold Mines," 4 (see n. 29)
[82] Arthur Taggart, *Handbook of Mineral Dressing Ores and Industrial Minerals* (New York: John Wiley & Sons, 1927), section 20, 63.
[83] Gardner and Johnson, "Mining and Milling Practices at Small Gold Mines," 3, 17 (see n. 29).
[84] E. H. Rieman, "Efficient and Effective Mine Timbering," in *Mining Congress Journal*, 1935, vol. 21 (July), 53, 55. McClelland, "Prospecting, Development, and Exploitation of Mineral Deposits" 231-9, 263-8 (see n. 52).
[85] McClelland, "Prospecting, Development, and Exploitation of Mineral Deposits," 449 (see n. 52).
[86] Jackson and Knaebel, "Gold Mining and Milling in the United States and Canada," 68 (see n. 78).
[87] Gravity fed mills did not require the use of elevators to bring mill feed into machines. Sloping mill sites were generally preferred by engineers in the first few decades of the twentieth century. Arthur Taggart, "Seventy-five Years of Progress in Ore Dressing," in A. B. Parsons (ed.), Seventy-five Years of Progress in the Mineral Industry 1871-1946 (New York: American Institute of Mining and Metallurgical Engineers, 1947), 117-20; Robert H. Richards, "Ore Dressing," in Robert Peele (ed.) *Mining Engineer's Handbook* (New York: John Wiley & Sons, 1918), 1706; S. J. Truscott, *Textbook of Ore Dressing* (London: MacMillan & Co., 1923), 652.
[88] Gardner and Johnson, "Mining and Milling Practices at Small Gold Mines," 21 (see n. 29).
[89] A 50-ton plant could be built for $30,000 to $40,000. Jackson and Knaebel, "Gold Mining and Milling in the United States and Canada," 133 (see n. 78).
[90] John A. Baker, "A Mill for the Small Gold Mine?: Outlining When It Is Justified and What Type to Build," in *Mining and Metallurgy*, vol. 13, no. 305 (May 1932), 214.
[91] Jackson and Knaebel, "Gold Mining and Milling in the United States and Canada," 112-3 (see n. 78).
[92] Philip Holdsworth, *The Nabesna Gold Mine and Mill* (see n. 26).
[93] This may have occurred at the North Midas Copper Company mill in the Kotsina-Chistochina District, for in 1922, the cyanidation plant was replaced by flotation. A. H. Brooks, et al., "Mineral Resources of Alaska: Report of the Progress of Investigations in 1922," *USGS Bulletin 755* (Washington: GPO, 1924), 26; John A. Baker, "A Mill for the Small Gold Mine?," 214 (see n. 90); Jackson and Knaebel, "Gold Mining and Milling in the United States and Canada," 113 (see n. 78).
[94] The prior removal of gold by amalgamation, for instance, would reduce the required capacity of the cyanidation plant. John A. Baker, "A Mill for the Small Gold Mine?," 213 (see n. 90).

Chapter IV: Narrative Site History

1901-1916: "The Bremner Is It": Placer Mining and Prospecting

In the late summer of 1901, Guy L. Banta, Angus Gillis, Bill McLane, Pete Monahan, and three other prospectors set off from Valdez to prospect for gold in the Bremner River region. Traveling up the Lowe River and over Marshall Pass (five miles southeast of Thompson Pass), the party abandoned pack animals about 15 miles from the mouth of the Tasnuna River and continued on boats down the Copper River to the Bremner River (figure 4.1). Near the head of the North Fork of the Bremner River, approximately 110 miles east of Valdez, the prospectors discovered placer gold in payable quantities on three tributaries, which they optimistically named Golconda, Standard, and Summit creeks.[1] Summit Creek upstream of its confluence with Standard Creek, gave best results with an average of 20 cents per pan.[2] As the prospectors soon discovered, gold could in fact be panned from practically every stream traversing slate and graywacke beds in the Bremner and Hanagita River drainages, although generally in quantities too low to encourage development.[3]

In order to stake as much ground as possible, the prospectors liberally used power of attorney.[4] In addition to staking claims on Golconda and Summit creeks, the party staked ground north of the pass along self-named Banta, Gillis, and Monahan creeks. Gillis Creek, assigned to the stream originating north of the Bremner pass and flowing to Monahan Creek, was staked from head to mouth. On Banta Creek, the section of Monahan Creek upstream of its confluence with Gillis Creek, the party marked out 52 claims of 500 feet each. Monahan Creek was staked for a distance of four-and-one-half miles.[5] Prospecting activities likely included searching for quartz veins. However, given the substantial capital required to finance lode mining and the considerable portion of ground still unprospected for

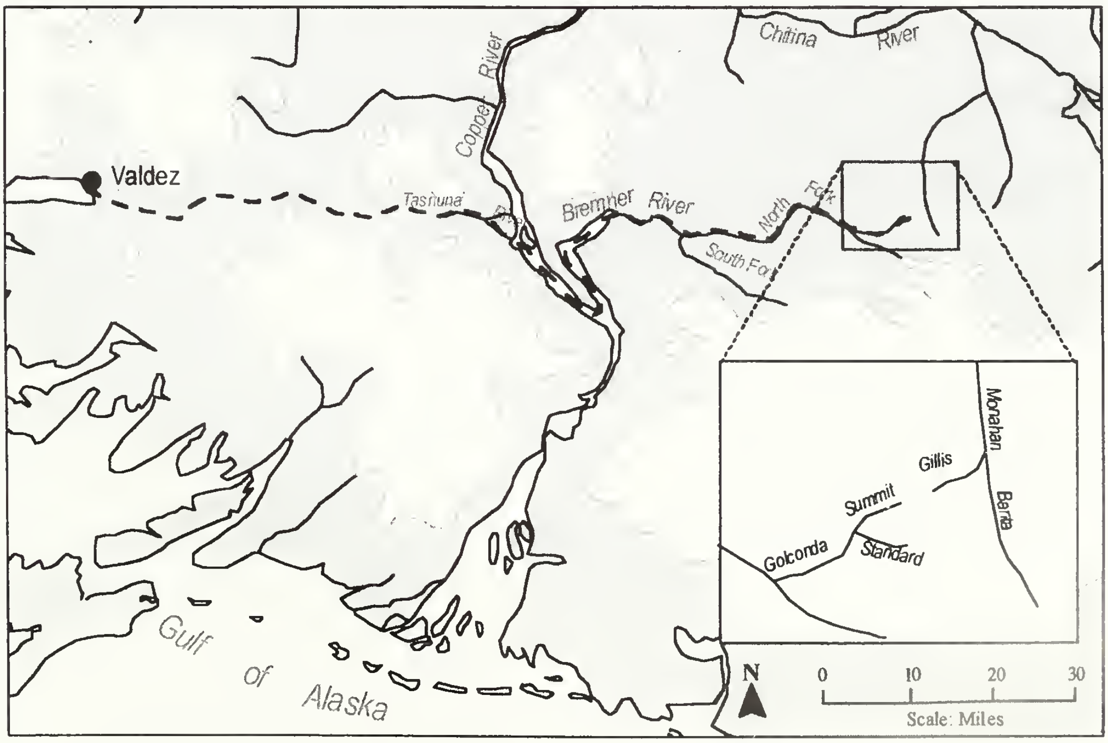


Figure 4.1. Route traveled by the first discoverers of the Bremner District. Inset shows main streams prospected in the Bremner area.

placer deposits, it is unlikely that any lode veins were staked during this time.[6]

Initial work on Monahan Creek involved the sinking of two prospect shafts on the discovery claim. Before the prospectors could finish staking claims and preliminary development work, however, a food shortage forced their abrupt return to Valdez.

The prospectors endeavored to keep quiet about their discoveries, but enough suspicion arose in Valdez that the Bremner District witnessed "quite a little stampede."[7] In mid-February, a group of 10 prospectors, including Billy Beaton, Tom Gain, Harry Happel, Geo. F. Hooper, John McLaren, Neil O'Connor, and Eli Payment, arrived in Valdez after staking claims along Monahan Creek and its tributaries.[8] A few days later, four members from the original group of prospectors (Banta, Gillis, McLain, and Monahan) and six other miners, Henry Anderson, R. Herron, Dr. King, Billy Mockler, Grant Sweet, and John Van Iderstein, left Valdez for the Bremner District. They carried with them five tons of provisions, 600 feet of 11-inch hose, and 500 feet of 6-inch hose. Each member of the party owned claims that they intended to bunch together for the purposes of working. At the mouth of the Bremner River, the party encountered a second group of prospectors heading for the Bremner District. Although Banta's group initially tried to evade them, the two parties eventually joined forces under a staking agreement, bringing their size up to 11 members.[9]

By mid-1902, Amma, Banta, Gillis, Golconda, Monahan, and Trail Creeks and Freeze-Out Gulch were all staked with placer claims.[10] Nine other creeks, Beaton Gulch, Black Rock, Bob, Goat, Hope, Imogene, Lost Shovel, Quartz, and Two Step, were named but remained unprospected until later in the season (figure 4.2).[11] Mining in the 1902 season utilized pick and shovel and sluicing methods. Sluice boxes were likely constructed from local timber stands found in the Hanagita River and Bremner River valleys north and south of the pass. The rush to stake claims, however, restricted the scale of operations. In addition to an insufficient number of sluice boxes, prospectors lacked even basic tools to handle and remove boulders (such as crowbars, sledgehammers, and blasting powder).[12]

What mining activity did occur concentrated on Summit, Golconda, and Monahan creeks (figure 4.3). On Summit Creek, three or four claims were opened in the 1902 season. Van Iderstein, a miner named Butler, and perhaps Monahan worked No. 2 Above in the early part of the season. Gillis, McLain, and Mockler worked No. 1 Above (owned by McLain). Here the paystreak was reported to be 50-feet wide, four-to-six-feet deep with two-feet of "pay," the pay ranging in value from five cents to one dollar per pan. Banta, Monahan, and Sweet initiated work on the discovery claim on Summit Creek by cutting a long bedrock drain from which to begin crosscutting through the paystreak. Little or no work was reported for claims upstream of No. 3 Above on Summit.

Golconda Creek attracted greater attention with nine claims worked during the season. Banta and Sweet turned their attention to No. 5 Above after completing preparatory work on their discovery claim on Summit Creek.[13] Perhaps dissatisfied with results from Summit Creek, Van Iderstein and Butler started work on No. 4 Above on Golconda late in the season, considered one of the better prospects in the Bremner area (as were bench areas on the west bank of Summit Creek). Anderson, Dunton, Herron, and King worked No. 3 Above on Golconda early in the season, but later prospected other ground. The No. 2 Above claim, owned by Gillis, was not worked. Harry Happel and Max Rigler worked No. 1 Above, and Ide and Manguson were reported to be doing "fairly well" on the discovery claim. No. 1 Below, owned by Beatty, was not worked, but prospectors Hawes and Craig, who worked No. 2 Below, obtained some success for their efforts. Ralph Wheaton worked alone on No. 3 below, which prevented him from making any substantial developments. Some work also took place on No. 4 Below, but similarly reaped little winnings. Joseph McKnight, who reported the activities of the prospectors during the season, worked on No. 6 Below.[14]

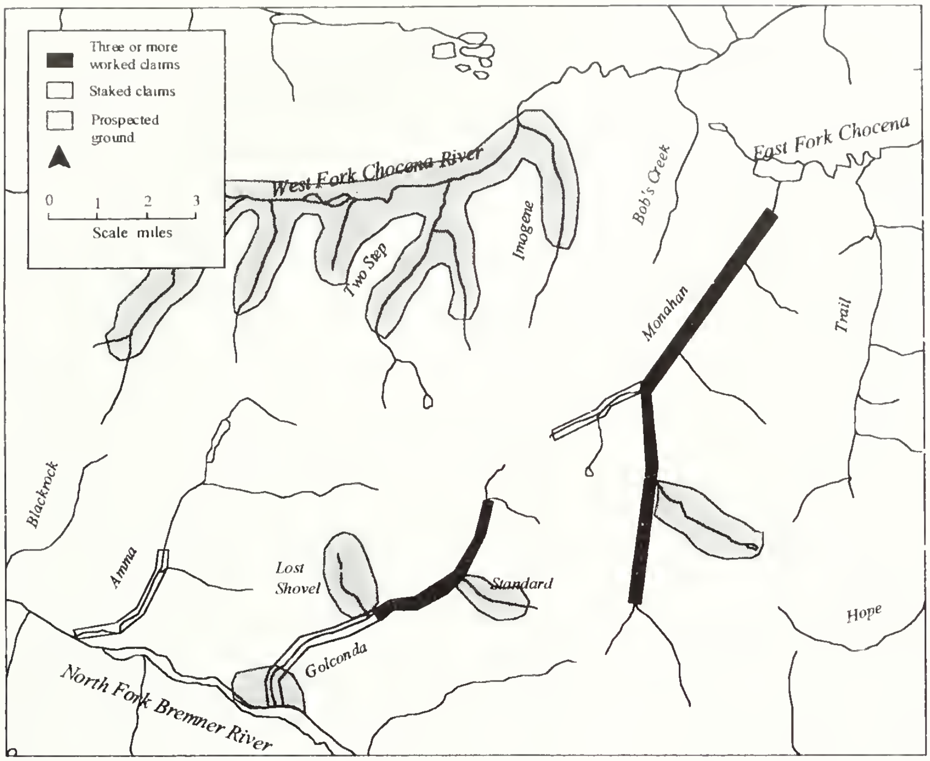


Figure 4.2. Mining activities in the heart of the Bremner District, circa 1902, including claims staked, worked, and areas prospected. Source: based on accounts in *Valdez News* and *Alaska Prospector*.

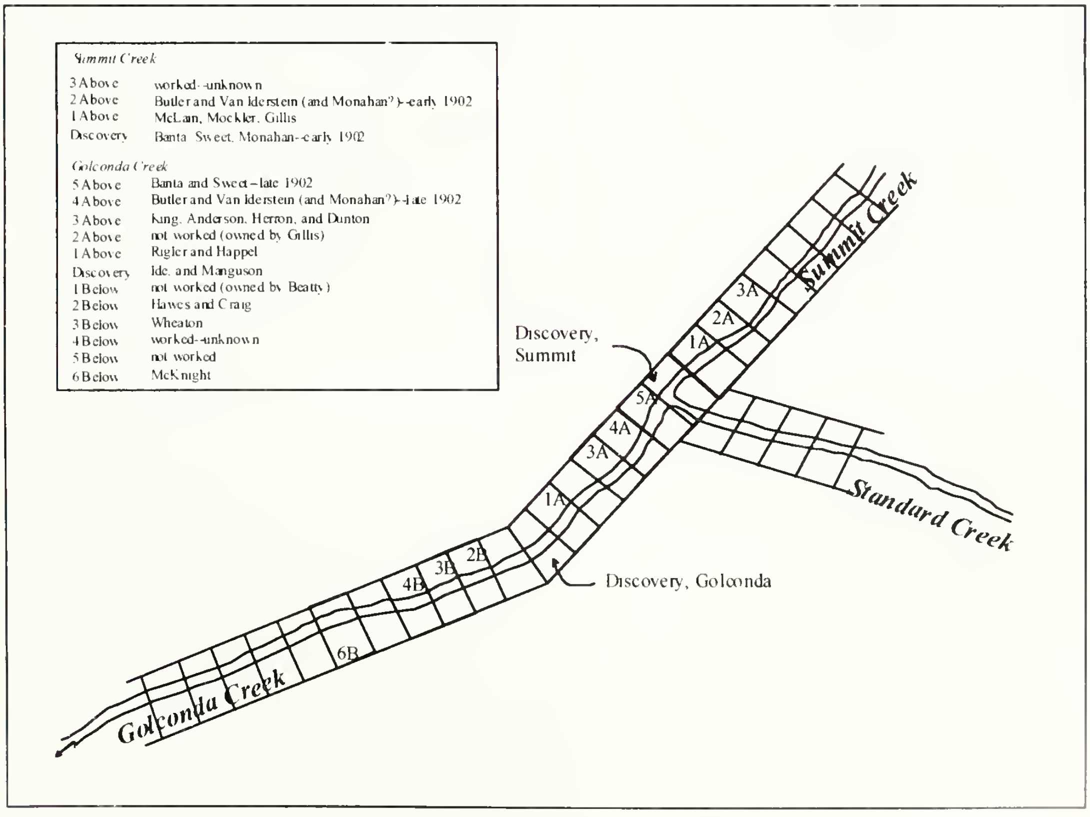


Figure 4.3. Hypothetical reconstruction of Golconda Creek and Summit Creek placer claims worked during the 1902 season. Source: *Valdez News*, *Alaska Prospector*, 1902.

Placer activity on Monahan Creek and its tributary Banta Creek occurred with less intensity. Monahan Creek received less work, in part due to high water levels.[15] Henry Anderson and three partners constructed a 30-foot long dam on No. 3 Above, Max Rigler opened No. 1 Above, Billy Beaton worked on No. 5 Below, and Eli Payment and his partner Talbot mined No. 14 Below with no great success. On Banta Creek, Tom Gain, Neal O'Conner, and George Hooper worked the No. 31 claim with "unknown," but likely discouraging results.[16]

The lack of equipment, meager returns, and existence of unprospected ground in the general area encouraged further prospecting ventures. Eli Payment and Talbot left their claims on Monahan Creek to prospect Imogene and Two Step creeks, three miles north from the head of Golconda Creek. Some prospectors sunk holes farther west along the West Fork of the Chokena River (Klu River). Billy Beaton, Higg, and O'Brien panned coarse gold from Beaton's Gulch, a tributary of Banta Creek.[17] Within the Golconda Creek watershed, prospectors panned coarse gold from Standard Creek and Shovel Creek, but neither watercourse received further work. Gold-bearing gravels found near the mouth of Golconda Creek provoked a small, but short-lived rush later in the season.[18]

In order to improve general living conditions, prospectors burned stands of timber throughout the Bremner Valley to rid the area of insects.[19] Willow and alder bushes, abundant in Golconda Valley, probably found use for cooking purposes, capitalizing on their tendency to produce a quick, hot fire.[20] Prospectors also encountered bears during the salmon spawning season, but the brevity of the mining season left little time or need for hunting, except for protection.[21]

Miners typically used wall tents for accommodations, adequate for work during the summer season and particularly suitable in areas with inadequate timber supply. The method of pitching tents varied according to the expected duration of work. For a few weeks of prospecting, for instance, the tent only needed to be supported with a few poles at each end. For seasonal work, however, prospectors often constructed a wood frame (typically from local timbers) over which to stretch the tent canvas. This provided more room and a frame from which to attach furnishings.[22] As an additional comfort, miners occasionally installed tongue and groove flooring, fashioned from fir or locally available timber.

The growth of mining activities elsewhere in the Copper Basin influenced the selection of routes into the Bremner District. The Bremner River trail, used by the first prospectors into the Bremner District, included a 12-mile-long canyon impassable by sleds in winter and by boats in summer.[23] The McClellan trail, however, along the north side of the Chitina Valley, serviced the Kennecott copper mines and the Nizina District and became the most well-traveled route in the region. As established trails made the movement of supplies and heavy equipment easier, the Hanagita River and Bremner River trails became largely outmoded, although they still likely saw service for general prospecting activities.[24]

Late in the 1902 season, Charles A. Schlosser arrived in the Bremner District bringing news of recent placer gold strikes in the Nizina District, approximately 40 miles to the north.[25] Prospectors Beaton and Mockler started for Nizina but changed their minds after talking with Arthur McNeer. As with prospecting in the Bremner District, the abuse of power of attorney assured that practically all the available property on the promising tributaries of the Nizina River (Dan, Rex, White, and Young Creeks) had already been staked by a few individuals.[26] A few days later, McNeer and Schlosser returned to the Nizina fields, taking with them Banta, Gain, Payment, Anderson, Hooper, and Talbot, perhaps for contract labor.[27]

At the close of the 1902 season, the Bremner District had produced only a few thousand dollars worth of gold. The Nizina District fared little better, given the similar portion of time spent hastily prospecting.[28] News of the Nizina strike, nevertheless, diverted rushers away from the Bremner District. By late 1902, less than one dozen miners continued to work claims along Golconda and Monahan Creeks. The Bremner District would never again see the same numbers of prospectors as it had earlier in the season.[29]

Many of the original prospectors probably left the Bremner District then permanently to search for better ground. In 1907 Pete Monahan and his partners William Grogg and Sidney Woffington struck rich placer ground on Valdez Creek, winning $80,000 from one bench.[30] Guy Banta found employment as the superintendent of the Latouche-Iron Mountain copper mine on Latouche Island, and Angus Gillis was recorded mining in the Iditarod district in 1911.[31]

With a reduction in the number of miners in the Bremner District, work resumed to only a limited extent in 1903. During the winter, a prospecting party sledded a small hydraulic plant into the Bremner District by the McClellan route. A boomer dam erected on Golconda Creek probably supplemented these hydraulicking operations (figure 3.4). This venture, however, appears to have met with minimal success. Levi Decker and Charles Mayman, who worked claims on Golconda Creek by pick and shovel methods, had better luck and accrued enough of a profit to gradually expand their holdings along the creek.[32]

Elsewhere in the district, high water on the Bremner River discouraged placer prospecting in the 1910 season. Al Doze and the Waln brothers, however, discovered placers along the Little Bremner River, a tributary of the North Fork approximately 30 miles west of Golconda Creek. Levi Decker also located a quartz lode deposit in the vicinity.

Interest in the Bremner District revitalized during the construction of the Copper River & Northwestern Railway (completed on 29 March 1911), linking the port of Cordova with the Kennecott copper mine, 60 miles east of the Copper River. Although the railway did not provide all-year access to the Chitina Valley (the washout of the bridge each spring closed the line for 2-3 months a year), it still eliminated excessive transportation costs and the lengthy traveling time that had seriously hindered mining throughout the Copper Basin.[33] In 1907, for example, it had cost Thomas Valentine $1.25 per pound and nearly six months traveling time to transport supplies from Valdez to the Bremner District—a cheap trip considering the normal cost of $3 per pound.[34] With the railway, Valentine could transport supplies to his claims for 3 cents per pound.[35]

Cheaper transportation costs enabled the profitable working of less-productive placers and facilitated the use of heavier equipment.[36] However, as the tenure of ground in the Bremner District proved too low to repay individual efforts (an observation later noted in USGS reports), the winning of profits required a fundamental change to the scale of operations. In 1911, the Golconda Mining Company acquired a five-year lease on 18 claims on Golconda Creek owned by Decker and Mayman. Organized by Chas. L. Graber, A. V. Doze, and E. H. Sellers, the company was capitalized with 100,000 one-dollar shares.[37] By January 1911, two men left Cordova for the Bremner District with "a car of supplies and hydraulic plant ready for work in the spring." A second hydraulic outfit (including large pipe, giants, and a sawmill) was destined to arrive in Cordova by February.[38] Equipment was sledded from the railway across the Chitina River and over the low pass from Monahan Creek.

The Golconda Mining Company spent most of the 1911 season installing the hydraulicking equipment and constructing support facilities. The latter involved digging a one-mile-long ditch for delivering water from Standard Creek and other smaller east-bank tributaries to a penstock with a head of approximately 250 feet. From the penstock, 1,800 feet of 12-inch-diameter iron pipe brought water to the workings.[39] The ditch and pipe system supplied enough water to the workings to support small-scale hydraulicking. By August 1, more than 100 feet of 30-inch-wide flume and two giants were in place and, in a little over a week, the company reached bedrock at the upper end of the workings to retrieve $1,100 worth of coarse gold (some nuggets fetching up to $20 each).[40] Operations may have later faced disposal problems, for the placement of sluice boxes apparently prevented the use of a canyon on Golconda Creek to flush tailings away from the claim.[41]

Although placer mining in the Bremner District had shifted significantly to attempts to consolidate operations, prospectors still worked individually. John Van Iderstein, for instance, continued work in the district during the 1911 season by finishing a ditch that brought water to his claims (possibly No. 4 Above on Golconda).

The significant improvements to transportation provided by the Copper River and Northwestern Railway also stimulated prospectors to investigate lode deposits in the Bremner area. Thomas Valentine prospected for quartz lodes along the South Fork of the Bremner River. In the heart of the Bremner District, a discovery stake and two gold lode claims—the Golconda and the Mammoth—were staked just south of the Bremner pass on the west side of the valley, but no development work had commenced by August.[42]

Prospecting for placer and lode deposits continued in 1912. Levi Decker worked a shallow deposit (between 4 and 20-feet deep) on Golconda Creek that he considered a fine hydraulic proposition.[43] High water levels, however, destroyed his season's work on the claims and Decker worked alone in 1913 re-installing the sluice boxes. Despite the delay, he managed to wrest 16 ounces of gold from the gravels by the close of the season.[44]

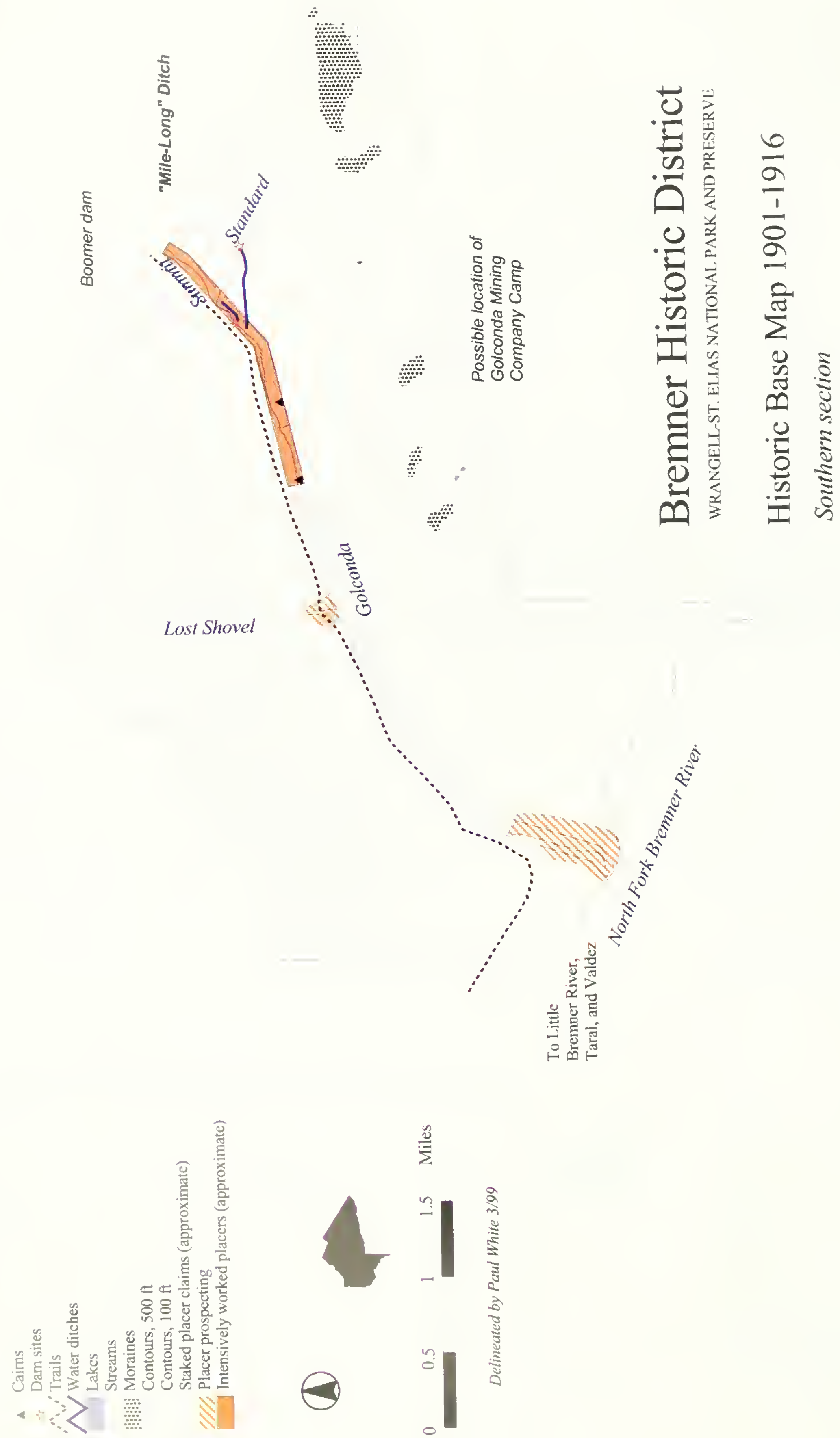
Henry Alheidt and Charles Graber spent 1912 prospecting the headwaters of the Bremner River and located placer ground that Alheidt intended to work on a large scale.[45] Harry Happel, Lewy Dahl, John Van Iderstein, and Frank Gobel prospected the Little Bremner River and found "good placer ground and splendid gold quartz indications." Their delayed return from the area caused considerable concern in Cordova, and a purse had been raised to send a search party.[46]

From the discovery of the district in 1902 to the close of the 1910 season, the Bremner District extracted an estimated $30,000 worth of gold, a figure undoubtedly little changed by 1913.[47] In contrast, production from the Nizina District for the same period exceeded 25 times that amount. Prospectors, nevertheless, kept positive outlooks for the eventual value of the district. Levi Decker predicted "a big movement to the Bremner and riches someday," and Thomas Valentine noted the area had "all the indications of a quartz camp."[48] Such claims were not entirely unfounded, for the prosperity of other mining districts in the region, including the Kennecott Mine, Nizina District, and recently discovered Chisana District, eased transportation costs and facilitated government programs to improve infrastructure in the Copper Basin. In 1914, for instance, the Alaska Road Commission constructed a bridge over the Nizina River (the longest bridge in Alaska at the time). This linked the Nizina District with the town of McCarthy and also served to aid the transportation of supplies into the Bremner District.

The advent of World War I, however, had serious consequences for the profitability of placer mining in the Bremner District, principally by increasing the scarcity of labor in a region that already suffered from it. In 1915, only one hydraulic plant operated. A year later, reports noted only "a little placer mining."[49] For several years after 1916, the Bremner District received no mention in annual government reports, and the Golconda Mining Company evidently did not renew its lease on the Golconda Creek claims. The first significant phase of mining had clearly ended.


To Nizina fields
Monahan
Banta
Gillis
Pocket
Summit
Golconda and Mammoth lode claims
To North Fork of the Bremner River
Cairns
Trails
Lakes
Streams
Glaciers
Moraines
Contours, 500 ft
Contours, 100 ft
Staked placer claims (approximate)
Intensively worked placers (approximate)
Lode claims (approximate)
0
0.5
1
1.5
Miles
Delineated by Paul White 3/99
Bremner Historic District
WRANGELL-ST. ELIAS NATIONAL PARK AND PRESERVE
Historic Base Map 1901-1916 Northern section

Figure 4.4



Bremner Historic District
WRANGELL-ST. ELIAS NATIONAL PARK AND PRESERVE
Historic Base Map 1901-1916
Southern section
Boomer dam
"Mile-Long" Ditch
Standard
Summit
Possible location of Golconda Mining Company Camp
Golconda
Lost Shovel
North Fork Bremner River
To Little Bremner River, Taral, and Valdez
Cairns
Dam sites
Trails
Water ditches
Lakes
Streams
Moraines
Contours, 500 ft
Contours, 100 ft
Staked placer claims (approximate)
Placer prospecting
Intensively worked placers (approximate)
0
0.5
1
1.5
Miles
Delineated by Paul White 3/99

Figure 4.5

1916-1927: Hiatus

During World War I and for several years afterward, the Bremner District experienced a lull in prospecting activity. As miners abandoned the district, they also left some equipment and personal possessions behind (including monitors, sleds, and tent-frames), perhaps in the hope of returning to the district, or else being reluctant to pack easily replaceable belongings. In the ensuing period of inactivity, various natural processes modified the placer landscape. Snow loads collapsed accommodations, and spring floods probably broke dams and removed sluice boxes.

Although the main period of placer prospecting had ended, it is unlikely that the area was entirely abandoned. In 1923, for instance, one report noted "one or two men" working a claim in the Bremner District.[50] Operations were, however, evidently so dispersed and ephemeral that they avoided detailed coverage by local newspapers and government reports.

1927-1938: Placer and Lode Mining

In the late 1920s, reductions to equipment costs and improvements to transportation led to a gradual revival of mining activity. The return of prospectors to the Bremner District was spearheaded by the search for lode deposits. In 1927, S. Lee Ramer staked 12 lode claims just south of the Bremner pass on the west side of the valley.[51] Collectively known as the Topsy Group, these claims tracked the Lucky Girl quartz vein, a fault fissure varying from 14-inches to 12-feet wide, over a vertical distance of 1,500 feet.[52] Shortly after Ramer's discovery, Charles A. Nelson located the Grand Prize vein at an elevation of 6,000 feet, approximately one mile north of the Topsy claims. Both the Lucky Girl and Grand Prize quartz veins held an average strike of north 36 degrees west and dipped approximately 79 degrees northeast. Gold ore occurred in small lenses along the fissure near the contacts of interbedded slates and graywacke of Mesozoic age. At the Grand Prize location, the ore occurred alongside a granitoid dike in the same formation.[53] In order to link the Topsy and Grand Prize groups, Nelson staked the Divide group of claims. Together, these lode prospecting activities marked out 42 lode claims and one placer claim in the Bremner District.

Within the next few years, placer mining also returned to the area. As with the early discovery period, mining occurred at a small scale with claims worked by individuals and small groups. Placer mining resumed on Monahan and Golconda creeks (including the section previously known as "Summit Creek") and also involved some attempt to work deposits on Standard Creek.[54] During the 1931 season, Fred Tagstadt erected a sod wing-dam on Golconda Creek, three-and-one-half miles below its head and one mile above Standard Creek. Tagstadt also owned the Black Bear and the Black Dog claims approximately one-and-one-half miles below the mouth of Standard Creek. Elsewhere on Golconda Creek, Hans Tyielle and E. C. Koivula sank four test pits and began shoveling in on the left limit of Seller's bar (presumably in the area formerly worked by Ed Sellers and the Golconda Mining Company).

At the mouth of Standard Creek, John Lucky and Olaf Soostadt dug a 200-foot-long bedrock drain.[55] The drain cut through three-and-one-half feet of gravel before reaching a one-and-one-half foot thick layer of soft slate bedrock. The prospectors panned fine and flaky gold from the workings and acquired one ounce of gold ($17.60) from their Standard No. 1 claim.

On Monahan Creek, Nickolai Jensen prospected the discovery claim. Robert Clark and Jack Young worked No. 1 Above Discovery by driving two bedrock drains, 200 feet and 400 feet long. They dug both drains to a depth of nine feet, but neither drain reached bedrock or recovered any gold. Deciding to prospect elsewhere, Clark and Young next drove a 600-foot long and nine-foot deep bedrock drain at the mouth of Monahan Creek, but this similarly failed to reach either bedrock or a paystreak.[56]

Prospecting also took place in other parts of the Bremner District. In the Tebay Lakes region, Jack O'Hara began the development of a group of claims six miles above the mouth of the Hanagita River.[57]

Contemporary government reports considered the Bremner District the "principal new area" in the Copper Basin, but placer operations clearly remained small-scale and miners typically spent most of their time prospecting.[58] Results from the 1931 season continued to indicate the ground was too poor to repay small-scale mining using only hand methods.[59]

As prospectors such as Thomas Valentine had predicted nearly two decades before, the resurgence of interest in the Bremner District occurred not over the reworking of placers, but in the exploration of lodes. In 1931, Lee Ramer optioned the Topsy claims to Asa C. Baldwin, B. B. Niedling, and Jack B. O'Neill, who immediately began work on proving the ore body.[60] Dissatisfied with their findings, the party soon abandoned the claims. The poor showing of the claims, however, did not deter Ramer or more than a dozen miners who searched the district for gold lodes in the 1932 season.[61] Of the "several promising leads" discovered and partly opened up, one group staked the Clyde Brown and Dieterlie lode claims east of Fred Tagstadt's placer operations one-and-one-half miles below the mouth of Standard Creek.[62] Retaining confidence in the worth of the Topsy and Grand Prize groups, Lee Ramer, together with his brother Peyton Ramer, formed the Bremner Gold Mining Company (capitalized at $250,000, comprising one-million 25-cent shares) with the purpose of thoroughly assessing the claims. Their efforts were generally considered the most work accomplished in the district.[63]

Renewed prospecting brought substantial improvements to the district's infrastructure. Matching the rapid adoption of air transportation by mining enterprises in Alaska, by 1930 prospectors had cleared a rough landing field south of Standard Creek from which to bring in supplies. The following year, a more substantial field (700-feet long and 150-feet wide) was completed on the east bank of Golconda (Summit) Creek with the cooperation of the Territorial Highway Engineer.[64] Although both landing fields were highly susceptible to weather conditions and were limited in use to aircraft fitted with balloon tires, their existence, nevertheless, quickly became the preferred mode of transport into the Bremner District.

Placer mining in the 1933 season managed to win a "small amount of gold," but lode prospecting now dominated work in the district.[65] The Ramer brothers traced a number of leads containing high grade ore on the surface of their claims. In addition to open cuts, assessment work likely involved the driving of exploratory drifts into the Lucky Girl and Grand Prize veins. As government officials commended, "the owners very sensibly are bending their efforts to proving the real extent of the ore body and as yet are taking no steps toward putting a mill on the property, so that it will be at least another year before any production of gold can be expected."[66]

If not completed earlier, the Bremner Gold Mining Company cleared ground for a small airstrip at the saddle of the pass. Like the other airstrips in the district, the landing field was notoriously small, rough, and boggy. Indeed, difficulties in leaving the Bremner airstrip gave the nickname "Mudhole Smith" to a Cordova Air Service pilot well-known in the Copper Basin.[67]

At the close of work in 1933, the Bremner Gold Mining Company felt enough confidence in the worth of the claims to build a small milling facility, and Lee Ramer began seeking out investors to furnish the necessary funds. By deciding to construct a mill, Ramer likely hoped to recoup some of the expenditure consumed in the development of the property—a problem faced by all mining companies, but one that proved particularly vital to the success of small-scale enterprises with limited starting capital. The decision also matched improved economic conditions for gold production, stemming from the U.S. government's abandonment of the gold standard on 19 April 1933, and the setting of a raised gold selling price ($35 per fine ounce) with the passage of the Gold Reserve Act several months later.[68]

While improved gold prices generated considerable interest and enthusiasm in the gold mining industry, sales of stock remained poor for the Bremner Gold Mining Company which still had three-quarters of its stock unissued. Nevertheless, the Gold Reserve Act boded well for securing loans and finances. Acquiring a loan from V. G. Vance, a Cordova banker, the company arranged the shipping of a 50-ton concentration and amalgamation mill for the 1934 season.

Probably owing to its bulk, the company decided to transport milling equipment into the Bremner District on the Copper River and Northwestern Railway and then by sleds.[69] However, as the Kennecott Copper Corporation had suspended operations on Bonanza Ridge between 1932 and 1934 (responding to lowered copper prices), the arrival of the mill was delayed several months until the temporary railway bridge over the Copper River near Chitina had been repaired.[70]

In preparation for the installation of milling machinery, the company blasted a terrace from the bedrock near the valley floor, approximately 70-feet east of an exploratory drift (termed the No. 1 Adit) on the Lucky Girl vein. Not only did this location have the advantage of being close to the mine, but the selection of a side-hill site would reduce milling costs and reduce power consumption.[71]

Until the arrival of milling equipment, the company directed attention to other surface improvements. Wood required for the construction of facilities was felled from timberlands located north of the Bremner District near the mouth of Monahan Creek.[72] With the aid of two Caterpillar tractors, the cords of lumber were sledded to the camp during the winter and early spring.

At the Lucky Girl Mine, the company created a terrace directly outside the No. 1 Adit for the construction of a blacksmith shop and compressor shed. The roof of the building extended past the walls to abut the cliff face, a likely measure to prevent the accumulation of snow and potential water damage to the structure.

Directly east of the Grand Prize vein, on the valley floor close to the pass saddle, the company constructed a permanent base camp. A cluster of structures, in place by 1935, included a bunkhouse (also serving as a mess-house), storage shed, mechanic shop, and water tower. The buildings were constructed using a variety of techniques, including log and balloon-frame construction, the latter sided with sawed planks or boards and metal sheets (figure 4.6 and 4.7). Mine workers not accommodated in the bunkhouse set up semi-permanent tents around the camp.[73] A short distance east of the camp, the company built an assay shed. The isolation of this structure from the main camp probably helped to minimize vibrations from vehicles passing by the camp and airstrip that would otherwise jar assaying balances.

Improvements to infrastructure during the 1934 and 1935 seasons included the construction of two aerial tramways. A 3,600-foot-long, two-bucket aerial gravity tram facilitated the movement of ore from the Grand Prize Mine. The sec-

Figure 4.6. Bremner Gold Mining Company camp, circa 1938, looking southwest. In addition to the frame tent, storage shed, bunkhouse/cookhouse, and water tank, a third wooden structure (log frame) is also visible between the bunkhouse and shed. To provide additional warmth, the bunkhouse was lined with celetex, a lightweight cane board. View looking southwest toward the Lucky Girl Mine. Photo courtesy of Sylvia Baldwin.

Figure 4.7. Bremner Gold Mining Company camp in the process of removal to a new site. The storage shed has already been moved. The log cabin in front of the bunkhouse was not shifted by Yellow Band Gold Mines Inc. to the new location—perhaps due to the instability of its foundations. Photo courtesy of Sylvia Baldwin.

ond tramway, constructed on the valley floor, linked the lower terminus of the Grand Prize tramway with the mill site. The Bremner Gold Mining Company also petitioned the Cordova Chamber of Commerce to finance "necessary improvements on the partially completed field in the Bremner District," likely referring to the airstrip two miles north of Standard Creek considered the safest field in the valley.[74] With the petition forwarded to the Alaska Road Commission, the Bremner District airstrip was slated for improvements, but did not receive work by the commission until the late-1930s.

In order to supply power to the mill, mines, and camp, the company constructed a hydroelectric system alongside Falls Creek, a tributary of Golconda Creek approximately one-half-mile south of the Lucky Girl vein. At the head of Falls Creek, workers constructed a 70-foot-long and 17-foot-high crib-dam. This improved the storage capacity of an existing glacial lake and extended the period of available water to five months. Approximately one-half mile downstream, workers also built a smaller dam to divert water into a 600-foot long ditch, cut into the hillside. A penstock at the other end of the ditch directed water into a 1,500-foot long pipeline, which in turn delivered water with a 400-foot head to a powerhouse situated on the valley floor (figure 4.8).[75]

The powerhouse (a small one-story, wood-framed structure sided with sheet metal) contained a 24-inch Pelton wheel and a Westinghouse AC/DC generator, capable of generating 156 kilowatts and 2,300 volts. A three-phase power line linked the powerhouse with the mill, Grand Prize lower terminal, and camp sites.[76]

Upon the arrival of milling machinery late in the 1934 season, work shifted to the construction of the mill. At its completion in 1935, the mill com-

Figure 4.8. Hydroelectric power system, circa 1938, on Falls Creek, showing hillside ditch (upper center), pipeline, and powerhouse (lower right). Photo courtesy of Sylvia Baldwin.

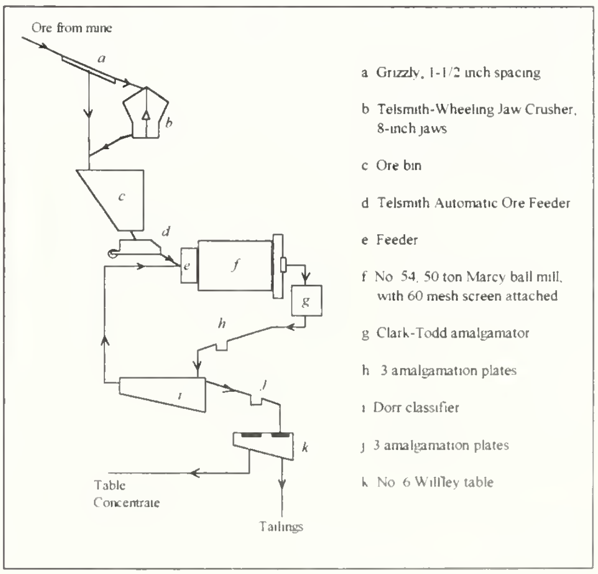
prised a 25-foot by 60-foot wood-framed structure, built with wood-preforms and sided with rabbeted boards and corrugated metal (figures 3.9 and 4.9).[77] The tight fit of the sideboards reduced draft in the mill, a significant benefit to the comfort of operators during cold temperatures at the beginning and end of the prospecting season.Internally, milling machinery was organized over three levels. The upper level included equipment for preliminary sorting and crushing. A grizzly, set with a spacing of one-and-one half inches, separated ore for the crushing circuit. A Telsmith-Wheeling Jaw Crusher with eight-inch jaws broke up the oversized ore from the grizzly (pieces larger than the bar spacing) into pieces suitable for finer milling. A shoveling plate beneath the grizzly directed both the undersized ore and crusher product into an ore bin. Directly beneath the ore bin and recessed into the cliff face, a Telsmith automatic feeder delivered feed down a launder into a Number 54, 50-ton Marcy ball mill at a regular rate. The ball mill crushed the ore further into "milling size." A screen at the other end of the mill allowed ore smaller than 60 mesh (0.0098 inches in diameter or smaller) to exit the mill and pass into a Clark-Todd amalgamator.[78] This machine agitated the milled ore with mercury to trap gold chemically by forming an amalgam. Overflow from the amalgamator washed in a thin film over three amalgamation plates coated with mercury to trap more gold and then continued to a Dorr classifier. The classifier sized ore by density through agitation in water. Heavier particles raked to one end returned by launder to the ball mill for finer grinding. Suspended particles flowed from the classifier over another set of three amalgamation plates for further concentration. Launders directed the overflow to a Number-6 Wilfley concentration table on the third level of the mill. The Wilfley table released a thin film of water over a moving tabletop fitted with wooden slats. Using a rocking motion, the denser particles in the slurry were caught by the slats and shaken to one end of the table where they could be bagged. Overflow from the Wilfley table received no further treatment in the mill and a launder channeled the waste outside to a tailings pile directly outside the building. In operation, a 50-horsepower Westinghouse electric motor ran the crusher, feeder, and ball

Figure 4.9

THE LUCKY GIRL MILL

Construction date: 1934-1935
Capacity: 50 tons
Treatment process: concentration/amalgamation
Approximate cost: $30,000

Lucky Girl Mill, circa 1938, showing overburden piles from the No. 1-No. 4 Adits, tailing dump outside the mill building, and power lines. The small structure at bottom left may be a privy. Photo courtesy of Sylvia Baldwin.



Lucky Girl Mill flow sheet, circa 1936.

mill, and a five-horsepower Westinghouse motor powered the table and classifier

The arrangement of machinery in the mill was, for the most part, extremely compact. However, in keeping with typical mill designs, enough space was left at the bottom of the mill for the addition of machinery and equipment.

Water necessary for the mill's operation derived from mine water and two seasonal streams a short distance west and east of the mill. To tap the streams, the company constructed two ditch lines above the mill, which directed water into a series of three settling drums outside the No. 2 Adit. A metal pipe next delivered the water to a drum positioned above the compressor shed (at which point a second pipe channeled water to a water pump attached to the compressor) and then into a 5,000 gallon wooden water tank adjacent to the mill.

Although the Bremner Gold Mining Company spent much of the two seasons involved in "dead work," some development took place on the claims. Underground work involved a combination of drilling and blasting. The company utilized six Gardner-Denver compressed-air drills (comprising two stopers, two drifters, and two jackhammers), a considerable improvement over traditional hand-drilling methods.[79] A 600-cubic-foot Gardner Denver two-stage compressor and a 120-cubic-foot portable compressor housed next to the blacksmith shop directly outside the No. 1 Adit ran the drills, with drill steels hand-sharpened by the blacksmith.[80] A small single-cylinder steam hoist (run by compressed air), moved mining supplies over a short aerial tram from the mill level to the No. 3 Adit (300 feet higher up the mountainside). By the close of 1935, three adits accessed the Lucky Girl vein with development and exploration work approaching 2,000 feet of drifts, crosscuts, and raises. Work on the Grand Prize vein included a 300-foot-long drift and a stope from which miners removed 500 tons of ore for processing in the mill. Poor indications in the workings, however, led the company to abandon further development of the Grand Prize vein (figure 4.10).[81]

Figure 4.10. Development at the Grand Prize Mine (above), which worked one of the first lode veins staked in the Bremner District, ended in 1935 on account of poor ore values. The Bremner Gold Mining Company, subsequently devoted efforts to developing the Lucky Girl property. Photo by author, MTU #BL-7.4.97.

Milling began in late 1935. The mill proved small enough for one man per shift to tend the machines. In the absence of a primary ore storage bin, the trammer dumped ore from the mine cars directly on to the grizzly. The trammer also aided the running of the mill by breaking up the larger pieces of ore on the grizzly with a sledgehammer. According to the company's estimate, the mill processed 1,500 tons of ore before work closed for the season.[82] The company may have either shipped mill concentrates for further refining, or, as a measure to further reduce costs, refined the concentrate into gold bars on site using a muffle furnace in the assay shed.

The improvement of gold prices combined with news of the Bremner Gold Mining Company's substantial investment in the district encouraged other prospectors to search the area for payable lodes.[83] In the 1934 season, Joe Meloy, Carl Killian, and Jack O'Hara discovered a series of quartz veins carrying high grade ore on the east side of the valley, approximately three miles south of the Lucky Girl vein. Between 300 and 1,000 feet above the valley floor, they staked 17 claims of the "Yellow Band" group. The following year, Asa Baldwin (who had previously examined the Topsy group) took out an option to prospect the Yellow Band claims. Upon arrival in the district, Baldwin and an associate set up a tent and crude blacksmith shop part way up the mountainside, approximately 700 feet above the

Figure 4.11. Yellow Band lower camp, circa 1938. The closest tent-frame in the picture may have served as the cookhouse. View looking northeast with wood storage area in left foreground. Photo courtesy of Sylvia Baldwin.

valley floor.[84] They may also have formed a small camp closer to Golconda Creek, which would in later years become the base of operations (figure 4.11).

In the first year, the two prospectors conducted 75-feet worth of development work on the claims, predominantly by open cuts. Assays on the Meloy lead, a two-inch to eight-inch wide quartz vein located 4,500 feet above sea level, indicated values of up to 35 ounces of gold per ton. The limited size of the outcrop and its highly erratic gold values, however, led Baldwin to argue against its further development.[85] Baldwin next turned attention to the Red Slide vein, located 300 feet farther east up the mountainside along a wide fault scarp traceable for several claim lengths. Near the intersection of the Red Slide with a northeast-southwest dike, the prospectors panned good values and proceeded to dig two open cuts. Owing to the depth of slide material, however, both cuts failed to reach solid rock. Baldwin concluded that while "there is evidently a gold bearing vein under the slide, the extent and value of which can only be determined by cross-cutting it, and drifting."[86] At the Red Slide vein they also found evidence of previous prospecting activity, namely an old rocker "packed there by two prospectors who might have made wages had the slide not been frozen."[87]

Approximately 300 feet east of the Red Slide vein, they came across the Killian lead, where three small dikes came together. Panning from slide deposits recovered "exceptionally rich float," and the muck yielded from 25 to 40 cents per pan. As the prospect was discovered just before winter, Baldwin and his associate only had time to conduct a limited amount of pick and shovel work.

Further up the mountain from the Killian vein, the prospectors panned gold from a large dike averaging 12 feet wide. They continued to pan values for a length of almost 3,000 feet; but, similar to the other veins, the greatest values were panned within close vicinity to the northeast-southwest dike. Operations in 1935 included three open cuts on the Pot Hole vein. The first cut, referred to as the No. 2 Cut, exposed a vein beneath the slide rock with $6.00 values. After deepening the cut to six feet, values reached as high as $90.00. The No. 1 Cut, 80 feet south of the No. 2 Cut, exposed a high-grade stringer, with values averaging $5.70 across the 12-foot width of the dike. No. 3 Cut, begun 50 feet north of the No. 2 Cut, did not receive enough work to permit panning a representative sample. From the results of the prospecting season, Baldwin concluded, "Although in some places high-grade ore and float has been found, the character of the deposits offer greater possibilities for a commercial body of medium low-grade ore."[88]

In addition to mineral prospecting, Baldwin measured the discharge of nearby Golconda Creek to determine its applicability for hydroelectric power generation. Baldwin considered that, despite its fluctuations, the stream could generate 200 horsepower throughout a four to five month period.[89]

By the end of the 1935 season, lode mining had become firmly established in the Bremner District. Baldwin's investigation of the Yellow Band claims indicated their economic potential, and the Bremner Gold Mining Company's construction of a milling facility after careful prospecting augured well for the feasibility of lode mining operations in the area.

The Bremner Gold Mining Company, however, suffered a number of difficulties in 1936. While some problems may have been technical, the costs incurred in the construction of the Lucky Girl Mill, combined with the delays in its operation, placed the company in a precarious financial situation serious enough to force the company's reorganization.[90] Little time was spent developing the claims during negotiations, but the company, nevertheless, employed 24 men during the season. Having ceased work at the Grand Prize location, attention centered on the development and exploration of the Lucky Girl vein. Mining primarily took place on three levels. The No. 1 Adit, directly west of the mill, included a 600- to 700-foot-long drift and two short crosscuts. The company completed a 700-foot-long drift and three raises in the No. 2 Adit, 150-feet further up the mountainside.[91] The majority of ore processed in the mill derived from the No. 3 Adit, 300-feet west of the mill. Here, workings included a 200-foot-long drift with four raises. Two of the raises led into a small stope 50-feet long, 35-feet high, and five to six feet wide. Raises connected the three tunnels and found secondary use as a cheap means to transport ore to the mill. Trammers dumped ore from the No. 3 Adit level into a six-inch diameter pipe, which traveled through the raises and exited at the No. 1 Adit on the mill level.

The company also undertook new development work at the claims. Under the supervision of Clarence Poy (a mining engineer from Valdez), miners drove a fourth tunnel on the Lucky Girl vein approximately 100-feet below the mill.[92] By mid-summer, the tunnel approached 60 feet in length, although it had still not tapped the vein.

In order to improve the stability of underground workings, the company put stulls in the drifts and crosscuts and square-set timbering in the raises. General safety measures at the mine, however, were substandard. Joseph Roehm, a mine inspector who visited the district in 1936, noted a fire door "of poor construction" erected at the No. 1 Adit, an absence of ventilation pipes in the workings (negated somewhat by the connecting raises), and a lack of first aid training among the miners.[93] Although the company expressed a willingness to begin first aid training in the 1937 season, this was too late to prevent the death of one of their miners, Fred Tagstadt, who died from blood poisoning after lacerating his thumb on a rock shortly after Roehm's visit.[94]

By August, the mill had processed approximately 1,000 tons of ore, probably producing around two tons of concentrate worth $10,000 to $12,000.[95] While the mill was essentially designed for "free-milling gold" (gold uncombined with other substances), the oxidized ore encountered in the Lucky Girl vein reduced recovery rates. The Wilfley table, which sorted ore from gangue by density, was particularly affected and produced only a $55 concentrate, passing the rest off as tailings.[96]

Asa Baldwin and a small crew continued development work on the Yellow Band claims in the 1936 season. In March, Baldwin sent in powder and supplies from Seattle by way of ship to Cordova and then by air to the Bremner District. While the freight landed in Bremner in good condition, snow slides during the winter season had destroyed the 1935 upper camp.[97] The prospectors necessarily spent the early part of the season engaged in the construction of a new camp. In order to lessen chances of future damage by snow slides, the second camp was located farther up the mountainside on a promontory free from slides.[98] The new camp comprised one or two tent frames, a rock-walled shelter with tin roofing in which to conduct blacksmithing operations, and a privy.[99] Dry-stone walls built around the tent frames lessened the effect of the wind at the exposed location (figure 4.12).

Construction of the upper camp postponed prospecting until late-July (figure 4.13). At the resumption of development work, Baldwin directed attention to the open cuts made the previous year on the Pot Hole vein—also termed the Meloy vein. Lowering the floor of the No. 3 Cut by six-feet, miners exposed a low-grade deposit of free-gold, assaying between $2 and $3 per ton. Although too low to work at a profit, further development on the other cuts yielded more encouraging results. Work on the No. 2 Cut confirmed the good values recovered in the 1935 season. More significantly, however, the deepening of the No. 1 Cut by three feet exposed a two-to-four-inch wide, high-grade stringer, assaying up to $647.50 per ton. A sample across 12 inches of the host quartz vein indicated an average value of $250 per ton. In the absence of any vein filling, Baldwin classed the surrounding quartz as a "mineralized lode, . . . similar in this respect to many of the lodes in the Cripple Creek district of Colorado."[100] In order to determine the size and quality of the deposit, Baldwin contracted a laborer to drive a narrow crosscut directly beneath the No. 1 Cut. This "wheel barrow tunnel" reached the quartz vein at a distance of 35 feet and, after a distance of another 20 feet, the tunnel had still not reached the full width of the vein. Of further encouragement, the presence of the high-grade stringer seen in the open cut was indicated near the center of the exposure.

Figure 4.12. Upper camp (built in 1936) at the Yellow Band Mine, circa 1938, showing two tent frames and a small shelter for blacksmithing operations. At least one tent frame is protected with dry stone walls. View to the southwest toward the North Fork of the Bremner River, with Standard Creek and Golconda Creek at lower right. Photo courtesy of Sylvia Baldwin.

The Yellow Band Group also drove a drift on the Killian lead during the season. Baldwin set up an "old rocker" from which to sample loose gravel, and this recovered around one-ounce of gold per cubic yard.[101] A grab sample of the slide material assayed at nearly $118 per ton. By mid-August, work on the Killian vein included an open cut and a 50-foot long drift.[102] The season's work on the Yellow Band claims ended prematurely with the arrival of an early snowstorm. The season's work showed a number of encouraging indications, but it had not yet proved any ore. Nevertheless, the open cut and cross-cut on the Meloy vein provided three corners of a high grade block cautiously estimated at 80 feet long, four to six feet wide, and 30 feet deep, with a potential value of $15,000. Baldwin postulated the existence of a second block of ore sharing similar dimensions and value beneath the first block.[103] Exercising prudence, Baldwin proposed driving another 200 feet of development in order to prove the worth of the claims.[104]

In addition to work conducted by the Bremner Gold Mining Company and Yellow Band Group in the 1936 season, a few prospectors were active in the local area (figures 4.14, 4.15). Charles A. Nelson discovered a good gold prospect among severely fractured graywacke one mile northeast of the Yellow Band claims, at the head of a steep cirque 6,000 feet above sea level. This location included five quartz veins, six to twelve wide, each carrying high-grade ore. On the surface,

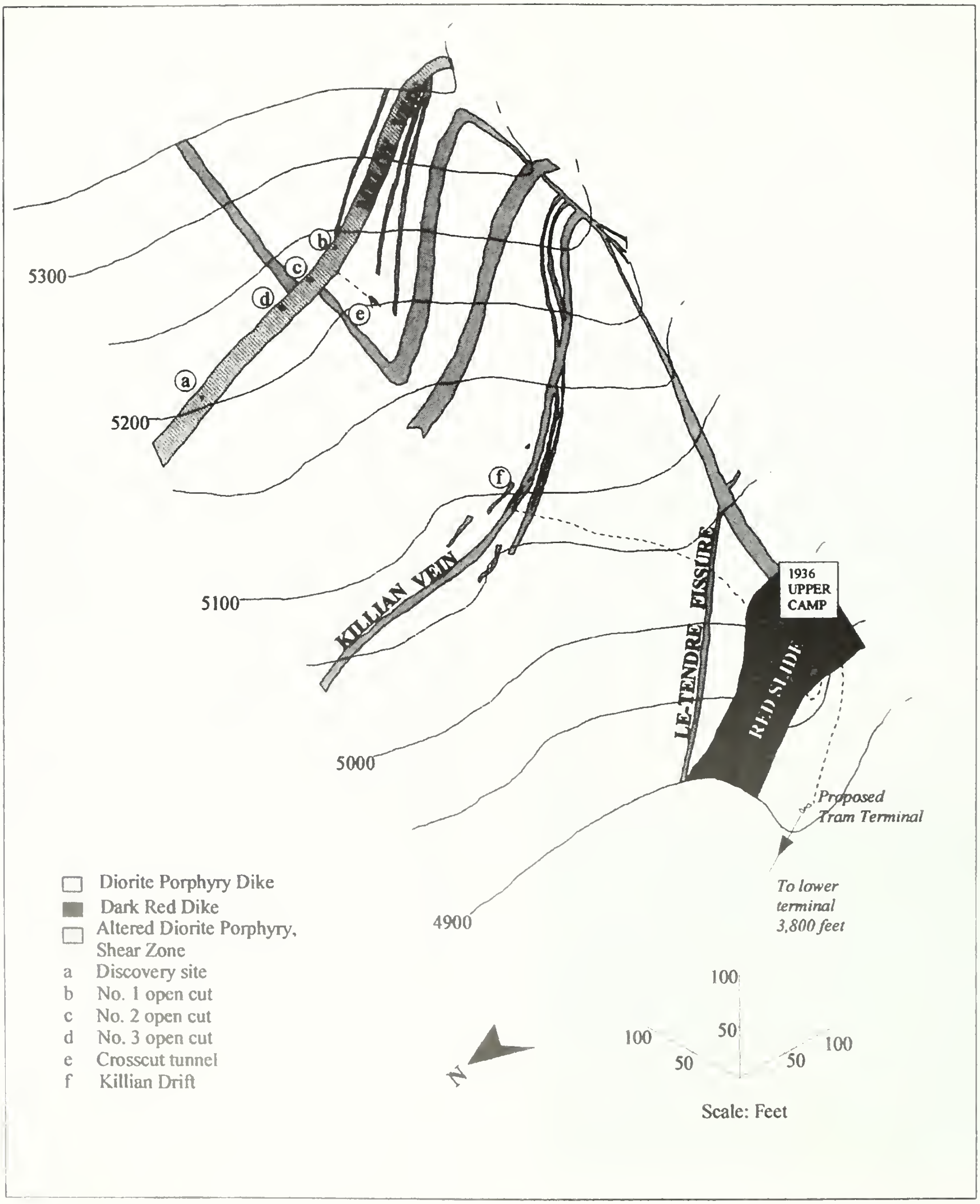


Figure 4.13. Isometric view of workings at the Yellow Band Mine, indicating surface geology and mine development, circa 1936. Adapted from: Asa Baldwin, *Surface Geology of Yellow Band Gold Veins, Golconda Creek, Bremner District, Alaska* (Asa Baldwin Collection, M36 8-30); National Park Service, *Cultural Resource Site Inventory Form XMC 107* (on file at park office); Historic photographs, courtesy of Sylvia Baldwin; and 1998 existing conditions survey.

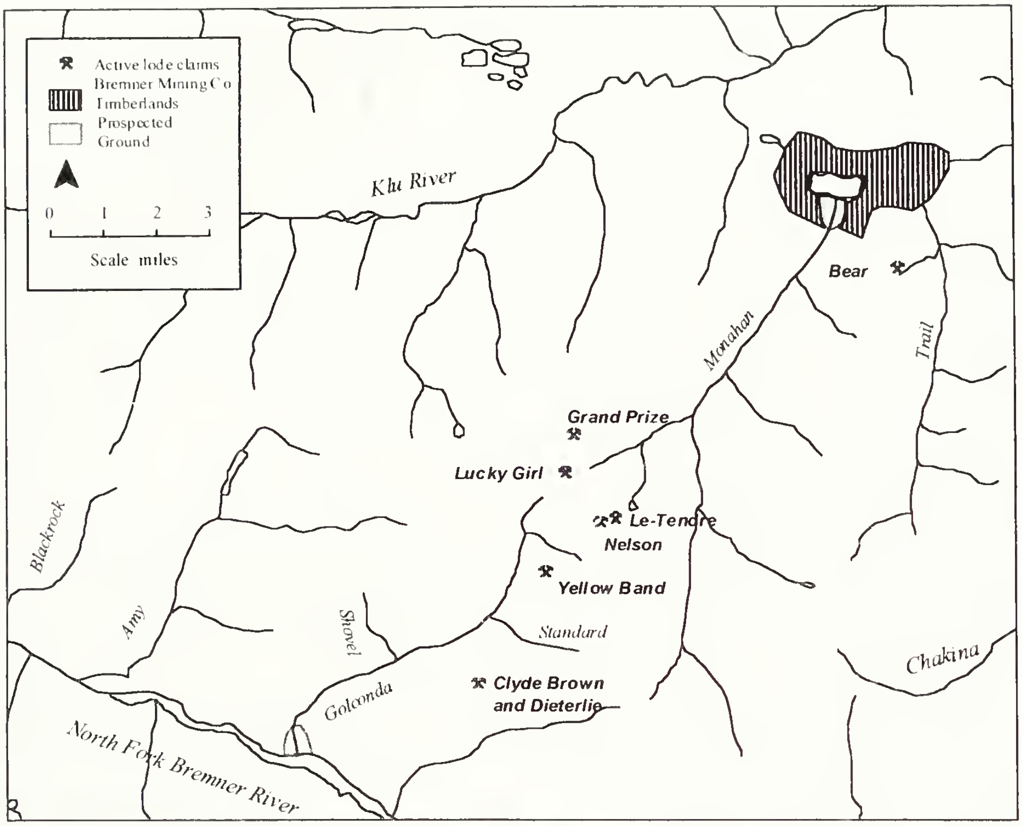


Figure 4.14. Placer and lode mining activity in the Bremner District circa 1936.

Figure 4.15. Part of the Yellow Band prospecting outfit, circa 1936-39, photographed outside the Copper River and Northwestern Railway depot at Chitina. Asa Baldwin is at left. Photo courtesy of Sylvia Baldwin.

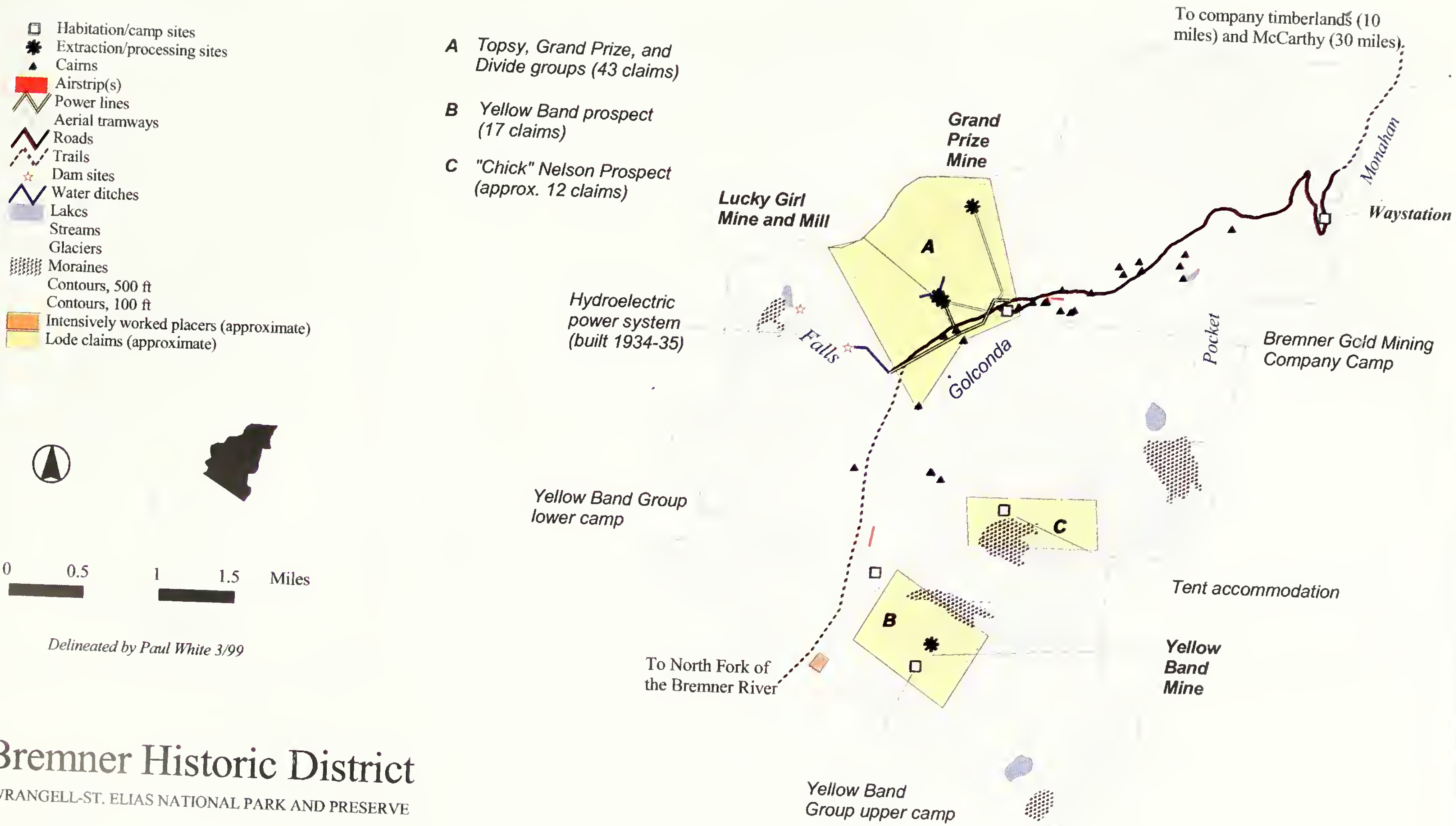
Nelson traced the length of the veins for 200 to nearly 400 feet, at a strike of 25 degrees northeast.[105] John Letendre discovered gold just over the ridge from the "Chick Nelson claims," but apparently did not conduct any significant work on the property.[106] Ten miles northeast of the Bremner pass saddle, Steve Pytel and Mack Sanford located a lode seam that panned from $1.75 to $22.82 per ton in gold and silver. They subsequently staked the prospect as the Bear Mine Group.[107]

Placer mining also occurred during the season, but only in a desultory manner. C. W. Vickery prospected near the mouth of Golconda Creek, and Fred Struckman tested deposits near the mouth of Monahan Creek.[108]

The 1937 and 1938 seasons saw diminished activity in the district. Besides operations by the Bremner Gold Mining Company and the Yellow Band Group, only two other prospectors, Carl the Bremner Gold Mining Company lay idle. At that point, the company had produced close to

$22,000 from the Grand Prize and Lucky Girl veins, but owed nearly $30,000 in unpaid wages, mortgage payments, and money to creditors.[109]

At the Yellow Band location, work during the 1937 season likely continued on the Meloy and Killian veins.[110] Confronted with heavy cash payments to the discoverers of the prospect at the end of the season, the Yellow Band Group found themselves in a similar predicament to that faced by the Bremner Gold Mining Company two years prior. However, the season's work instilled confidence in the value of the claims. Furthermore, the demise of the Bremner Gold Mining Company and location of high-grade prospects elsewhere in the district presented an opportune time for the company to acquire extensive holdings in the district. Seeking adequate finances, Baldwin successfully accrued support for his venture, particularly among residents of the Copper Basin—including at least five members of the Nabesna Mining Corporation's board of directors.[111] In February 1938, the Yellow Band Group reorganized as the Yellow Band Gold Mines, Inc. With these changes came a renewed vigor to transform the mining of gold deposits in the Bremner District into a profitable enterprise.

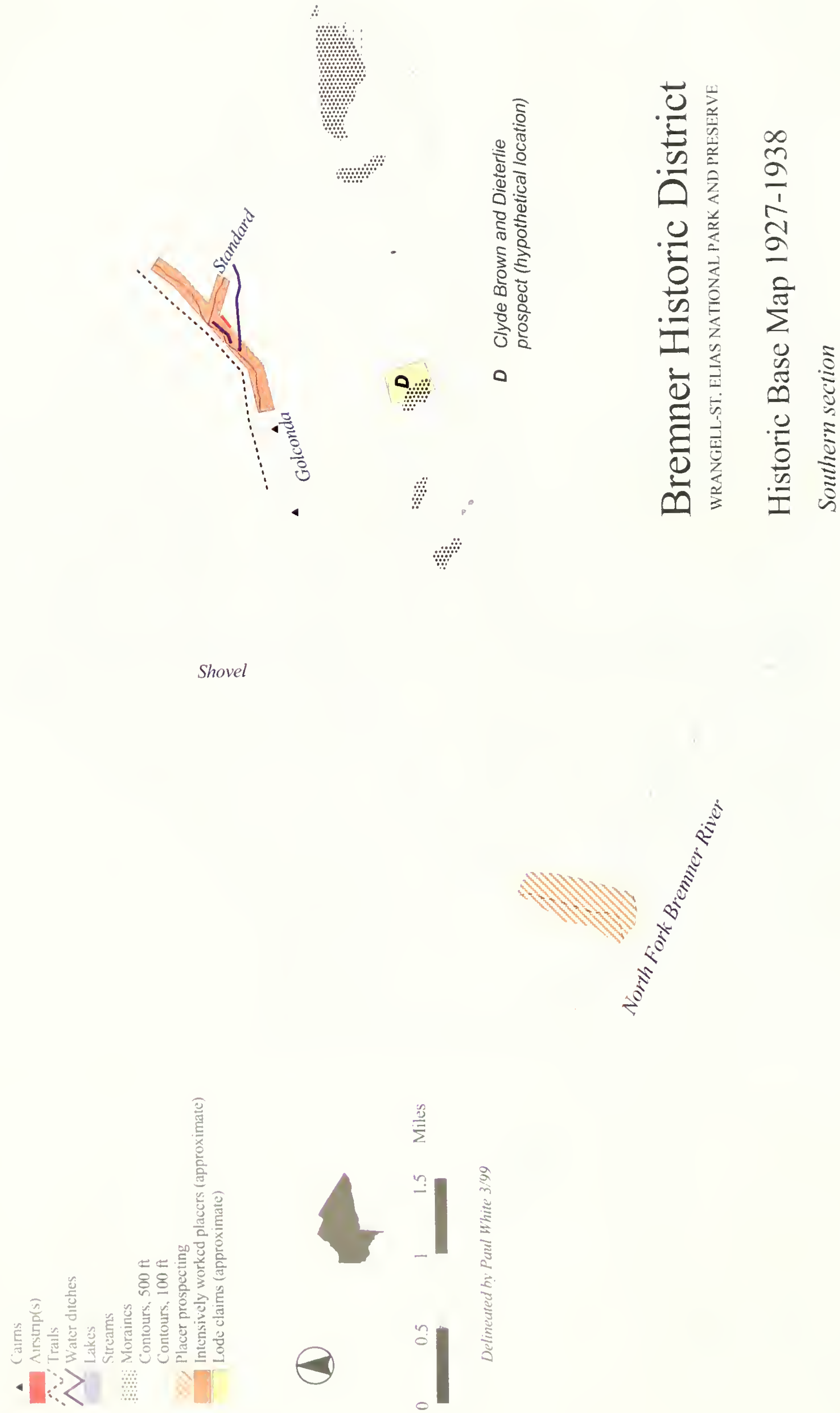


Bremner Historic District

WRANGELL-ST. ELIAS NATIONAL PARK AND PRESERVE

Historic Base Map 1927-1938 *Northern section*

Figure 4.16



Standard
Golconda
Shovel
North Fork Bremner River
D
D Clyde Brown and Dieterlie prospect (hypothetical location)
Bremner Historic District
WRANGELL-ST. ELIAS NATIONAL PARK AND PRESERVE
Historic Base Map 1927-1938
Southern section
Cairns
Airstrip(s)
Trails
Water ditches
Lakes
Streams
Moraines
Contours, 500 ft
Contours, 100 ft
Placer prospecting
Intensively worked placers (approximate)
Lode claims (approximate)
0 0.5 1 1.5 Miles
Delineated by Paul White 3/99

Figure 4.17

1938-1942: Yellow Band Gold Mines, Inc.

The Yellow Band Gold Mines company began with a capitalization of $350,000, comprising 100,000 one-dollar shares of preferred stock and one million 25-cent shares of common stock. Through exchanges in shares rather than in cash payments, the company acquired considerable property in the Bremner District within a short time of its formation. Yellow Band Gold Mines first traded some of its stock for a one-half interest in the Chick Nelson claims and for a reduced cash payment to the Yellow Band discoverers.[112] Negotiations quickly followed for the purchase of all assets belonging to the Bremner Gold Mining Company (including all the milling and mining equipment, as well as the other half-interest in the Nelson claims). Similarly acquired through an exchange in stock, the Bremner Gold Mining Company, in effect, merged into the Yellow Band Gold Mines. The company assets were substituted for 104,000 shares of common stock, and Bremner Gold Mining Company shareholders received stock in the Yellow Band mines at the rate of 14 shares of common stock or 35 shares of preferred stock to one Yellow Band share of common stock.[113] The Yellow Band Gold Mines absorbed all Bremner Gold Mining Company debt (except what the Bremner Gold Mining Company owed on the Nelson claims) through a new mortgage to V. G. Vance for $22,436.81 at six percent interest.[114]

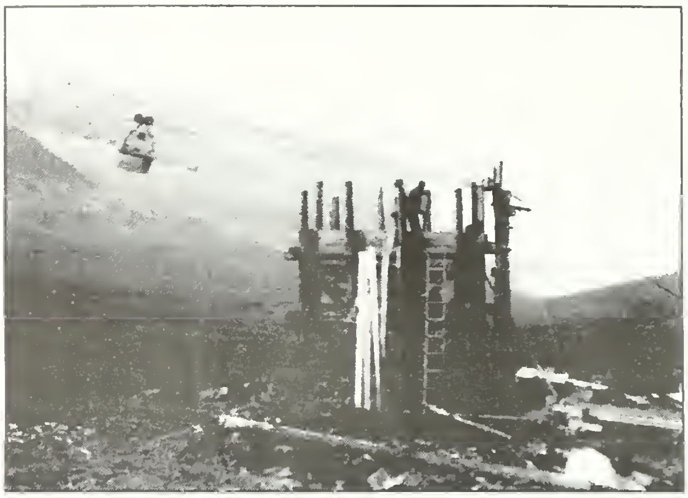
For a total cost of half the capitalization, the Yellow Band Gold Mines consolidated the Topsy, Discovery, Grand Prize and Yellow Band groups, and the Chick Nelson claims—also termed the "Sheriff" property. By staking additional claims on the valley floor, the company connected all its property into an unbroken band of 71 lode claims and five placer claims, some one-and-one half miles wide and two-and-one-half miles long.[115]

The company spent its first season (1938) conducting surface improvements. From January until mid-April, two men freighted supplies 30 miles from the Chitina River to the Bremner District. Six men were put to work in May and, in the following six months, an average crew of eight worked the property.[116] Improvements included general repairs, such as mending leaks in the hydroelectric pipeline, but emphasized the development of infrastructure to enable two mines, the Sheriff and Yellow Band, to be worked simultaneously. Workers constructed a 3,500-foot long double-reversible aerial tramway, with a maximum capacity of three tons per hour, between the Yellow Band upper camp and a lower terminal 1,600-feet below on the valley floor (figures 4.18-4.20). Work also began on the construction of a single-cable aerial tram line to the Sheriff Mine, with 2,500-feet of tram line (approximately half the total distance toward the mine) completed by the end of the season.

In the long term, the company evidently intended to build a new mill close to the Sheriff and Yellow Band claims where, reportedly, water could be obtained for nine months of the year. The need to start production as quickly as possible, however, prompted the use of the existing Lucky Girl Mill, with some modifications, until adequate profits were attained.[117] George White, a millwright employed by the company, performed the mill adjustments, including the replacement of the 60-mesh screen at the end of the ball mill with an 80-mesh screen (allowing particles 0.007 inches in diameter or smaller to pass through to the amalgamator). The resultant finer grinding in the ball mill released more free gold and improved the recovery on the plates, although it reduced the mill's capacity to 30 tons per day.[118]

The considerable distance between the mill and mine sites prompted the construction of haul roads to connect the mill with the lower tram terminals of the Sheriff and Yellow Band mines (respectively 2 and 2.5 miles southeast of the mill. By the end of the season, approximately four miles of tractor road were completed.

Of the three buildings "constructed" during the 1938 season, most, if not all, likely comprised improvements to existing accommodations. This possibly included the enlargement of a semi-permanent tent erected part way to the Sheriff claims which, similar in design to structures at the Yellow Band upper camp, was protected by dry stone walls (figure 4.21). A second renovation likely conducted then included the siding of a tent frame at the Yellow Band camp



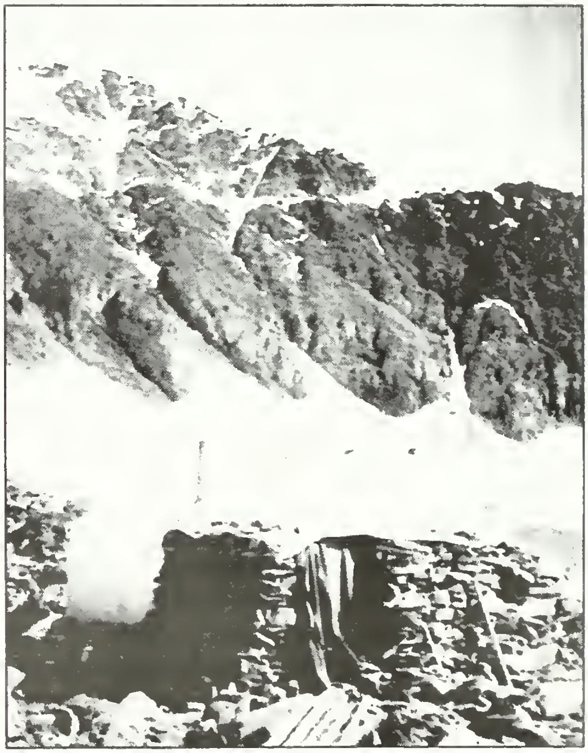


Figure 4.18 (top left). Yellow Band aerial tramway, completed in 1938. Photo looking northwest toward Golconda Creek. Tents of the lower camp are just visible at photo center. Photo courtesy of Sylvia Baldwin.

Figure 4.19 (bottom left). Upper tram terminal at Yellow Band Mine, circa 1938, showing terraces formed during its construction. The figure at center is probably Jack O'Neill. Photo courtesy of Sylvia Baldwin.

Figure 4.20 (top right). Lower tram terminal and ore bunker of the Yellow Band Mine, indicating the use of the aerial tram for the transfer of timbers to the mine workings. In order to move supplies up to the mine, a weighted bucket, probably filled with ore, descended down the tram line at the same time. View looking south. Photo courtesy of Sylvia Baldwin.

Figure 4.21 (bottom right). Lower camp at the Sheriff Mine, likely constructed by Charles Nelson during prospecting work in the mid 1930s. The structure was expanded by the Yellow Band Gold Mines shortly after purchasing the Nelson property in 1938, although the camp was probably abandoned by 1940. View looking south. Photo courtesy of Sylvia Baldwin.

with metal sheets, improving both its permanence and livability.

In addition to significant surface improvements, development work took place at the Sheriff and Yellow Band locations using hand-drilling methods. At the Sheriff Mine, miners dug a series of open cuts and pits. Two shallow open cuts exposed the "No. 5 vein," the most southerly of the five veins at the outcrop. Combining assays from cuts on the No. 1, 3, 4, and 5 veins, the Sheriff Mine yielded an average value of $119 per ton.[119] Work at the Yellow Band location included driving a 30-foot-deep winze in the Killian drift and a 20-foot long drift at the bottom of the winze. Values on the lower drift panned well at almost $86 per ton.[120] A test run of the mill near the end of the season processed 20 tons of ore from the Killian vein, producing $400 worth of concentrate at a 91 percent recovery rate.[121]

Four men remained in the district after the season's end in October to freight supplies and cut wood from company timberlands near the mouth of Monahan Creek (in all probability, in the same location as the former Bremner Goid Mining Company lands).[122] During that time, the Chitina Valley experienced two events with important repercussions to mining in the Bremner District and the Copper Basin. In November, the Kennecott Copper Corporation closed its mines on Bonanza Ridge and, in the following month, the Copper River & Northwestern Railway made its last run to Cordova. Without the mines and railway, Chitina Valley residents lost their major employers and, after 1938, the towns of Chitina and McCarthy were largely abandoned. Mining enterprises remaining in the valley consequently faced rising transportation and supply costs. The government's decision against converting the disused railbed into a roadbed necessitated an even greater dependence on air transportation for Chitina Valley businesses than had previously existed.

As some consolation, the closure of Kennecott provided local mines with an opportunity to acquire cheap, secondhand equipment. In October, Asa Baldwin purchased an assortment of supplies (10,000 feet of ¾-inch tractor cable, 4,000 feet of 2-inch pipe, 200 feet of air hose, tram carriers and pans, blasting powder, a mine car, 12 cots, and 24 folding chairs) from the Kennecott Mine for $725.90.[123]

The territorial government also wished to encourage the continuance of mineral exploration in the Copper Basin. In 1939, aided by funds from the Territorial Highway Engineer and the Alaska Road Commission, the Bremner District finally received an adequately sized airstrip. Constructed on a moraine terrace close to the Yellow Band lower camp, the airstrip improved upon the cruder version cleared with the aid of government funds in 1931. During the improvements, Yellow Band Gold Mines supplied a bulldozer and necessary equipment and provided board and quarters for Alaska Road Commission workers. After completing the new airfield, the Alaska Road Commission also constructed four miles of tractor road from the Bremner pass toward the Monahan Creek valley, eventually intending to connect the Bremner District with the Nizina District.

In the 1939 season, the Yellow Band Gold Mines procured enough funds to take on 14 to 16 men.[124] From January to April, a small crew employed the two tractors and sleds to freight 280 tons of supplies, including 150 tons of saw logs, mine timbers, and transmission and telephone poles to the Bremner camp.[125] In May, the bunkhouse, storehouse, assay shed, and garage were moved from their location near the saddle of the Bremner pass to a new site near the powerhouse, considered by Baldwin "a more central and convenient place for future operations."[126] In order to move the camp, workers first slid log skids underneath the buildings. The skids were probably roped to a tractor and towed to the new location. At the new camp site, sills were laid for the bunkhouse and garage, but the assay building and storage shed were left on the log skids.[127] The garage, perhaps the first building moved, was sledded the farthest from the old camp and set approximately 450-feet northeast from the powerhouse. The other three structures were repositioned in a small cluster 450-feet northeast of the garage. Around this cluster of buildings, the company positioned a two-hole privy, meat cache, and tent-frames (figure 4.22). A small portable sawmill was set near the powerhouse.

Figure 4.22. Structural improvements were among the first activities of the Yellow Band Gold Mines in the Bremner District. *Top:* Yellow Band Gold Mines camp (1939) looking southeast toward Sheriff Mine valley. From left to right, structures include a bunkhouse, meat cache, storage shed, two tent frames (one semi-permanent), and company office (former assay shed at the Bremner Gold Mining Company camp). In addition, a mechanic's shed (not visible) was located a few hundred feet south of the main building cluster, close to the powerhouse. *Bottom:* Cliff House at the Sheriff Mine (1939) showing crib foundations and wall tent extension upgraded to a permanent structure during the 1939 season. Both photographs courtesy of Sylvia Baldwin.

During the relocation of the camp, equipment from the assay shed was transferred to the blacksmith shop at the Lucky Girl Mill, and the shed became a company office.

With the formation of a new camp came improvements to communication facilities at the mine. A radio transmitter at the new camp connected to the Yellow Band and Sheriff mines and also enabled operations to communicate with Chitina and McCarthy in the Chitina Valley.[128]

Surface improvements at the claims continued to prepare the Sheriff and Yellow Band mines for extraction. This included the completion of the 4,800-foot long Sheriff tram line, as well as a two-mile long transmission line from the powerhouse to the mine.[129] Ore bunkers with a capacity of 50-tons were constructed at each end of the tram line.

Between the upper bunker and the No. 5 vein, workers blasted a grade for a 130-foot long surface track. This unexpectedly revealed two small offshoot veins from the No. 1 and No. 4 leads.[130] A ledge was also blasted for a bunkhouse, known as the "Cliff House," and for a blacksmith shop. After constructing the bunkhouse, a wall tent was set up on its south side to accommodate the greater number of workers at the site (figure 4.22). The company directed a couple of men to build snow sheds to protect the mine buildings and tram line from slide damage. These were constructed from wood and flattened drums.

At the Yellow Band prospect, ore bins with a capacity of 33 tons were built at each end of the tram line. A 300-foot-long tram from the Killian tunnel to the upper tram terminus at the mine camp improved the transportation of ore to the mill. As a further measure to improve infrastructure, tractor roads connecting the Yellow Band and Sheriff mines to the mill were upgraded for a dump truck. If not already in place, this involved the construction of at least three short bridges to span gullies and streams, including a wooden-bridge across the head of Golconda Creek. At the mill, the company constructed a 75-ton-capacity bin and a broad metal chute between the bin and the terminus of the mill road, enabling the truck to dump ore directly into the storage bin.

The only development work during the 1939 season occurred at the Sheriff Mine. Work initially involved drilling by hand, but the installation of an Ingersoll-Rand compressor at the mine in September provided enough power to run one compressed air drill. After the compressor's installation, work began on a tunnel to cut across the veins. By the end of the season, 75 feet had been driven on the "6001 crosscut," exposing the No. 1 and No. 2 veins.[131] The compressed air drill was also employed on the No. 5 vein to excavate a 55-foot long open-cut (figure 4.23). The exposed ore averaged $28 per ton. Stripping on the No. 1 vein revealed a thin vein of rose colored quartz averaging $48 per ton. The "Igorrote" vein proved even more enticing, as it held clumps of arsenopyrite assaying as high as $4,354 per ton.[132]

The transfer of ore to the mill not only enabled the mill to operate for the season, but provided weight to the gravity tram so it could haul up supplies to the mine.[133] The mill ran for a total of 340 hours between 3 August and 12 October, in which time it processed 505 tons of ore mostly derived from slide rock taken from open cuts at the Sheriff location. As a cost reduction measure, milling operations involved the reduction of amalgam into gold bars in the assaying facility. In order to increase the amount of amalgam recovered in the mill, concentrates from the Wilfley table were fed back into the ball mill for regrinding.[134] Baldwin calculated the value of ore processed in the mill for 1939 at $4,270.27, with a net recovery of 92.3 percent of the gold. Profits for the season's operations figured to $2.83 per ton, a slim margin given the small quantity of ore processed and the exclusion of taxes, depreciation, and overhead from the calculation. However, since most of the necessary surface improvements had been completed, Baldwin expected to step up operations the following season and intended to "hold a crew at the mine during the winter months to carry on a development program."[135] An inventory of the property conducted at the end of the season accredited the company with over $100,000 worth of supplies and equipment (figure 4.24).

Unfortunately for operations, the continuation of development in the following season was

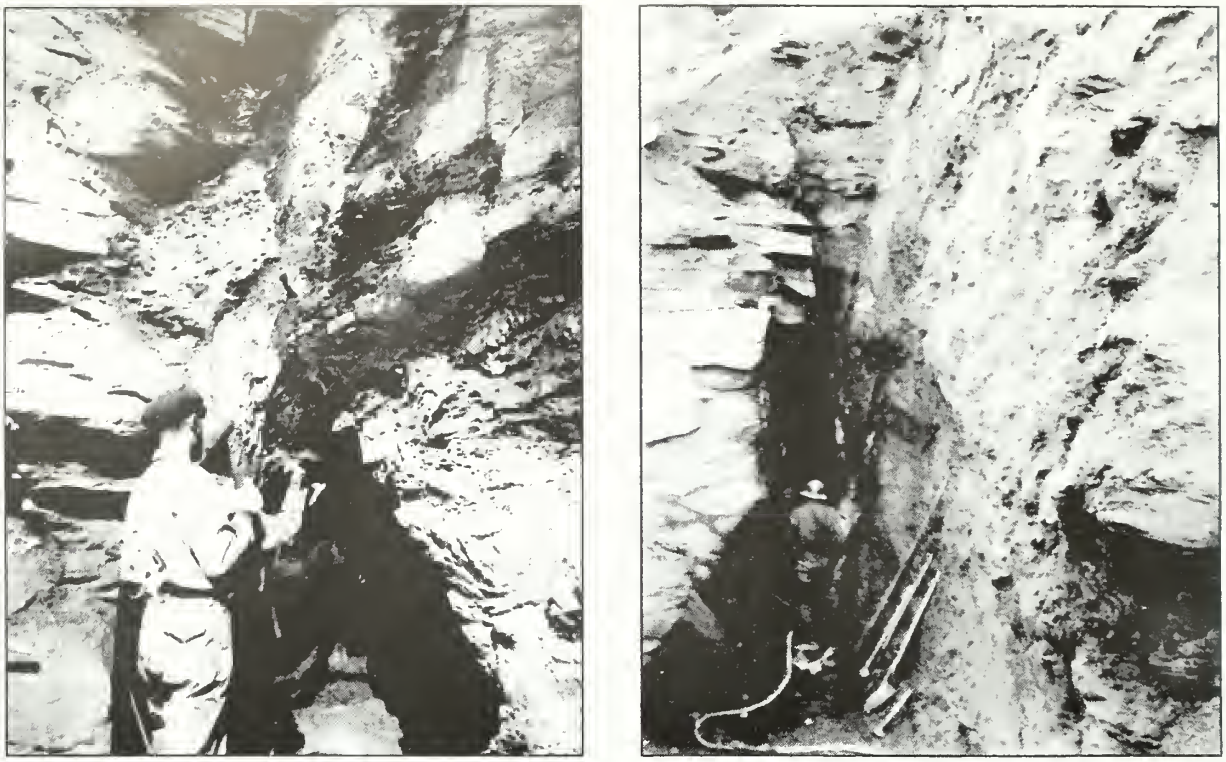


Figure 4.23. Drilling techniques employed on the No. 5 vein at the Sheriff Mine, circa 1938-39. Hand drilling (left) required two miners at the face, one to hold the drill, and the other to wield the sledgehammer. These tasks were regularly rotated to allow rest. The use of compressed air drills (right) greatly improved the speed and efficiency of operations, with only one miner having to operate the drill. Both photographs courtesy of Sylvia Baldwin.

hindered by damage to the property from snow slides. Initial work on the claims necessarily focused on the repair of facilities, with the Sheriff aerial tram line, lower bunker, and transmission line being the most damaged. In order to mitigate damage by future snow slides, the lower terminal of the Sheriff Mine was rebuilt with 200 tons of rock fill at its base, and approximately 600 feet of snow sheds were constructed to protect power lines and the upper workings.

The hydroelectric system also needed repair. Leaks had not only developed along the pipeline (a regular occurrence resulting from the effects of the freeze-thaw cycle), but more seriously at the base of the storage dam. Given the difficulty of repairing the bottom of the dam, the company began the construction of a second dam immediately in front of the original dam. This involved blasting a bedrock trench in front of the cribbing with which to construct an impervious layer at the base level. Repair efforts additionally intended to raise the height of the dam by 12 feet, increasing the dam's storage capacity to two-and-one-half million cubic feet and extending the period of available electricity by about 30 days.[136]

Conditions at the Sheriff Mine improved with the completion of a transmission line supplying 440 volts to the workings. In addition, the company extended the south-side of the Cliff House to accommodate up to eight more men (replacing the wall tent erected the previous year).[137]

Company workers ditched and graveled the mill road from the lower terminal of the Sheriff Mine to improve drainage. After these improvements, the ore truck was able to make 10 return trips between the Sheriff lower terminal and the mill per shift. The Alaska Road Commission also continued work in the district and completed another mile of tractor road toward McCarthy. The

Yellow Band Gold Mines, Inc.

Inventory of Supplies, Machinery, Buildings, and Equipment, 31 December 1939

1. Itemized List of Mining and Milling Supplies

Explosives		$ 646.18
Gas and Oil		262.00
Grinding Balls for Mill		827.09
Lumber		169.26
Wood, timber, lagging		1,003.68
Assay supplies		100.00
Air pipe, 2000 ft		200.00
Tents and Tarpaulins		287.45
Track Rails,	# 16; 990 ft	594.00
	# 12; 1600 ft	408.78
Track Spikes, 100 #		12.09
Mercury, 10 #		17.25
Drill Steel, 1" hex		562.97
Celotex		500.00
Drill Steel, hand, 7/8" hex		100.00
Air Hose, 100 ft		20.00
Steel gates for ore chutes, 2		67.00
Parts for Gardner-Denver drills		326.48
Machine drill column		78.68
Ford truck parts		321.79
No. 4 copper wire, 15000 ft., cross-arms, insulators, etc		1,090.76
Misc. supplies		3,152.86
Supplies- Commissary includes staple groceries		700.00
Inventory- retail store includes cigarettes, tobacco, gloves, etc.		25.00

TOTAL $10,473.26

2. Buildings and Equipment

Includes buildings at Main Camp, Yellow Band upper and lower camp, Sheriff camp, garage, blacksmith shops, cabins on Monahan Creek, Mother Lode power house at McCarthy, cabin and garage on ranch at McCarthy.

TOTAL $10,132.54

3. Itemized list of Machinery and Equipment

50-ton Mill and Building	$25,000.00
# 54 Marcy Ball Mill	
Telsmith-Wheeling Jaw Crusher	
Dorr Classifier	
Clark-Todd Amalgamator	
#6 Wilfley Table	
Amalgamating Plates	
Telsmith Plate Feeder	
50 h.p. Westinghouse Electric Motor	
5 h.p. Westinghouse Electric Motor	
185 h.p. Hydro-electric Plant	18,500.00
Pelton Impulse Water Wheel	
156 k.v.a. Westinghouse Generator	
Westinghouse Switchboard	
1,500 ft. pipe line	
600 ft. flume	
Diversion Dam	
Storage Dam	
35 Caterpillar Hook-up to Power Plant	544.64
Gardner-Denver Compressor, 610 cu. ft	6,305.02
Ingersoll-Rand Compressor, 153 cu. ft.	2,631.57
Worthington Compressor, 120 cu. ft.	775.77
6 Gardner-Denver Air Drills	1,818.60
2-Drifters	
2-Stopers	
2-Jack Hammers	
35 Caterpillar Tractor and Angledozer	5,895.47
25 Caterpillar Tractor	2,877.78
1 Ford Truck	398.46
1 Wagon	100.00
6 Gregg Bobsleds	1,518.12
Sheriff Aerial Tramline, 48,000 ft.	4,367.83
Yellow Band Aerial Tramline, 3,600 ft.	2,421.46
Grand Prize Aerial Tramline, 3,600 ft.	2,500.00
Sheriff Snowsheds	683.29
4 ½ miles of Road—Mill to Aerial Trams	3,692.31
Mill ore bunkers, 75 ton capacity 959.39	
Sheriff upper and lower ore bunkers, 50 tons	898.39
Yellow Band upper and lower bunkers, 33 tons	1,253.65
Yellow Band Stub Tram, 300 ft. 243.45	
Transmission Line-Power House to Sheriff Claims, 2 miles	2,923.68
Transmission Line-Power House to Mill 1 mile	1,196.71
Radio telephones at Mine and at Chitina, Alaska	587.48
Mine Cars, 4	467.24
Anvils, 3	168.51
Forges, 4	100.00
Welding Outfit	202.45
Assay furnace, balance etc.	658.23
5000 gal. Wood Water Tank	214.00
Stoves and Ranges	509.80
Misc. small equipment	422.09

TOTAL $90,835.39

Figure 4.24. Inventory of Equipment and Supplies at Yellow Band Gold Mines. Source: Asa Baldwin, *Balance Sheet, December 31, 1939*. Courtesy of Sylvia Baldwin.

tractor road now ended at the junction of Gillis Creek and Monahan Creek, within five miles of the company's timber reserves at the mouth of Monahan Creek.[138] Later in the season, some of the Yellow Band crew ventured to the timberlands and cut 35 cords of wood for the storage dam and mine timbers.[139]

Three miners (Frank, Klas, and Otto) worked at the Sheriff claims from early-June to mid-October. Miners concentrated on particular tasks, with Frank drilling, Otto mucking, and Klas blacksmithing, although all worked on repairs and other miscellaneous activities.[140] Within this period, the mine underwent extensive development. The 6001 crosscut was extended north to tap the No. 3 and No. 4 veins. Twenty feet before the 6001 N. Drift, a western extension to the 6001 crosscut was driven to better determine the relationship between the No. 1 and Igorrote veins, but this did not reach them before the end of the season (figure 4.25). On the north wall of the 6001 crosscut, a drift, termed the 6001 N. Drift, was begun on the No. 3 vein and driven a total of 75 feet, with some stoping carried out. On the south wall, the 6001 S. Drift extended 50 feet. A drift was also begun on the No. 5 vein, but difficult ground caused the drift to tap the No. 4 vein.[141] At the end of the season's work at the Sheriff, a 300-ton block of ore, holding a probable value of $15,000, had been partially developed.

Despite two seasons involved in developing infrastructure, the Yellow Band Mine again received no work in the 1940 season. Some limited prospecting did, however, take place in the general proximity. Fred Struckman (who had previously worked placer claims in the district) led Baldwin to a garnet lead carrying gold he found on the north side of the mountain. His prospect probably assayed poorly for it was not mentioned in the annual report.[142]

The mill ran for a total of 368 hours in the 1940 season. Low water had threatened to restrict the mill's operation near the end of the season, but the company kept the mill running by reducing the diameter of water nozzles feeding the Pelton Wheel, and also by hooking up the small Caterpillar tractor to the powerhouse.[143] Consequently, the mill was able to process 461 tons of ore, all of which derived from the Sheriff claims.[144] While the gross tonnage proved less than the previous year, the richer ore doubled the value of the mill

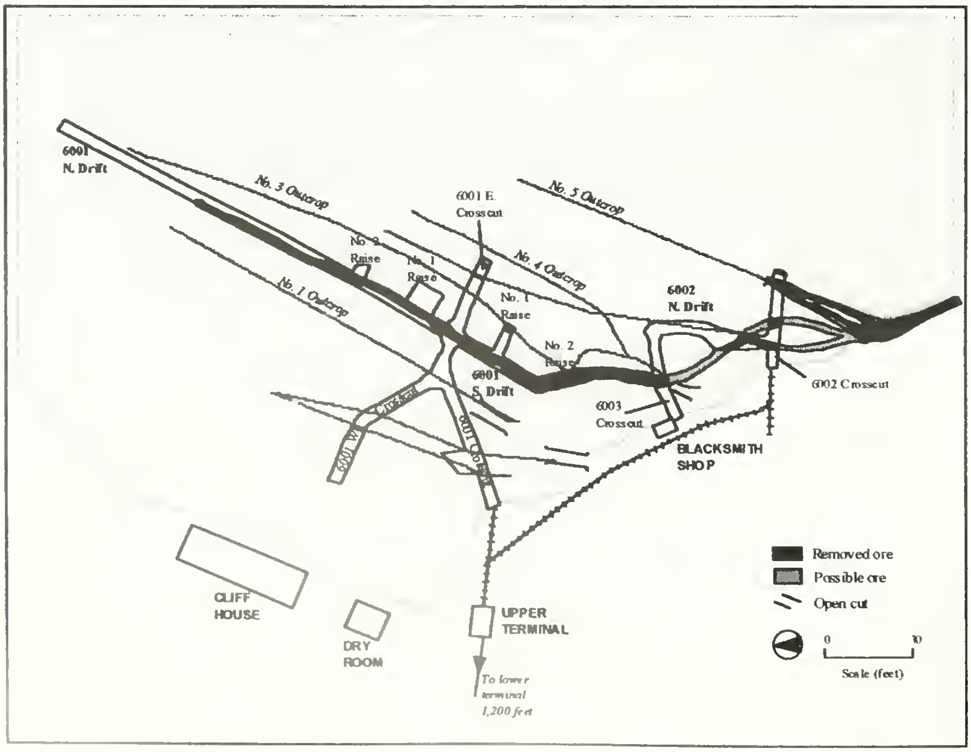


Figure 4.25. Underground workings and surface improvements at the Sheriff Mine, circa 1941. Source: Asa Baldwin *Underground Workings, Sheriff Claims* (Asa Baldwin Collection, MS 36 8-29).

product to nearly $9,300. The estimated mill recovery also remained high at 96.4 percent.

Even with increased gross profits, the high cost of operations left the company with a meager working capital of $1,634.50[145] In order to resume operations at a small-scale for the 1941 season, the company directors agreed to take out a loan of $4,500. Additional support came from the Highway Engineer, William Hesse, who agreed to set $500 aside for widening the main airstrip.[146]

In April, a crew of five (Joe Sommers, John Station, Lloyd Johnson, Bill Bruno, and a miner named Adrian, plus Bob Smith, the camp cook) started work to open the camp. First tasks included the freighting of timber cut the previous fall to the main camp. Wood for use on the storage dam was hauled part way to the dam in sled loads with the small Caterpillar and then pulled to the site with a small hoist and quarter-inch cable.[147] Preparatory work also included breaking a trail to the Sheriff Mine, conducting minor repairs, and preparing the mine for workers scheduled to arrive in early May. A minor accident occurring during the repair of the Sheriff lower bunker resulted in Joe Sommers taking four days off to rest.[148]

Problems with air transportation delayed the arrival of the mining crew, along with gas and food supplies, until June.[149] Supplies ran so low that the crew began to work half days, and Baldwin and the camp cook started hunting for ptarmigan in the area.[150] The delay in getting to the Bremner District cost the mining crew (Klas, Otto, Morris Nelson, and a cook, Ernie) nearly one month with no pay. Nevertheless, their loyalty to the company remained high and none accepted other job offers while waiting to be flown to Yellow Band. A few days after the mining crew arrived, Cordova Air Service flew in another seasonal, Axel Wahlstrom. Back in Chitina, the company vice president, Claude Stewart, tried to interest more laborers, but met with no success, calling it "the worst season in history for getting men."[151]

The 1941 crew worked on a variety of tasks for the season, including minor surface improvements. In addition to work on the storage dam, the crew constructed a new blacksmith shop at the Sheriff Mine in August and converted the former shop into a dry room.[152] The installation of a 120-cubic-foot Worthington air compressor in July provided enough compressed air to supply two drills. At the main camp, the storage building next to the bunkhouse was sided with flattened drums and partially converted into a bathhouse.[153] The mill also underwent a few adjustments. This included a new shoveling plate installed below the grizzly and, more significantly, the laying of foundations for corduroy blankets to catch gold after the Wilfley table (figure 3.5). It is, however, uncertain whether the blankets were in use by the end of the season.

The delay in the arrival of miners restricted the amount of underground development conducted at the Sheriff Mine for the season. The west extension to the 6001 crosscut begun in 1940 was extended another 50 feet and tapped the No. 1 and Igorrote veins. Drifting continued on the No. 3 vein. The 6001 N. Drift was driven 31 feet farther; and as a stabilization measure, stulls and lagging were installed along the length of the drift. Miners removed 30 feet of ore on the 6001 S. Drift. This made the drift accessible by an open cut, which then served as a drainage tunnel for the underground workings.[154] Exploration work at the Sheriff removed the 300-ton ore block developed the previous season, and this comprised the only ore transported to the mill. Work at the mines continued to be carried out on a semi-specialized basis. Klas conducted blacksmithing, but also worked in the stopes. John drilled, with Otto mucking (performing the same task as the previous season). William Bruno ran the compressor and trams.

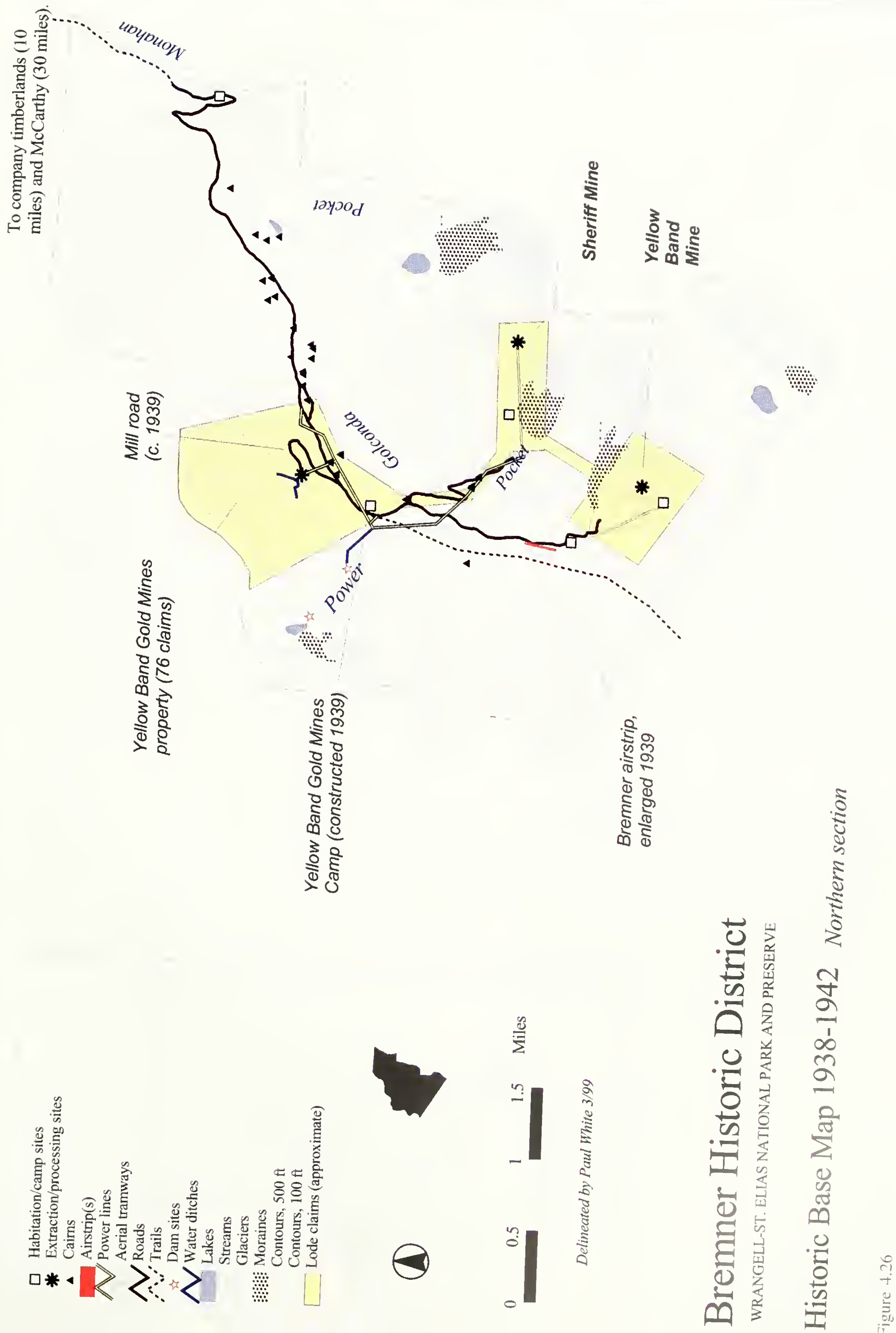
On the valley floor, Bob Smith (originally hired as the camp cook, but given other tasks after his wife arrived with the mining crew) trucked ore from the Sheriff Mine's lower bunker to the mill. Adrian and Axel worked on various tasks, including changing liners in the mill, setting up telephone poles, and graveling roads. Asa Baldwin worked in the mill, but also conducted assays, checked water storage levels, and occasionally ran the tram and trucked ore.

Likely in keeping with previous years, the crew worked almost every day of the season. Work did not adhere strictly to shifts, with some tasks, including milling and sledding in supplies, occasionally conducted through the night. The dedication of the crew reflected, in part, a vested interest in the property—at least three workers in the 1941 season, Bruno, Sommers, and Wahlstrom, owning stock in the company by 1943.[155]

The mill operated between 9 July and 7 October for a total of 210 hours. As with the previous year, inadequate waterpower during the months of September and October inhibited the mill's efficient operation. Consequently, the mill only processed 262 tons, leaving 63 tons still in the ore bin at the close of the season. Despite the limited run, the mill produced $12,170.90 worth of concentrate, a 30 percent increase on the previous year's gross profit. Estimated gold recovery also improved to 97 percent.

Unfortunately, the income generated from the mines again proved insufficient to rectify the company's tenuous financial position and, at the close of operations, accounts due (including wages and mortgage payments) exceeded $18,000.[156] While the company clearly required additional capital investment to continue operations in the 1942 season, Baldwin remained cautiously positive, noting in the 1941 annual report, "The limited amount of exploration and development already done seems to justify such an expenditure" and that "the mortgagee and several of the creditors have already indicated their willingness to cooperate to the end that operations may be resumed."[157]

The passing of Preference Rating Order P-56 by the U.S. Government in December 1941 would have undoubtedly aided the Yellow Band Gold Mines in reducing mining costs, but any benefits were stripped in early-1942 by an amendment that withheld gold and silver mines from obtaining priority ratings.[158] Faced with higher mining costs, as well as uncertain finances, company directors decided to suspend operations for the year.


To company timberlands (10 miles) and McCarthy (30 miles).
Monahan
Pocket
Sheriff Mine
Yellow Band Mine
Mill road (c. 1939)
Golconda
Pocket
Yellow Band Gold Mines property (76 claims)
Power
Yellow Band Gold Mines Camp (constructed 1939)
Bremner airstrip, enlarged 1939
Habitation/camp sites
Extraction/processing sites
Cairns
Airstrip(s)
Power lines
Aerial tramways
Roads
Trails
Dam sites
Water ditches
Lakes
Streams
Glaciers
Moraines
Contours, 500 ft
Contours, 100 ft
Lode claims (approximate)
0 0.5 1 1.5 Miles
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Bremner Historic District
WRANGELL-ST. ELIAS NATIONAL PARK AND PRESERVE
Historic Base Map 1938-1942 Northern section

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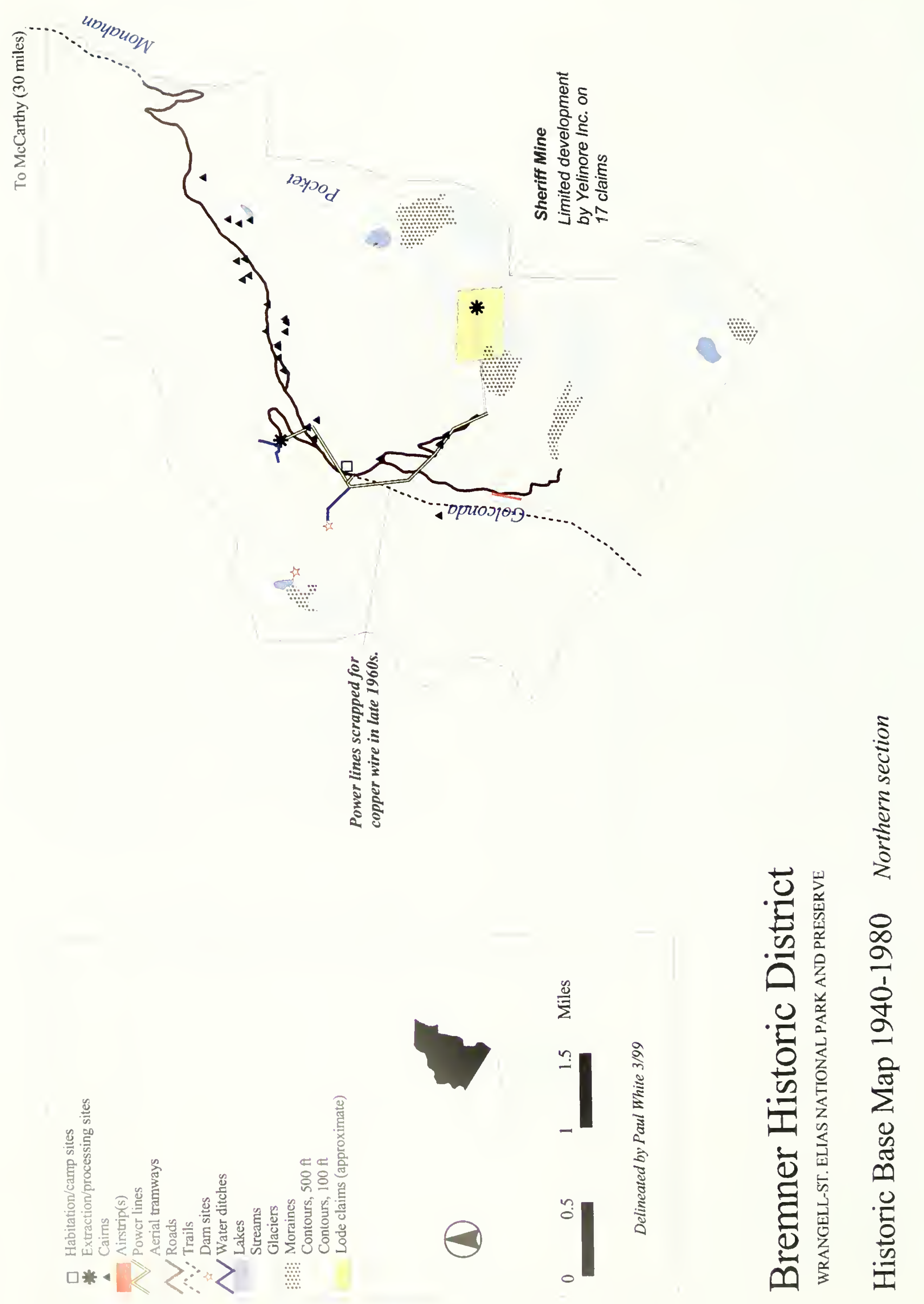

To McCarthy (30 miles)
Monahan
Pocket
Sheriff Mine
Limited development by Yelinore Inc. on 17 claims
Golconda
Power lines scrapped for copper wire in late 1960s.
Habitation/camp sites
Extraction/processing sites
Cairns
Airstrip(s)
Power lines
Aerial tramways
Roads
Trails
Dam sites
Water ditches
Lakes
Streams
Glaciers
Moraines
Contours, 500 ft
Contours, 100 ft
Lode claims (approximate)
0 0.5 1 1.5 Miles
Delineated by Paul White 3/99
Bremner Historic District
WRANGELL-ST. ELIAS NATIONAL PARK AND PRESERVE
Historic Base Map 1940-1980 Northern section

Figure 4.27

1942-1980: Ebbing Enthusiasm

At the end of four years of mining, the Yellow Band Gold Mines maintained only a marginal existence. Economic conditions had frustrated attempts to simultaneously develop the Yellow Band and Sheriff mines, and the working of only one mine was insufficient to bring the company into good financial standing. The fate of the company, however, would be more severely tested by two events occurring in late 1942. On 18 September 1942, Asa Baldwin, who had played such a pivotal role in the formation, management, and promotion of the company, died from a heart attack.[159] Claude Stewart became company president and faced the daunting task of reconstructing an essentially bankrupt enterprise. Less than three weeks after Baldwin's death, the War Production Board passed Limitation Order L-208, declaring gold and silver mining in the United States a non-essential wartime industry.[160] Although, based on 1941 production figures, the Yellow Band Gold Mines could have argued for exemption (having produced less than 100 tons per month), the continuation of work at such a reduced scale would have plunged the company further into debt. It was, therefore, with little option that the directors decided to postpone operations indefinitely.

Despite the suspension of operations, the company continued to hold annual meetings. Discussions centered on "the business of raising money for the continuation of development at the mine when restrictions are removed and other conditions will permit."[161] However, the national situation continued to present unfavorable conditions for mining, and company finances by the mid-1940s risked total depletion. After paying the recording fee for filing an annual report, only $84.80 remained in the treasury, enough to cover the cost of recording an affidavit of intent for holding the mining claims, but of little value in paying off an accrued debt of nearly $40,000.[162]

The situation finally showed signs of improvement on 1 July 1945, when the U.S. government repealed Limitation Order L-208.[163] At a meeting in mid-August, the Yellow Band directors decided to refloat the company through a public offering of stock. As the treasury was bereft of enough shares, three of the larger stockholders donated a portion of their common stock back to the treasury, Marguerite Baldwin (the widow of Asa Baldwin) donating more than 80 percent of the 180,000 shares returned.[164] The company benefited also from the generosity of V. G. Vance, who agreed to write off the mortgage for an equivalent number of shares in the company.

On 20 December 1945, Yellow Band Gold Mines announced the sale of 300,000 shares selling for 25 cents each. Exchanging stock for outstanding debts, the company quickly cleared up all but $6,543. By early 1946, Stewart considered the corporation to be "in a much better standing than it has been since taking over the Bremner Holdings." Stewart also noted that the 1946 annual meeting, although poorly attended, met with a "very good spirit of enthusiasm for the future of the mine."[165] Seeking to recommence work as expediently as possible, the directors began negotiations to acquire a $50,000 loan from the federally funded Reconstruction Finance Corporation. Stockholders, however, relieved that the company was almost free of debt strongly disapproved of the scheme and the company abandoned the pursuit of another loan.[166] With a continued lack of capital, it remained uncertain whether operations could begin the following summer.

In August 1946, the company accrued enough finances to send Adrian Nelson into the Bremner District to assess the condition of the mines, the first such visit since the end of the 1941 season. Nelson reported that snow slides had felled power lines and aerial trams, but that the materials themselves were not badly damaged. He also reported no serious damage to the mill, powerhouse, machinery, and mine workings, and determined that the chief cost of repairs would be expended in labor.[167]

Although the good condition of the mines gave favorable indications for returning to operations, the high cost of mining and the depressed state of the mining industry proved prohibitive. These conditions affected the sale of shares and, by February 1947, only 9,400 of the company shares had sold for cash.[168]

Conditions worsened in 1948 with rising mining costs set against the fixed selling price of gold. With diminished enthusiasm, Stewart admitted "under the present conditions, if money was available, it would not be practical to operate at a profit."[169] The company, nevertheless, remained steadfast in efforts to retain the Yellow Band property. Claude Stewart continued to have the necessary annual assessment work done on the claims for a few years after Nelson's visit. When this exhausted the financial resources of the company, Stewart and his wife, Bertha, as well as Otto A. Nelson, continued to pay for assessment work themselves, at a total cost approaching $750 per year.[170] Realizing the unlikelihood that the Yellow Band Gold Mines would ever acquire adequate finances to begin work again without incurring more debt, Stewart tried to interest other mining companies in buying the property. Stewart's age presented difficulties for him to easily visit the claims, but Paul Fretzs, a stockholder in the company and "something of a miner and prospector," offered to take prospective mine buyers to the property.[171]

In the late 1950s, Fretzs struck an agreement with Stewart to conduct the annual assessment work on the property in return for what he could take out, and also on the understanding that his efforts would be repaid if the company became solvent.[172] For a few years following, Fretzs, under the auspices of Yelinore Inc., conducted assessment work on seven claims in the Bremner District, all probably at the Sheriff location.[173] Operations were small-scale, with a crew not exceeding three other workers.[174] Activity likely involved prospecting and the cleanup of workings rather than the exploration of deposits. Fretzs continued to take prospective mine buyers to the location, but, as before, met with no success.[175]

After the deaths of Claude Stewart, Bertha Stewart, and Otto Nelson (probably during the 1960s), Fretzs gained ownership to the claims of the Yellow Band Gold Mines. Fretzs continued work during the summer months for a time, but became increasingly disaffected with the conditions facing the mining industry. In addition to high wage labor, the mining industry by the mid-twentieth century had seen an almost complete replacement of the jack-of-all-trades miner with the task-specialized worker. While this suited large-scale mining, it was detrimental to smaller operations where the employment of a multi-skilled labor force reduced labor expenditure significantly. Fretzs noted in the 1970s:

> (In 1934-1939) At one time they hired real miners at $100 a month and their board, but now you can't get a miner (there is no such thing as a miner anymore) because they have all gone to school and can't work anymore. They don't know a single jack from a double jack. You can't get even a half a miner anymore for $100 a day and board." [parentheses original.][176]

Some improvement to economic conditions came in 1967 with the abandonment of the $35 per ounce selling price. However, in spite of rising gold prices, the U.S. Mint paid a slightly raised, but fixed, $38 a fine ounce for unprocessed hard-rock gold. As Fretzs did not operate the mill, he could not take advantage of the higher selling prices. In order to help Yelinore weather the times, Fretzs salvaged a few items, including copper wire from the power lines, for resale.

The uncertain fate of the Wrangell-St. Elias region during Alaska's "d-2 period" (at which time a variety of interest groups at the local, state, and national levels disputed ownership and allowable land use) left a generally bleak future for mining in the Wrangells.[177] Fretzs conceded in 1975, "Yes I have really tried to make Yellow Band work, but it is impossible."[178]

By this time, the climate had damaged the property; the glacial lake at the head of Power Creek burst the storage dam; a large snow slide took out part of the mill; and, at the Sheriff Mine, a slide damaged part of the Cliff House. Fretzs also noted that a number of visitors to the district engaged in looting and vandalism.[179] Fretzs, nevertheless, continued to visit the Bremner District and, in later years, performed somewhat of a custodial duty in maintaining the airstrip and main camp buildings. He indeed became so enamored with the location that he chose the valley for his final resting place.[180]

Attempts to work the lode deposits ended with Paul Fretzs. However, the high price of gold in

Figure 4.28. Significant improvements to gold prices in the late–1970s facilitated the return of placer mining in the Bremner District. Prospectors reworked moderately productive placer ground near Standard Creek using heavy equipment. However, operations probably did not yield high returns and efforts were soon abandoned. Some equipment, such as this backhoe on Golconda Creek, was also abandoned at the workplace. Photo by Patrick Martin, MTU #BP-4.4.98

the late-1970s ($307.50 per fine ounce in 1979, for example), encouraged other miners to rework placer deposits in the district (figure 4.28). Operations centered on Golconda Creek, within a mile of its confluence with Standard Creek. In this area, the gravels were broad and more amenable to work by mechanized equipment (such as bulldozers and backhoes). The use of heavy machinery also created informal roads to the claims, including a route between the airstrip and the mouth of Standard Creek. Accommodations constructed in this period were typically small cabins (wood-framed and sided with sheet metal) with room enough for two or three beds. In keeping with earlier placer operations, habitation sites were located in close proximity to the workplace, namely on raised benches beside the workings. By 1980, no valid mining claims were extant in the district.

1980-present: National Park Service Era

In December 1980, the Bremner District, as well as other mineral lands in the Nizina, Chisana, and Nabesna districts, fell within the jurisdiction of the Wrangell-St. Elias National Park and Preserve. Following National Park stipulations, mining activity was prohibited. However, given the extended debate over land use in the Wrangells region, beginning as early as the late 1930s, the park permitted mining to continue at the same scale in areas where claims had been staked and actively worked before the commencement of d-2 land withdrawals in 1971.[181] This enabled some operators in the Nizina District to continue mining, although almost all other mining areas, including the Bremner District, were now closed.[182]

The formation of the park, however, did not deter mining from occurring surreptitiously in prohibited areas. Gold prices remained high, and the immense size of the park ensured staff could not police all areas effectively. In the Bremner District, a few miners operated intermittently through the 1980s and 1990s. Gravel bars on Golconda Creek within one mile south of Standard Creek received most attention, with work probably involving either small-scale suction-dredging or the use of heavy equipment as performed in the 1970s. The National Park Service discovered one placer operation in the 1990s, and it was quickly closed.

The National Park Service first visited the Bremner District in 1983 during a survey of cultural resources located on mining claims. At this time the mill and main camp were documented and photographed, the product of which determined the eligibility of the district for the National Register. Because of both the size of the park and the need to inventory sites with active claims, no other documentation work was carried out in the area for eight years.

From 1991, the park initiated intensive field surveys of the Bremner District, carried out over a week or two-week period during the summer. Most documentation centered on recording the lode mining landscape with only one placer site fully recorded by 1997. In addition to archaeological survey, the park also initiated the systematic removal of hazardous wastes from easily accessible areas. In 1993, barrels, jerry-cans, batteries, fuel, fuses, and blasting caps were removed from the Lucky Girl Mill, Yellow Band Gold Mines camp, and Sheriff Mine. Explosives, including powder and blasting caps, were removed from the Yellow Band Mine in 1995 and from the Grand Prize Mine the following year.

Since the damage to the mill, storage dam, and Sheriff Mine reported by Paul Fretzs in the mid-1970s, sites in the Bremner District have only been subject to minimal degradation, chiefly by the encroachment of vegetation among placer workings and on the roads constructed by the Yellow Band Gold Mines and Alaska Road Commission. Snow slides have caused the collapse of the Grand Prize mine lower terminal and of a portion of the mine bunkhouse. Aerial tram lines still stood at the Yellow Band and Grand Prize locations until the mid-1990s, when they were slackened to reduce a potential threat to aircraft. The easing of cable tension subsequently caused tram towers on the lines to collapse. The collection of artifacts by visitors to the area has occurred sporadically over the years.

Currently, other permanent structures (as well as two tent frames) remain remarkably intact. Buildings at the main camp are extant with some minor deterioration due to water and animals. In summer 1997, the park undertook the partial restoration of the main camp bunkhouse, storage shed, machine shop, office, privy, and powerhouse. This involved repairs to foundations (replacing rotten corner posts and sills, installing rodent wire underneath joists, and restacking stone foundations), reattaching siding and roofing, latching windows, and treating exposed exterior wood with water repellent. The bunkhouse also underwent some internal improvements, including the installation of a safety stove and stovepipe in the main bunkroom.

No significant mining operations appear to have taken place in the district since the detection of an illegal placer operation in the 1990s. Mining continues only as "recreational mining" practiced occasionally by visitors to the district. This includes panning stream gravels or taking ore specimens from the easily accessible sites. While both these forms are currently of such small scale and infrequency that their impact is negligible, their continued persistence is a future threat to the integrity of the district's resources.

Summary

For almost a century, miners have intermittently prospected and worked gold deposits in the Bremner District. The two major periods of activity, 1901-1916 and 1927-1942, paralleled a national interest in gold mining during the Alaska gold rush and Great Depression eras. Throughout all periods, placer and lode mining operations consistently occurred at a small scale.

While the discovery of gold in the Bremner District helped to fuel interest in the mineral resources of the Copper Basin, the district was never itself inundated with large numbers of prospectors, and it never saw the development of other support industries. Prospectors who endured working claims in the district did so under trying environmental and economic conditions. With an estimated total production of 2,000 to 3,000 troy ounces from placer mining and less than 1,500 troy ounces from lode mining, the Bremner District both tantalized and tormented those who sought profits.[183]

To miners persisting after the brief rush period, few opened claims with the expectation of finding a bonanza. Aiming instead for moderate returns, miners in the Bremner District tended to develop claims along conservative lines. Technologies employed to work deposits were common to those used elsewhere in the Copper Basin for small-scale operators. Placer mining methods ranged from basic pick and shovel work to hydraulicking and the use of mechanized equipment. Lode mining operations utilized hand-drilling and compressed-air drilling techniques. In addition to influencing the selection of mining technologies, the fickle nature of deposits and high mining costs encouraged both placer and lode operations to be coordinated at greater economies of scale. This resulted in two instances (Golconda Mining Company and Yellow Band Gold Mines) where companies formed through the consolidation of mining efforts.

Operations in the district were never truly isolated. Placer miners were highly mobile and lode mining operations maintained radio contact with settlements in the Chitina Valley. However, the Bremner District fundamentally lacked cheap and reliable transportation to other areas in the Copper Basin. The continued remoteness of the district throughout all mining periods ultimately was one of the causal factors in the failure of mining attempts by ensuring high development costs that small-scale operators could not overcome. Most, if not all, operations in the district were locally financed and, with slim starting capital, operators had little choice but to conduct development, extraction, and ore processing each season in order to pay debts and assure mining for the next year.

A second major hindrance to mining operations in the Bremner District was one that miners had little power to control or adjust, namely the economic conditions affecting mining in Alaska and the United States during the twentieth century. These conditions not only created a dearth of abundant and cheap labor in the Copper Basin, but, between 1942 and 1945, prohibited gold mining altogether and impeded its later return. The suddenness with which these events affected the gold mining industry detrimentally affected small-scale operations which already only eked out a tenuous financial existence.

The worth of the Bremner District never proved exceptional in monetary terms—the total gross production of the district probably did not exceed more than $30,000 from placers, and $48,000 from lodes. The tenacity of prospectors, nevertheless, left a remarkable legacy. Unlike the common portrayal of the Alaska miner either reaping bonanzas or suffering incredible hardship, the Bremner District helps to indicate that gold mining was also capable of yielding a working wage.

CHAPTER IV: ENDNOTES

[1]Miners who named streams in placer districts often used synonyms to associate with gold, prestige, and wealth—"Standard" and "Summit," being no exception. The name "Golconda" likely referred to a fourteenth to seventeenth century market center in India famous for its diamond trade. V. Ball, *The Diamonds, Coal, and Gold of India: Their Mode of Occurrence and Distribution* (London: Trübner & Co., 1881), 4.
[2]Mendenhall and Schrader, "The Mineral Deposits of the Mt. Wrangell District, Alaska," *USGS Professional Paper 15* (Washington: GPO, 1903); *Valdez News* (15 February 1902). Like the abuse of power of attorney, the splitting of streams into two or more names (such as Golconda becoming Summit and Golconda at the confluence of Standard Creek) was a circumvention of mining law commonly seen in placer districts during the Alaska gold rush. As mining law stipulated only the discovery claim of a stream could gain full water rights (important to placer mining given the heavy dependence on water for operations), the renaming of streams at their junction with tributary streams enabled more than one claim along a stream to gain full water rights.
[3]Fred Moffit, "Geology of the Hanagita-Bremner Region," *USGS Bulletin 576* (Washington: GPO, 1914), 44.
[4]"The Bremner Is It," *Alaska Prospector* (20 February 1902).
[5]*Valdez News* (15 February 1902). The "500-foot claims" presumably refers to stream frontage. If the prospectors also staked 500-foot claims on Gillis and Monahan Creek, these creeks were respectively divided into approximately 24 and 46 claims.
[6]The reluctance to stake lode claims was common during the Alaska gold rush period, where prospectors rushed for quick profits from rich placer ground. William Hunt, *Mountain Wilderness: Historic Resource Survey for Wrangell-St. Elias National Park and Preserve* (Anchorage: National Park Service, 1991), 64.
[7]*Valdez News* (15 February 1902).
[8]Ibid.
[9]"The Bremner Is It," *Alaska Prospector* (20 February 1902).
[10]Ibid.
[11]Imogene Creek was likely named by Guy Banta after his daughter. *US Census of Population, 1910*, Valdez District.
[12]"The Bremner," *Valdez News* (12 July 1902).
[13]As there are no reports of a No. 6 Above on Golconda and no numbers below the discovery claim on Summit Creek, the Discovery claim and No. 5 above on Golconda may have been adjacent.
[14]"More News from Bremner," *Valdez News* (16 August 1902).
[15]Fluctuations in creek levels frequently limited placer mining. During times of high water, water covered river bars, often damaging improvements made to the property. Low water levels slowed the working of gravel deposits.
[16]"More News from Bremner," *Valdez News* (16 August 1902).
[17]"The Bremner," *Valdez News* (12 July 1902); "More News From Bremner," *Valdez News* (16 August 1902).
[18]"More News From Bremner," *Valdez News* (16 August 1902).
[19]Moffit, "Geology of the Hanagita-Bremner Region, Alaska," 13 (see n. 3).
[20] Wolff, Ernest. 1964. *Handbook for the Alaskan Prospector* (Fort Collins, Colorado: Burnt River Exploration and Development Co.), 333.
[21] Prospector Ed Sellers, who was later involved in the formation of the Golconda Mining Company which worked claims on Golconda Creek, apologized for shooting a bear, saying he didn't mind them in the daytime, but "he would be blamed if he would sleep with them on the same bar at night." "Many New Gold Strikes Along the Copper River," *Cordova Daily Alaskan* (26 November 1910).
[22]Prospectors who continued work in the winter months often constructed log cabins, no examples of which have yet been recorded in the Bremner District. Ernest Wolff, *Handbook for the Alaskan Prospector* (Colorado: Burnt River Exploration and Development Company, 1964), 331.
[23]Fred H. Moffit, "The Taral and Bremner River Districts," *USGS Bulletin 520* (Washington: GPO, 1912).
[24]A USGS party traveling the Bremner River route in 1911 noted the trail was "old and little used," and spent considerable time "clearing out the trail or cutting new pathways." Fred H. Moffit, "Geology of the Hanagita-Bremner Region, Alaska," 8 (see n. 3).
[25]"More News From Bremner," *Valdez News* (16 August 1902). Reports reached the town of Valdez around June/July, 1902.

[26]W. C. Mendenhall, "Geology of the Central Copper River Region, Alaska," *USGS Professional Paper 41* (Washington: GPO 1905), 118. Most property in the Nizina District was held by Robert Blei, Frank Kernan, and Charles Koppus. Hunt, *Mountain Wilderness*, 57 (see n. 6).
[27]Like the Bremner District, power of attorney was freely used in staking claims, so that even by 1902, practically all of the available property had been staked—a likely reason for Mockler and Beaton changing their minds. W. C. Mendenhall, "Geology of the Central Copper River Region, Alaska," 118 (see n. 26).
[28]Ibid. 118-9 (see n. 26) Mendenhall notes only one short string of sluice boxes in use in the Nizina District at this time.
[29]Ibid. 120 (see n. 26). According to Mendenhall, the number of prospectors in the Bremner District had never been large. Newspaper accounts indicate approximately 30 prospectors were named in newspapers for 1902: Anderson, Banta, Beaton, Beatty, Butler, Craig, Dunton, Gain, Gillis, Hawes, Happel, Herron, Higg, Hooper, Ide, King, Manguson, McKnight, McLain, McLaren, Monahan, Mockler, O'Brien, O'Conner, Payment, Rigler, Sweet, Talbot, Van Iderstein (possibly "Ide"), and Wheaton. Other miners or misspellings include Beatson, Gane, Happle, Hemple, Haws, Heron, Magnusen, McLane, and Mockley/Muckler.
[30]*Mining and Scientific Press*, vol. 45 (21 December 1907), 25.
[31]*Mining and Scientific Press*, vol. 44 (23 February 1907), 8; *Alaska Polk directories*.
[32]"Will Hydraulic Ground in Bremner River Country," *Cordova Daily Alaskan* (27 December 1910).
[33]Alfred Brooks, "Alaskan Mineral Resources in 1907," *USGS Bulletin 345*, (Washington: GPO, 1908); Alfred Brooks, "Alaskan Mineral Resources in 1904," *USGS Bulletin 259* (Washington: GPO, 1905), 31.
[34]Valentine took the Thompson Pass route to Chitina, and probably the "McClellan route" along the Chitina River drainage to arrive in the Bremner District. "Rich Placer Grounds at Bremner," *Cordova Daily Alaskan* (19 January 1911), 1.
[35]The Copper River and Northwestern Railway adopted a policy of "enlightened self-interest" to prospectors in the area, particularly by reducing its freight and passenger rates in Spring 1910, although their charges were still considered "relatively high." *Report of the Governor of Alaska* (1911), 486-7.
[36] Prospectors in the Tebay Lakes region brought in a drilling apparatus to test places shortly after the completion of the railroad. Fred Moffit, "Geology of the Hanagita-Bremner Region," 49-53 (see n. 3).
[37]"Will Hydraulic Ground in Bremner River Country," *Cordova Daily Alaskan* (27 December 1910).
[38]"Much Activity in Placer Mining," *Chitina Leader*, 1, 17 (14 January 1911); Lone E. Janson, *The Copper Spike*, eighth printing (Anchorage: Alaska Northwest Publishing Co., 1995 [1975], 101. The Copper River Railway first crossed the Gilahina River, approximately 30 miles east of Chitina on 28 January 1911, and the car of supplies was presumably off loaded near that point. Charles Mayman and Fred Stroebeck also purchased a 1,200 pound hydraulic outfit for their operations on the Little Bremner River.
[39]Fred H. Moffit, "The Taral and Bremner River Districts," 97 (see n. 23); "Mining Development in the Interior," *Chitina Leader* 2, 21 (1 March 1912).
[40]Fred H. Moffit, "The Taral and Bremner River Districts," 97-8 (see n. 23).
[41]Ibid. (see n. 23).
[42]Fred Moffit, "Geology of the Hanagita-Bremner Region, Alaska," 50 (see n. 3).
[43]In April, Decker had left the Copper River railway at Long Lake and freighted supplies into the Bremner District by dog sled. *Chitina Leader* 3, 28 (16 September 1913).
[44]The flooding of Golconda Creek may have occurred in mid-October 1912, when high water seriously damaged at least three placer operations in the Nizina District. The Dan Creek Gold & Copper Company lost $18,200, exclusive of timber loss. Dan Creek Mining Co. lost a recently installed hydraulic plant, valued at $65,000. The Rex Alaska Mining Co. suffered a partial loss of $8,000. The damage was serious enough to release placer and lode operators in the Nizina District from having to perform the mandatory assessment work in 1913 to keep title to their claims. United States Congress Committee on Mines and Mining, *Chitina Mining District, Alaska* (Washington: GPO, 1913).
[45]Alheidt planned to travel to New York in order to interest "monied friends and relatives" in his placer property, but may not have been successful. *Chitina Leader* 3, 2 (29 October 1912).
[46]*Chitina Leader* 3, 21 (11 March 1913).
[47]"Will Hydraulic Ground in Bremner River Country," *Cordova Daily Alaskan* (27 December 1910).
[48]*Cordova Daily Alaskan* (19 January 1911); *Chitina Leader*, 3, 28 (16 September 1913).
[49]"Work on the Bremner," *Chitina Leader* 5, 34 (15 June 1915); *Report of Governor of Alaska, 1915* (1915), 512; Alfred Brooks, "The Alaskan Mining Industry in 1916," in A. H. Brooks et al, "Mineral Resources of Alaska: Report of Investigations in 1916," *USGS Bulletin 662* (Washington: GPO), 43.

[50]Norman L. Wimmler, "Placer Mining in Alaska in 1923," in *Annual Report of the Mine Inspector to the Governor of Alaska, 1923* (Juneau).
[51]In the process, Ramer likely incorporated or staked over the Golconda and Mammoth lode claims located 16 years earlier.
[52]J. C. Roehm. "Preliminary Report of Bremner Mining Company, Hanagita-Bremner Mining District, August 14, 1936," *Alaska Territorial Department of Mines Property Examination 87-3.*
[53]J. C. Roehm, "*Investigations: McCarthy, Nizina River, Bremner, and Chisana Mining Districts Summary Report and Itinerary of J. C. Roehm, Associate Engineer to Commissioner of Mines, Territorial Department of Mines, Juneau, Alaska, Aug. 4 to Sept. 1, 1936*", (microfilm at Alaska State Library), item 25, roll 9.
[54]Since no prospectors in the 1901-1916 period appear to have worked in the district during the 1930s, the term "Summit Creek" may have been forgotten.
[55]Benjamin D. Stewart, *Mining Investigations and Mine Inspection in Alaska, Biennium Ending March 31, 1933* (Juneau: no publisher, 1933), 85-6.
[56] Ibid.
[57]Ibid., 86-7.
[58]Philip S. Smith, Mineral Industry of Alaska in 1931," in Philip S. Smith et al., Mineral Resources of Alaska: Report on Progress of Investigations in 1931, *USGS Bulletin 844-A* (Washington: GPO, 1933), 21, 28.
[59]Ibid., 28.
[60]Asa Columbus Baldwin was born in Austinburg, Ohio, on 21 June 1887. In 1903, he acquired a bachelors degree in civil and mining engineering from Case University, Ohio, and, in 1913, a bachelors degree in law from George Washington University, Washington, D. C. (with license to practice in Alaska and Washington, D. C.). Between 1910 and 1913, Baldwin served as a field officer in the United States-Canada International Boundary Survey from Point Barrow to Mount St. Elias. Prior to his investigation of the Topsy group, he ran a private engineering practice based in Valdez and Seattle. Baldwin served as a surveyor and consultant for the Prince of Wales Mine, Alaska-Juneau Mine, Kennecott Copper Corporation, and the Alaska Railroad. In addition Baldwin served as the regional consultant for Schlumberger electrical prospecting methods (of use in determining the extent of ore bodies), methods he may have employed in examining the Topsy claims. Alaska State Library, *A Guide to the Asa C. Baldwin Papers & Photographs in the Alaska Historical Library, Juneau* (Alaska State Library, Asa C. Baldwin collection, manuscript 36, 1978). His companions, B. B. Niedling and Jack O'Neill, were seasoned prospectors who had worked in the local area.
[61]Philip S. Smith, "Mineral Industry in Alaska in 1932," in Philip S. Smith et al., Mineral Resources of Alaska: Report on Progress of Investigations in 1932, *USGS Bulletin 857-A* (Washington: GPO, 1934), 21.
[62]The notable lack of information about this prospect, both at the time and also when the Alaska Territorial Department of Mine Inspectors visited the Bremner District in 1936 to conduct property examinations on all active claims, suggests it did not pan out. By 1938, Clyde Brown was reported "putting a two ton Gibson mill on the Clyde Ellis property located on Boulder Creek [Tiekel District] four miles from the Richardson Highway. This prospect was reported containing a small quartz vein in graywacke and schist with spotty values." J. C. Roehm, "Summary Report of Mining Investigations in the Nizina, Bremner, Chisana, Tiekel, Nabesna, and Prince William Sound Districts . . . August 22 to September 1, 1938," *U.S. Bureau of Mines Records* (ARL, microfilm, roll 9, item 35, 3), 6.
[63]J. C. Roehm, *Preliminary Report of Bremner Mining Company, Hanagita-Bremner Mining District, August 14, 1936* (US Bureau of Mines Microfilm Records, 5, 7, ARL), 2; Philip S. Smith, "Mineral Industry in Alaska in 1931," 22 (see n. 58).
[64]Chas. T. O'Neill to Wm. A. Hesse, Highway Engineer, 14 October 1931. Courtesy of Geoff Bleakley.
[65]Philip S. Smith, "Mineral Industry in Alaska in 1933," in Philip S. Smith et al., Mineral Resources of Alaska: Report on Progress of Investigations in 1933, *USGS Bulletin 864-A* (Washington: GPO, 1936), 30.
[66]Ibid., 24.
[67]An account of this episode is provided in Lone E. Janson, *Mudhole Smith, Alaskan Flier* (Anchorage: Alaska Northwest Publishing Co., 1981), 46-7.
[68]The Gold Reserve Act passed Congress on 30 January 1934. The next day, President Roosevelt, acting under title 3 of the act, issued a proclamation fixing the gold price at $35 per fine ounce. Chas. W. Henderson, "Gold and Silver," in *Minerals Yearbook, 1934*, Part II: Metals (Washington: GPO, 1934), 25-34.
[69]Philip S. Smith, "Mineral Industry in Alaska in 1933," 24 (see n. 65).
[70]Philip S. Smith, "Mineral Industry in Alaska in 1934," in Philip S. Smith et al., Mineral Resources of Alaska: Report on Progress of Investigations in 1934, *USGS Bulletin 868-A* (Washington: GPO, 1937), 24. Had the Com-

pany decided to move machinery from McCarthy through the Nizina District, they might have met further delays with the washing out of the Nizina bridge sometime in the early 1930s.

[71]Side-hill mill sites reduced the need for ore elevators, as mill overflow could pass to other machines largely by gravity. Robert H. Richards, *Ore-Dressing*, vol. 2 (New York: McGraw-Hill Book Company Inc., 1909), 1085-6.

[72]According to records, on file at the Bureau of Land Office, the company held four timber-cutting permits. Although the exact location is not specified, the Alaska Road Commission helped construct a tractor road to timberlands approximately 10 miles north of the pass saddle in the late 1930s.

[73]Fred Moffit, "Recent Mineral Developments in the Copper River Region, Alaska," *USGS Bulletin 880-B* (Washington: GPO, 1937), 101.

[74]Cross winds made the other two fields in the district hazardous, and the central airstrip also had the feasibility of being extended to 1,200 feet. Chas. O'Neill to Wm. A. Hesse (Highway Engineer) 14 October 1931; Bremner Gold Mining Company to Cordova Chamber of Commerce, 8 May 1935; Truman Brown (Cordova Chamber of Commerce) to Ike Taylor (Alaska Road Commission) 11 May 1935. Documents courtesy of Geoff Bleakley.

[75]J. C. Roehm, *Preliminary Report of Bremner Mining Company* (see n. 63).

[76]Ibid., 1 (see n. 63); The three-phase power system held advantages over single-phase systems because it could deliver power at different voltage levels, enabling electric motors and lights to run in the mill. In addition, three-phase generators were "considerably cheaper than single-phase ones of the same output." Harold Waddicor, *The Principles of Electric Power Transmission by Alternating Currents* (New York: John Wiley & Sons, Inc., 1928), 3.

[77]Floors in the building were set after the wall pre-forms were set up. Machinery had its own concrete base. The interior was filled with rock scree over which timbers and beams were set. Concrete was then poured to create the floor. National Park Service, *Cultural Resource Site Inventory Form XMC-104* (on file at park office); existing conditions survey 1998.

[78]According to standards of the Institution of Mining and Metallurgy, the aperture of 60 mesh was set at 0.0083 inches. This was superseded in 1932 by the British Engineering Standards Association Series allowing an aperture of 0.0099 with a tolerance of six percent, which itself was superseded in 1938 by the ASTM standard of 0.0098 with a tolerance of five percent. S. J. Truscott, *A Text-Book of Ore Dressing* (London: MacMillan and Co., Ltd., 1923), 199; Arthur F. Taggart, *Handbook of Mineral Dressing Ores and Industrial Materials*, fifth printing (New York: John Wiley & Sons, Inc., 1953), section 19, 102-3.

[79]The Yellow Band Gold Mines, who later bought the property, conducted a full inventory of mining equipment in 1939. As there is no mention of other drills being owned or brought in by the new company, these drills were likely from the Bremner Gold Mining Company workings. Yellow Band Gold Mines, *Balance Sheet December 31, 1939*, courtesy of Sylvia Baldwin.

[80]Powered by a 100-horsepower Westinghouse electric motor, the compressor exerted a maximum pressure of 125 pounds.

[81]J. C. Roehm, *Preliminary Report of Bremner Mining Company*, 9 (see n. 63).

[82]Ibid., 4 (see n. 63). Using the approximate recovery of $10 to $12 per ton supplied to the inspector in 1936, this would give an upper estimate of $15,000 to $18,000 worth of gold. Although development work from 1931 probably created a sufficient pile of ore, the company was unwilling to provide exact figures, and its production rate may have been exaggerated.

[83]Fred Moffit, "Recent Mineral Developments in the Copper River Region, Alaska," 99 (see n. 73).

[84]Asa C. Baldwin, Sketch map of Yellow Band claims c. 1935-7, showing surface geology (ACB collection, ASL), indicates the 1935 camp at an approximate elevation of 4,400 feet above sea level.

[85]Asa C. Baldwin, *Yellow Band Prospect, Golconda Creek, Bremner District, Alaska* (manuscript c. 1935, courtesy of Sylvia Baldwin), 2.

[86]Ibid., 2.

[87]Ibid., 2.

[88]Ibid., 3.

[89]Over a period of four to five months Golconda Creek varied from 6 to 20 cubic-feet per second. Baldwin calculated the stream to have a fall of five-and-one-half feet per 100 feet of stream length, delivering a head of 200 feet. Ibid., 4.

[90]Philip S. Smith, "Mineral Industry in Alaska in 1936," in Philip S. Smith et al., "Mineral Resources of Alaska: Report on Progress of Investigations in 1936," *USGS Bulletin 897-A* (Washington: GPO, 1938), 41.

[91]These raises were located at 40 feet, 90 feet, and 135 feet from the entrance. The deepest raise broke through to the surface. J. C. Roehm, *Preliminary Report of Bremner Mining Company*, 1 (see n. 63).

[92]C. B. Arnold, "You're Rich if You Find It," *Alaska Life*, vol. 1, no. 9 (October 1939).

[93]J. C. Roehm, *Investigations: McCarthy, Nizina River, Bremner and Chisana Mining Districts, Summary Report* (*US Bureau of Mines*, 1936), Microfilm Records, no. 25, roll, 9, ARL.
[94]The Alaska Department of Mines reported Fred Togstad (probably Tagstadt, the miner who had previously worked placer claims in the district) died on 23 September 1936, aged 58. *Report to the Commissioner of Mines to the Governor for the Biennium Ended December 23, 1936* (1936), 31.
[95]The Bremner Gold Mining Company estimated its seasonal production lying between two-to-three tons of concentrate, achieving a value of $10 to $12 per ton of ore. The company may have embellished its production figures to the Alaska mine inspector, although the statistics were specifically not for publication. J. C. Roehm, *Preliminary Report of the Bremner Mining Company*, 4 (see n. 63).
[96]Ibid., 4 (see n. 63). Gold bonded with oxides proved lighter, and thus separated with less success on machines that concentrated ore by density.
[97]Asa C. Baldwin, *To the Unitholders in Yellow Band Gold Option* (manuscript, 10 March 1937, courtesy of Sylvia Baldwin), 1.
[98]The promontory was located approximately 5,000 feet above sea level, 600 feet higher than the former camp.
[99]Evidence of the privy is noted in *Cultural Resource Site Inventory Form XMC-107* (on file at park office).
[100]Asa C. Baldwin, *To the Unitholders in Yellow Band Gold Option*, 2 (see n. 97).
[101]The "old rocker" is, in all likelihood, the rocker found the previous year at the Red Slide location. This presently lies in a disassembled state outside the Killian vein at the Yellow Band Mine location. Asa C. Baldwin, *To the Unitholders in Yellow Band Gold Option*, 2 (see n. 97); *Mining Inventory and Monitoring Program, Cultural Resource Site Inventory Form: XMC-107* (20 July 1990, unpublished manuscript on file at park office), 6.
[102]J. C. Roehm, "Preliminary Report of Yellow Band Group, Bremner District, August 18, 1936," *Alaska Territorial Department of Mines Property Examination 87-6* (1936). Interestingly, the drift is not mentioned in Baldwin's write-up for the 1936 season, although it was definitely in place by 1937. Philip S. Smith, "Mineral Industry of Alaska in 1937," *USGS Bulletin 910-A* (Washington: GPO, 1939), 32, records the drift as 50 feet. In actuality the drift was a combination 50-foot long open cut and a 50-foot long tunnel. Asa C. Baldwin, *Yellow Band Gold Mines, Inc., President's First Annual Report to Stockholders, Year 1938* (privately published, 1938), 7. Courtesy of Sylvia Baldwin.
[103]Asa C. Baldwin, *To the Unitholders in Yellow Band Gold Option*, 2 (see n. 97)
[104]This included drifting on the Pot Hole vein exposed in the 1936 crosscut, driving a new crosscut 200 feet to the north, packing up timbers to the Killian lead, and driving a full size drift. In addition, Baldwin wished to construct a good pack trail for horses as well as a more comfortable upper camp. Asa C. Baldwin, *To the Unitholders in Yellow Band Gold Option*, 2-3 (see n. 97)
[105]J. C. Roehm, "Preliminary Report of Chas. A. Nelson Prospect, Bremner Mining District, August 15, 1936," *Alaska Territorial Department of Mines Property Examination 87-4.*
[106]Fred Moffit, "Recent Mineral Developments in the Copper River Region, Alaska," 102 (see n. 73).
[107]The prospect was located on the west bank of Trail Creek, four miles upstream from its mouth, between 4,500 and 4,700 feet above sea level. J. C. Roehm, "Preliminary Report of Bear Mine Group (Trail Creek), Bremner Mining District," *Alaska Territorial Department of Mines Property Examination 87-5.*
[108]Philip S. Smith, "Mineral Industry in Alaska in 1936," 41 (see n. 90); J. C. Roehm, Investigations: McCarthy, Nizina River, Bremner and Chisana Mining Districts . . .," 1936, 11 (see n. 93).
[109]Asa C. Baldwin, *President's First Annual Report to Stockholders*, 2 (see n. 110). Philip S. Smith, "Past Lode-Gold Production From Alaska," *USGS Bulletin 917-C* (Washington: GPO, 1941), Table 5, 186-7.
[110]Little information is provided on the 1937 season, other than at its close, a total of $20,000 had been invested in developing the holdings since 1935, and that the holdings now included three placer claims. Asa C. Baldwin, *President's First Annual Report to Stockholders*, 1 (see n. 110).
[111]According to a 1943 stockholder list (Yellow Band Gold Mines, Inc., *List of Stockholders as of June 30, 1943.* Courtesy of Sylvia Baldwin). Nabesna board members held 20 percent of Yellow Band's total common stock: Carl Whitham, 49,222; Claude Stewart 12,185 (and his wife Bertha Stewart 107,737); O. A. Nelson 19,177; M. N. Chase 13,885; and Thomas Donahoe 28; O. A. Nelson to C. F. Taplin, 6 January 1960 (courtesy of Sylvia Baldwin).
[112]The Sheriff claims were purchased in two installments of $20,000, each transaction gaining a quarter interest. The company paid the discoverers of the Yellow Band group 5,000 shares of preferred stock and 20,000 shares of common stock. This reduced the purchase price of the claims from $50,000 to $45,000. Under a new contract, a minimum 25 percent royalty was imposed on any ore coming from the mine, with a minimum yearly payment of $1,500. Asa C. Baldwin, *President's First Annual Report to Stockholders*, 2 (see n. 110).

[113]The merger was agreed upon on 1 September 1938. Asa C. Baldwin, *Notice of Special Meeting of Stockholders* (unpublished flier, 1938, courtesy of Sylvia Baldwin); Asa C. Baldwin, *President's First Annual Report to Stockholders*, 2 (see n. 110).
[114]Ibid., 2 (see n. 110).
[115]Ibid., 3 (see n. 110).
[116]Ibid. (see n. 110).
[117]Philip S. Smith, "Mineral Industry of Alaska in 1938," *USGS Bulletin 917* (Washington: GPO, 1942), 31.
[118]Asa Baldwin alludes to these changes in *Annual Report for the Year 1941* (courtesy of Sylvia Baldwin), 4.
[119]Asa C. Baldwin, *President's First Annual Report to Stockholders*, 3 (see n. 110).
[120]Ibid., 7 (see n. 110).
[121]Ibid. (see n. 110).
[122]Ibid. (see n. 110). Workers cut approximately 100 cords (approximately 12,800 cubic feet) of lumber for construction and fuel use.
[123] W. A. Richelsen (Kennecott Copper Corporation), *Memorandum, Kennecott, Alaska, 15 October 1938*. On file at park office, courtesy of Geoff Bleakley.
[124]"Yellow Band Gold Mines Submit Annual Report," *The Alaska Weekly* (22 December 1939).
[125]The company held at least two cutting permits, probably located around 10 miles north of operations, near the mouth of Monahan Creek.
[126]Asa C. Baldwin, *To the Stockholders of Yellow Band Mines, Inc.* 1939 Annual Report (courtesy of Sylvia Baldwin), 1.
[127]James R. Baker, *Work Completed at Bremner Mining Camp, July, August 1997: A Report on the Preservation and Skills Training Program Projects*, manuscript (1998) on file at park office.
[128]Asa Baldwin, *Diary*, 1941 (Asa C. Baldwin collection, Alaska State Library, Juneau).
[129]It is unlikely that the company reused poles for the transmission line between the powerhouse and the old Bremner camp, as it still needed lines to the mill and Grand Prize Mine.
[130]Asa C. Baldwin, *To the Stockholders of Yellow Band Mines, Inc.* 1939 Annual Report (see n. 126).
[131]Using the elevation to name the levels, Baldwin employed 6,000 to designate workings at 6,000 feet above sea level. The crosscut comprised a 25-foot long open cut and a 50-foot drift. Asa C. Baldwin, *To the Stockholders of Yellow Band Mines, Inc.* 1939 Annual Report, 2-3 (see n. 126).
[132]Asa C. Baldwin, *To the Stockholders of Yellow Band Mines, Inc.* 1939 Annual Report, 4 (see n. 126).
[133]Asa C. Baldwin, *To the Stockholders of Yellow Band Mines, Inc.* 1939 Annual Report (see n. 126); "Yellow Band Gold Mines Submit Annual Report," *The Alaska Weekly* (see n. 124).
[134]Philip S. Smith, "Mineral Resources of Alaska, 1939," In Mineral Industry in 1939, *USGS Bulletin 926-A* (Washington: GPO, 1941), 27.
[135]"Manager of Yellow Band Mines Arrives in Seattle," *The Alaska Weekly* (3 November 1939).
[136]Asa. C. Baldwin, *To the Stockholders of Yellow Band Mines, Inc.* 1940 Annual Report (courtesy of Sylvia Baldwin), 1.
[137]Ibid., 1
[138]Ibid.
[139]Ibid.; Asa C. Baldwin, *Annual Report for the Year 1941*. (see n. 118)
[140]Asa Baldwin, *Diary* (see n. 128).
[141]Asa C. Baldwin, *To the Stockholders of Yellow Band Mines, Inc.* 1940 Annual Report, 2 (see n. 136).
[142]Baldwin, *Diary*, 13 September 1940 (see n. 128); Fred Struckman was also a shareholder in the Company. Yellow Band Gold Mines, Inc., *List of Stockholders as of June 30, 1943* (courtesy of Sylvia Baldwin).
[143]. Reducing the size opening of the nozzle improved water pressure. Although the company owned a supply of different sized nozzles, they also modified the opening by beating it with a hammer. Asa Baldwin, *Diary*, entries 5, 7 September 1940 (see n. 128).
[144]Around 100 tons of the ore came from the stopes, the rest deriving from ore removed in the drifts and crosscuts. Asa. C. Baldwin, *To the Stockholders of Yellow Band Mines, Inc.* 1940 Annual Report (see n. 136).
[145]Costs for the year approximated $22,000. Ibid., 4 (see n. 136).
[146] Asa Baldwin, *Diary*, entry 22 March 1941 (see n. 128).
[147]Asa Baldwin, *Diary*, entries 25-31 May, 3-4 June, 1941 (see n. 128).
[148] Asa Baldwin, *Diary* (see n. 128).

[149]The two airplanes available to do the flying were both damaged, one on landing on a mud flat in Valdez, and the second in a fire at Copper Center. Asa C. Baldwin, *Annual Report for the Year 1941* (see n. 118); Asa Baldwin, *Diary* (see n. 128).
[150]Asa Baldwin, *Diary*, entries May 1 through May 22, 1941 (see n. 128).
[151] Claude Stewart to Asa Baldwin, 6 June 1941. Courtesy of Sylvia Baldwin.
[152]Asa Baldwin, *Diary*, entries August 6-8, and September 1, 1941 (see n. 128). The new blacksmith shop was located closer to the workings, just outside the 6001 drift.
[153]Asa Baldwin, *Diary*, entries June 1941 (see n. 128). Although Baldwin does not refer specifically which building became the bathhouse, it is evident that an extant building was converted rather than a separate bathhouse constructed. The storage building at the main camp is the likely candidate. The outside of the building is sided with flattened drums (the only such building in the Bremner District), and a stove and heating coils are found on the west wall. The walls of the building are also double thick with a woolen blanket material in between. Refer *Cultural Resource Site Inventory Form, XMC-105* (National Park Service, on file at park office).
[154]Asa C. Baldwin, *To the Stockholders of Yellow Band Mines, Inc.* 1940 Annual Report (see n. 136)
[155] Asa Baldwin, *Diary* (see n. 128); Yellow Band Gold Mines, Inc., *List of Stockholders as of June 30, 1943.* Courtesy of Sylvia Baldwin.
[156]This broke down to $10,000 in wages and other accounts, an interest payment on the mortgage of $885.55, and a $7,478.94 payment toward the principal. Asa C. Baldwin, *Annual Report for the Year 1941*, 3 (see n. 118).
[157]Asa C. Baldwin, *Annual Report for the Year 1941*, 3-4 (see n. 118).
[158]U.S. Congress, Section 982.1, Part 982—Mines, Title 32: National Defense, Chapter 9, Office of Production Management (Washington: GPO, 1941), 3031-35; Chas. A Henderson, "Gold, Silver, Copper, and Lead in Alaska," in *Minerals Yearbook, 1942* (Washington: GPO, 1944), 224.
[159]Alaska State Library, *A Guide to the Asa C. Baldwin Papers & Photographs in the Alaska Historical Library, Juneau* (see n. 60).
[160]C. E. Needham, "Gold and Silver," in *Minerals Yearbook, 1942* (Washington: GPO, 1944), 80-1.
[161]Claude Stewart to Marguerite Baldwin, 5 March 1945 (courtesy of Sylvia Baldwin).
[162]Ibid.
[163]The freeing up of labor and equipment, however, did not occur until after the Japanese surrender on 14 August—too late in the season to have any positive impact on mining operations in Alaska for the 1945 season. H. Foster Bain, "The Mineral Industry of Alaska," in *Minerals Yearbook, 1945* (Washington: GPO, 1947), 220.
[164]Marguerite Baldwin did not attend the directors meeting in which Bertha Stewart (Claude Stewart's wife) and Carl Whitham (manager of the Nabesna Mine) donated respectively 10,000 and 20,000 shares back to the Company. The donation of half her holdings was done at the request of Claude Stewart, albeit voluntarily and "in the spirit of cooperating as much as she can in your effort to rehabilitate the corporation." Ernest B. Herald to Claude Stewart, 21 September 1945 (courtesy of Sylvia Baldwin). See also Claude Stewart to Marguerite Baldwin, 5 March, 17 August, and 29 September 1945; Ernest B. Herald to Claude Stewart 5 September 1945 (courtesy of Sylvia Baldwin).
[165]Claude Stewart to Marguerite Baldwin, 9 February 1946 (ACB collection). A number of stockholders had lost interest in the corporation due to L-208 and because the mine itself did not look promising. The poor attendance at later meetings, however, was also due to many stockholders having dispersed during the war period (a number also passing away). O. A. Nelson to C. F. Taplin Jr., 6 January 1960 (courtesy of Sylvia Baldwin); Paul Fretzs to C. F. Taplin Jr., 9 January 1960 (courtesy of Sylvia Baldwin).
[166]Claude Stewart to Marguerite Baldwin, 9 February 1946 (courtesy of Sylvia Baldwin); The Reconstruction Finance Corporation (RFC) formed with President Hoover's signing of the RFC Act on 22 January 1932. This created a funding body similar to the War Finance Corporation, permitting "business and industry to carry on normal activities free from the fear of unexpected shocks and retarding influences." Jesse Jones, *Fifty Billion Dollars: My 13 Years with the RFC*, 1932-1945 (New York: The MacMillan Press, 1951), ix.
[167]Claude Stewart to Marguerite Baldwin, 10 November 1946 (courtesy of Sylvia Baldwin).
[168]Stewart notes in a letter to Marguerite Baldwin that the trying conditions "caused those operators who did resume work last spring, with the hope that conditions would improve during the summer, to again close their work down." Ibid.
[169]Claude Stewart to Marguerite Baldwin, 15 March 1948 (courtesy of Sylvia Baldwin).
[170]Paul Fretzs to Sylvia Baldwin, 17 April 1978 (courtesy of Sylvia Baldwin), 2.
[171]Paul Fretzs to C. F. Taplin Jr., 9 January 1960; O. A. Nelson to C. F. Taplin Jr., 6 January 1960 (courtesy of Sylvia Baldwin).

[172]O. A. Nelson to C. F. Taplin Jr., 6 January 1960, 3; Paul Fretzs to Sylvia Baldwin, 17 April 1978, 2-3.
[173]The name Yelinore represents a likely merge between Yellow Band and Elinore Fretzs (Paul Fretzs's wife). The company name has elsewhere been spelled Yellinor and Yellinore.
[174]The Yelinore company was reported in the District for at least 1958-60. All reports note a crew of four, and it is likely that Fretzs was one of them. Alaska, Department of Mines, *Report of the Commissioner of Mines for the Biennium Ended December 31, 1958*; Alaska, Department of Natural Resources, *Report of the Division of Mines and Minerals for the Year 1959*; Alaska, Department of Natural Resources, Division of Mines and Minerals, *Report for the Year 1960* (Juneau: 1961).
[175]Paul Fretzs to C. F. Taplin Jr., 9 January 1960.
[176] Paul Fretzs to Sylvia Baldwin, 17 April 1978. Courtesy of Sylvia Baldwin.
[177]Refer Michael Lappen, *Whose Promised Land?: A History of Conservation and Development Management Plans for the Wrangell and Saint Elias Mountains Region, Alaska, 1938-1980* (M.A. Thesis, Santa Barbara: Univ. of California, 1984).
[178]Paul Fretzs to Sylvia Baldwin, 17 April 1978, 7.
[179]Ibid., 5. Fretzs notes, "some of the mountain came down on the building up at the Sheriff mines," likely the Cliff House. Looting during this time may have involved the attempted removal of the Ford dump truck by helicopter. The truck was pushed outside the mechanic shop and set on blocks. Geoff Bleakley, personal communication.
[180]Fretzs to Sylvia Baldwin, 26 March 1975 (courtesy of Sylvia Baldwin).
[181]Donald Defenderfer and Robert B. Walkinshaw, *One Long Summer Day in Alaska: A Documentation of Perspectives in the Wrangell Mountains*, Environmental Field Program, Publication No. 8 (Santa Cruz: Univ. of California), 27.
[182]The turbulent formation of the Wrangell-St. Elias National Park and Preserve (refer Chaper 1, "Administrative Background" for a synopsis or Michael Lappen's *Whose Promised Land?* (see n. 177) for an in-depth treatment) led the government to grant concessions to disparate interest groups, including the mining industry. Active mining occurring within park boundaries could be classed as an "inholding," which permitted private interest within park boundaries. Phil Holdsworth to Sylvia Baldwin, 9 July 1987 (Courtesy of Sylvia Baldwin).
[183]E. M. MacKevett Jr., N. R. D. Albert, D. F. Barnes, J. E. Case, K. Robinson, and D. A. Singer, "The Alaskan Mineral Resource Assessment Program: Background Information to Accompany Folio of Geologic and Mineral Resource Maps of the McCarthy Quadrangle, Alaska," *USGS Information Circular 739* (Washington: GPO, 1977), 4. The estimate for lode mining is a revision (from 750 troy ounces) to account for the production of the Yellow Band Gold Mines and Yelinore Inc.

Chapter V: Existing Conditions

Introduction

Consistent with conditions historically affecting the area, the Bremner Historic District currently has limited accessibility. Access is largely restricted to charter flights offered by tour operators in the Chitina Valley or by private plane. Climatic conditions generally limit wheeled flights to the summer months and particularly between late-June and early August when the majority of snow cover has melted. The vigor of streams and rivers in the Chitina Valley limit land access in the winter months to snowmobile, at which time the park receives few visitors. Consequently, visitor numbers to the Bremner District are likely low, although they have not been accurately gauged.

The documentation of existing conditions in the Bremner District by the National Park Service has occurred since the implementation of archaeological surveys and hazard mitigation procedures in 1990. The documentation of existing conditions specific to generating this *Cultural Landscape Report* took place in 1997 and 1998. In sum, these surveys have recorded 18 archaeological sites and more than 80 other features in the district (figures 5.1 and 5.2).

This chapter incorporates information gathered from surveys and other National Park Service activities in the district to provide an account of current conditions. The documentation of landscape characteristics follows guidelines specified in *A Guide to Cultural Landscape Reports* (National Park Service, 1996). Sketch maps for most sites mentioned in text are included as an appendix (refer Appendix 1).

Recording Considerations

Although placer mining and lode mining operations in the district did not develop separately from each other, they created essentially separate landscapes. This is not only seen in the different emphasis on resources (for instance, regarding the exploitation of primary and secondary ore deposits), but also spatially, with placer mining and lode mining operations concentrated respectively in the southern and northern parts of the valley. For these reasons, the existing conditions presented here address placer and lode mining sites separately in terms of their landscape elements: spatial organization, industrial workplaces, habitation sites, constructed water features, circulation, and small-scale features.

Recorded sites in the Bremner District are not distributed evenly between the placer and lode mining landscapes, and only four of the 18 sites directly associate with placer operations. Rather than indicating any historically formed disposition, the paucity of recorded placer sites reflects, in part, the limited number of archaeological surveys conducted in the southern section of the district. No surveys, for instance, have investigated the mouth of Shovel Creek or Golconda Creek, although historical accounts note placer prospecting in those areas.[1] More significantly, however, the deficiency of known sites points to the difficulty inherent in documenting placer workings.

Particularly in small-scale operations, placer mining involved considerable mobility. Prospectors continually tested other locations and shifted camps, re-staked claims to align better with paystreaks, and jumped other miners' claims. Placer claims did not necessarily follow natural boundaries, such as creeks, but spanned them as well, a decision governed by the nature of the ore body and available space. These factors act to impede the identification of discrete placer sites.

While some placer mining techniques leave distinctive landscape impacts (ground and box sluicing often associated with hand-stacked tailings, for instance), not all methods leave unique signatures. For instance, ground sluicing and hydraulic sluicing methods utilize water races and wing dams and employ tailings (stacked or piled) to serve as sluice walls. In a similar vein, a considerable portion of placer mining equipment finds employment for a variety of methods with little modification. Sluices, sluice forks, riffles, and hoses, for example, may derive from shoveling-in, ground sluicing, hydraulicking, or suction dredging techniques. Consequently, the reworking of placer claims by different methods, sometimes contemporaneously, complicates the interpretation of the workplace and formation of site typologies.[2]

As an additional consideration, placer landscapes may reflect more than just strict functional interpretations. The layout of tailings and sluices, in some instances, served to demarcate claim boundaries. The techniques employed and subsequent arrangement of tailings may also indicate the ethnicity of prospectors.[3]

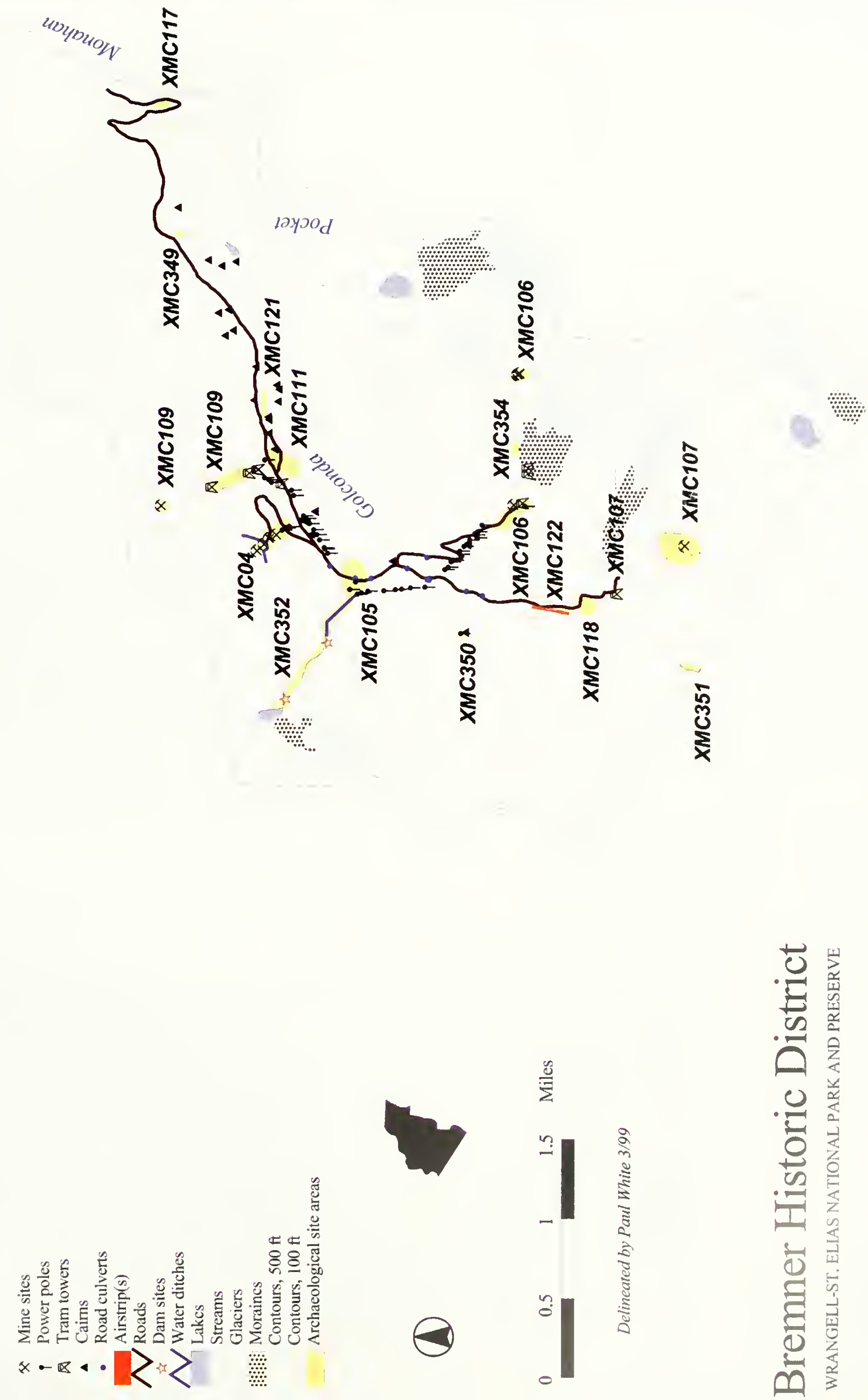
As a consequence, placer landscapes known to have been worked and reworked by different techniques, such as in the Bremner District, leave complicated signatures. With the dynamics of placer landscapes and the inherent difficulties in identifying discrete and contemporaneous sites, the placer landscape in many ways represents a temporally and spatially continuous archaeological site. In the interests of management recommendations, which generally prefer the identification of bounded areas, the 1997 and 1998 existing conditions surveys regarded placer workings as "discrete" in the presence and "continuous" in the absence of habitation sites in close proximity.

The four discrete sites recorded in the district all include workplaces, habitation areas, and water features. To aid the elucidation of landscape characteristics, each of these site aspects is addressed separately in the following existing conditions documentation.

While sites in the lode mining landscape do not pose the same difficulty in assessing boundaries and period of use as in the placer landscape, archaeological sites are similarly complex in the close grouping of landscape elements (mine sites, for instance, include bunkhouses, repair shops and underground workings, storage tanks, and tramways under one site designation). As with sites in the placer landscape, to facilitate the analysis of the cultural landscape and treatment recommendations addressed in later sections, the various components of sites are discussed according to their landscape element rather than under individual site headings.

Due to high levels of preservation, a number of archaeological sites in the Bremner District contain currently existing structures. In addition to assessments of archaeological integrity, this chapter appraises the current condition of extant structures according to standard Cultural Landscape Inventory criteria:

- *Good:* The features of the landscape need no intervention; only minor or routine maintenance is needed.
- *Fair:* Some deterioration, decline, or damage is noticeable; the feature may require immediate intervention; if intervention is deferred, the feature will require extensive alteration in three to five years.
- *Poor:* Deterioration, decline, or damage is serious; the feature is seriously deteriorated or damaged, or presents a hazardous condition; due to the level of deterioration, damage, or danger the feature requires extensive and immediate attention.



Bremner Historic District

WRANGELL-ST. ELIAS NATIONAL PARK AND PRESERVE

Existing Conditions *Northern section*

Figure 5.1


Bremner Historic District
WRANGELL-ST. ELIAS NATIONAL PARK AND PRESERVE
Existing Conditions
Southern section
Southern extent of 1997
existing conditions survey
Isolate 13
Standard
XMC353
XMC119
Golconda
XBG135
Shovel
North Fork Bremner River
Cairns
Dam sites
Water ditches
Lakes
Streams
Moraines
Contours, 500 ft
Contours, 100 ft
Archaeological site areas
0
0.5
1
1.5
Miles
Delineated by Paul White 3/99

Figure 5.2

Spatial Organization

Placer Mining Landscape

Sites associated with placer mining are located in the north and southcentral sections of the Bremner District, with workplaces concentrated along a three mile stretch of Golconda Creek, extending one mile above and two miles below its confluence with Standard Creek. Sites in this section are predominantly located on creek placers, although at least one site (XMC-119) worked a high bar deposit. Features associated with placer mining, including habitation sites, constructed water systems, and small-scale features are located near workplaces. Habitation sites are typically located on benches alongside the workings, with only one site (XBG-135) indicating a sizable camp.

In contrast, the northern area of placer mining is characterized by a dearth of workplaces, habitation sites, and constructed water features. The abundance of cairns next to main watercourses, nevertheless, indicates this zone had been prospected and staked for placer deposits, albeit likely through the abuse of power of attorney. Historic trails associated with placer mining are not well preserved, but the location of other activity areas suggests circulation closely followed hydrological drainages to connect with workplaces.

Lode Mining Landscape

The lode mining landscape is concentrated in the central and northcentral portions of the Bremner District. Considerably more dispersed than the placer mining landscape, sites are located at elevations ranging from 3,700 to 6,200 feet. Both industrial workplaces and habitation sites are located on the valley floor and upper elevations.

The overall spatial organization indicates minimal adherence to natural water features; and constructed water features, such as dams and culverts, are typically removed from workplaces. In addition to geological conditions, topography exerted a major influence on the location of activity areas, with most sites and features, including the main camps, circulation networks, and small-scale features, concentrated along the valley floor or on the floor of hanging valleys tributary to Golconda Creek.

Industrial Workplaces

Placer Mining Landscape

Placer workplaces in the Bremner District are identifiable principally by the presence of tailings stacks. With few exceptions, most tailings in the placer district exist as low mounds of loosely piled rock, the mounds separated by shallow

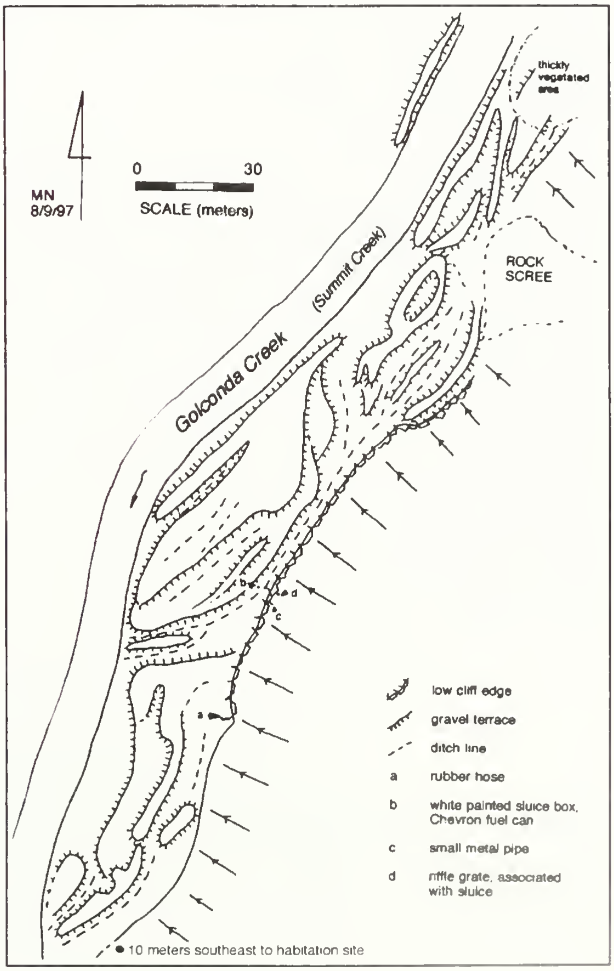


Figure 5.3. Site XMC-351 typifies the appearance of many placer worksites in the Bremner District. Tailings mounds are generally low and piled rather than neatly stacked, although hand-stacks may be present. Residual mining equipment typically dates to the 1960s. The workplace, nevertheless, presents a palimpsest of nearly a century of intermittent placer mining activity. Figure by author.

bedrock drains (figure 5.3). Artifacts and features associated with historic operations, such as monitors, sluice forks, penstock, and sluice boxes, are relatively infrequent, particularly in comparison to well-preserved placer mining areas elsewhere in the Wrangell-St. Elias National Park and Preserve (notably the Chisana District). However, a wide range of mining equipment from efforts in the 1960s and 1970s remains on workplaces along the intensively worked three-mile section of Golconda Creek at its confluence with Standard Creek.

Three discrete placer sites are currently recorded in the Bremner Historic District. All sites are located on Golconda Creek, within one mile of its confluence with Standard Creek. Two of these sites lie along the stream section historically designated as Summit Creek.

Site XMC-351, one mile upstream of the confluence of Golconda and Standard creeks, comprises approximately 80,000 square feet of workings, with an associated habitation site located a short distance to the southeast. Miners at this site probably worked deposits on both sides of the creek, but devoted most attention to the larger creek placer on the east bank. Surface evidence indicates at least three different phases of working the deposits. Hand-stacked tailings at the northeastern section of the east bank and also on the west bank suggest ground sluicing or shoveling-in methods (figure 5.4). Piled tailings (as differentiated from stacked tailings) throughout the east bank, coupled with a monitor in the nearby habitation site, imply the use of low-pressure hydraulicking techniques, probably during the 1930s.[4] A small painted sluice box, riffles, and modern hose among the workings probably relate to suction dredging operations in the 1970s and 1980s. Modification of the site during this last phase is also indicated by a 15 foot wide drain along the eastern side of the site exiting to Golconda Creek halfway along the length of the bar. Although the northern end of the ditch is bordered by hand-stacked tailings (suggesting its use in an earlier period) the ditch line has been adjusted in its southern section to cut across earlier drains. Scrub vegetation encroaches on the northern and central parts of the workings.

Isolate 13 is located on a creek placer immediately north of Standard Creek on Golconda Creek's east bank. The workings extend south to Standard Creek and may continue eastward up the north bank of the tributary for a conservative estimate of 100,000 square feet. The remnants of a habitation site are located on a slightly raised terrace northeast of the workings. Prospectors probably examined this bar throughout all mining periods, although surface evidence (including the site's current access by a tractor road) indicates largely post-1940s modification. This includes leveled terraces, broad ditches, and a paucity of well defined tailings stacks, suggestive of the use of hydraulicking techniques (probably low-pressure) assisted by bulldozers. A 35-foot-long steel sluice with riffles removed lies on the gravel bar and probably associates with opera-

Figure 5.4. Site XMC-351 looking north, showing the portion of hand-stacked tailings bordering the eastern extent of the worksite and a bedrock drain west of the tailings. Photo by author, MTU #BP-1.1.97.

tions during the 1960s-1970s (figure 5.5). Scrub vegetation encroaches on the outskirts of the gravel bar.

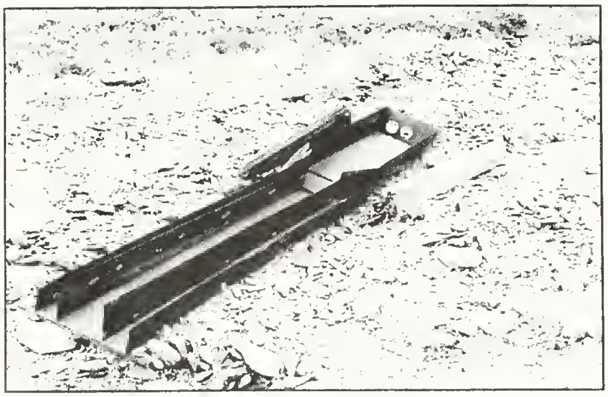


Figure 5.5. Abandoned sluice box at Isolate 13. In operation, water entered the sluice at the distant end. Miners shoveled ore onto a grizzly placed over the trough (propped up against the far end of the sluice) and gold was trapped in riffles attached to the trough sides. The narrow troughs worked finer gravel sizes. Photo by Will Updike, MTU #26978-22.

Site XMC-119 lies one-third of a mile south of the confluence of Golconda and Standard Creeks. In excess of 120,000 square feet, this site worked high bar deposits either side of Golconda Creek. Prospectors expended the majority of effort on the substantially larger west bank, where a habitation area is also located. The site indicates working by at least three placer techniques. Neat, hand-stacked rows of tailings forming the walls of bedrock drains (in places up to eight feet high) are likely associated with shoveling-in or ground sluicing methods (figure 5.6).[5] Flat rock stacks arranged linearly at the heads of some ditches (namely those perpendicular to Golconda Creek) functioned as supports for sluice boxes. A small monitor dumped at the north end of the site indicates miners employed low-pressure hydraulicking methods. More recent suction dredging operations (figure 5.7) are also indicated by the reuse of a rectangular prospecting pit (5' wide by 10' long by 5' deep) at the north end of the site for caching equipment under camouflage tarpaulins (including garden hoses, regulators, an inner tube float, and bicycle pump). A second pit of similar dimensions is located on a terrace west of the workings and may represent earlier testing of bench deposits. Artifacts scattered around the workings include a substantial can dump with a number of items (such as solder-top cans) dating to the early twentieth century.

Creek placers south of XMC-119 indicate placer mining operations on almost every bar for nearly two miles downstream of Golconda's confluence with Standard Creek, at which point Golconda Creek begins a course through a narrow canyon. Worked bars in this area are representative of the wide variety of mining techniques historically employed in the district: loosely piled tailings on most bars probably resulted from ground sluicing or low-pressure hydraulicking; an exposed hillside on the east bank approximately one-quarter

Figure 5.6. Site XMC-119 contains more than 100,000 square feet of hand-stacks associated with ground-sluicing and low pressure hydraulicking techniques. In places, the stacks reach 4-5 feet in vertical height. Photo by author, MTU #26979-2.

Figure 5.7. Secreted suction dredging equipment at site XMC-119. The pit was likely dug by earlier prospectors in the district as one means to assess the worth of the claims. Photo by Patrick Martin. MTU #BP-3.8.98.

mile downstream from XMC-119 was probably worked by high-pressure hydraulicking; and a backhoe immediately south of the hydraulicked hill indicates mechanized operations in the 1970s or 1980s.

While the paucity of habitation sites in this region complicates the discernment of discrete workplaces, four bars located close to the constriction of Golconda Creek are within one-third of a mile of a small camp (refer habitation section below). These creek placers include loosely piled or stacked tailings suggestive of ground sluicing or low-pressure hydraulicking methods, and existing equipment, including a metal sluice and grizzly. Sections of iron pipe located in Golconda Creek, may relate to the water conveyance system constructed by the Golconda Mining Company in 1911. Remains of a wooden trestle 150 feet south of the camp probably supported a flume crossing to the west bank of Golconda Creek.

Recent efforts to work placer deposits in the Bremner District by suction dredging concentrate in the area between Standard Creek and the site of the abandoned backhoe, just south of site XMC-119. The impact of this mining technique at such a limited scale is negligible, given that suction dredging works creekbed rather than bench deposits. Natural conditions pose a more significant threat to the integrity of creek placers. Collections of driftwood on most creek workings, as well as the deposition of gravels on the backhoe, indicate the water level of Golconda Creek occasionally reaches high enough to fully submerge placer sites.

Lode Mining Landscape

Industrial workplaces recorded in the Bremner District include a concentration mill, assaying facility, and the sites of four mines (Lucky Girl, Grand Prize, Yellow Band, and Sheriff). Together, these comprise all sites known to have been historically developed in the District.

The Lucky Girl Mill (**XMC-104**), in operation intermittently between 1935 to the close of 1941, occupies a site east of the compressor and assay shed. A succession of slides has removed practically the entire superstructure (wood-frame, sided with rabetted boards and corrugated iron) and scattered it for nearly one-quarter mile east of the building foundations (figure 5.8). Slide-borne rock and superstructure debris also capped tailings east of the mill. Recent slides have upturned and twisted the classifier from its original position on an inclined deck and removed traces of corduroy cloth formerly present near the Wilfley table. Despite the impact of slides, the organization of the mill remains largely intact. The jaw crusher has fallen from its original mounting and currently lies directly above the automatic feeder, having demolished the ore bin in the process. The ball mill, amalgamator, launders for amalgamation plates, and Wilfley table lie in-situ. Roughly made launders between the ore bin and ball mill, as well as the absence of amalgamation plates in the launders to and from the classifier, probably relate to salvage attempts in the 1960s-1970s by Yelinore Inc.

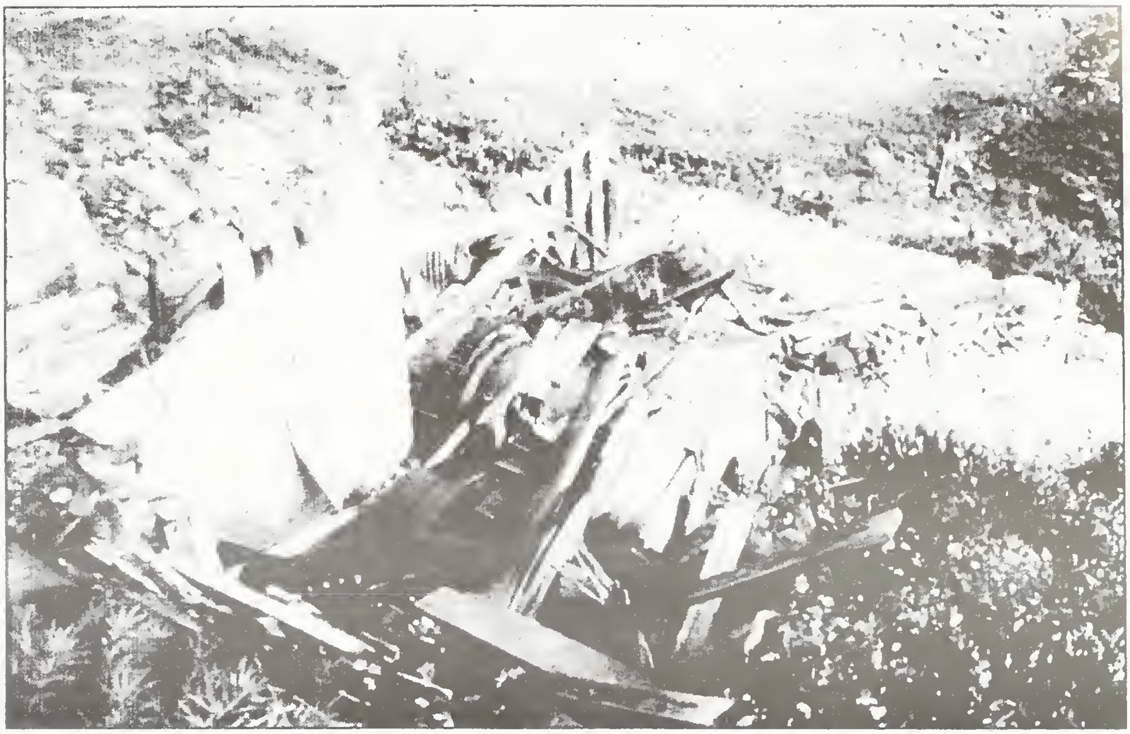


Figure 5.8. Overview of the Lucky Girl Mill, indicating the near total removal of superstructure from slide damage. The crusher and ore bin remnants lie in the foreground. Photo by author, MTU #BL-5.2.98.

Ore testing and milling facilities, constructed by the Bremner Gold Mining Company in 1935 (and later used by Yellow Band Gold Mines between 1938 and 1941), retain good integrity. A compressor and assay shed (12' by 20'6") is in fair-to-poor structural condition. The assay room, in fair condition, preserves the layout of the shop as well as its equipment, including a muffle furnace, crucibles, and cupels (figure 5.9). Doors to the assay shed, constructed of dynamite box sides, indicate adaptive reuse of local materials on hand. Slides have removed the covering roof and south wall of the compressor shed. Equipment such as the Gardner-Denver compressor and electric generator, however, remain set on their footings. Animal damage is minimal, although birds currently nest on the rafters under the assay-shed roof.

Figure 5.9. XMC-104, workbench against south wall of assay shed, showing broken assay crucibles. Photo by Will Updike, MTU #BL-3.5.98.

The Lucky Girl Mine (XMC-104), worked by the Bremner Gold Mining Company between 1931 and 1938, is located on the west side of the valley, one mile south of the pass saddle. Mine workings consist of four adits, located between 4,400 feet and 4,800 feet above sea level, aligned diagonally along a single quartz vein. Overburden piles lie outside all four adits. The deterioration of underground workings is evident on the surface with two adit entrances (the No. 2 and No. 4 adits) entirely collapsed. The No.1 and No. 3 adits, which remain accessible, show significant deterioration of wooden supports from freeze-thaw processes (figure 5.10). Fallen rock outside the No. 1 Adit has caused the workings to flood, and

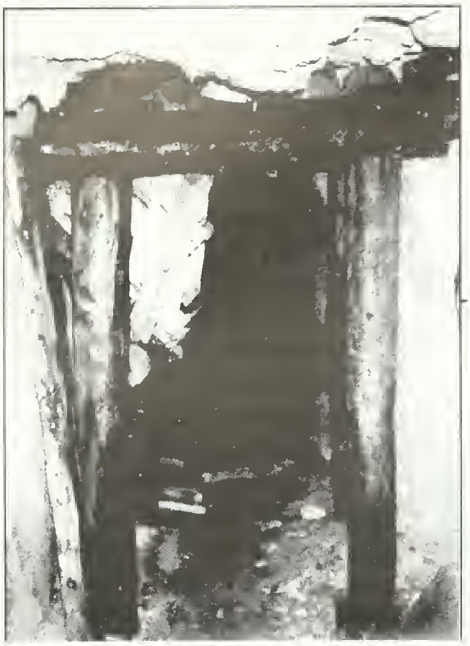


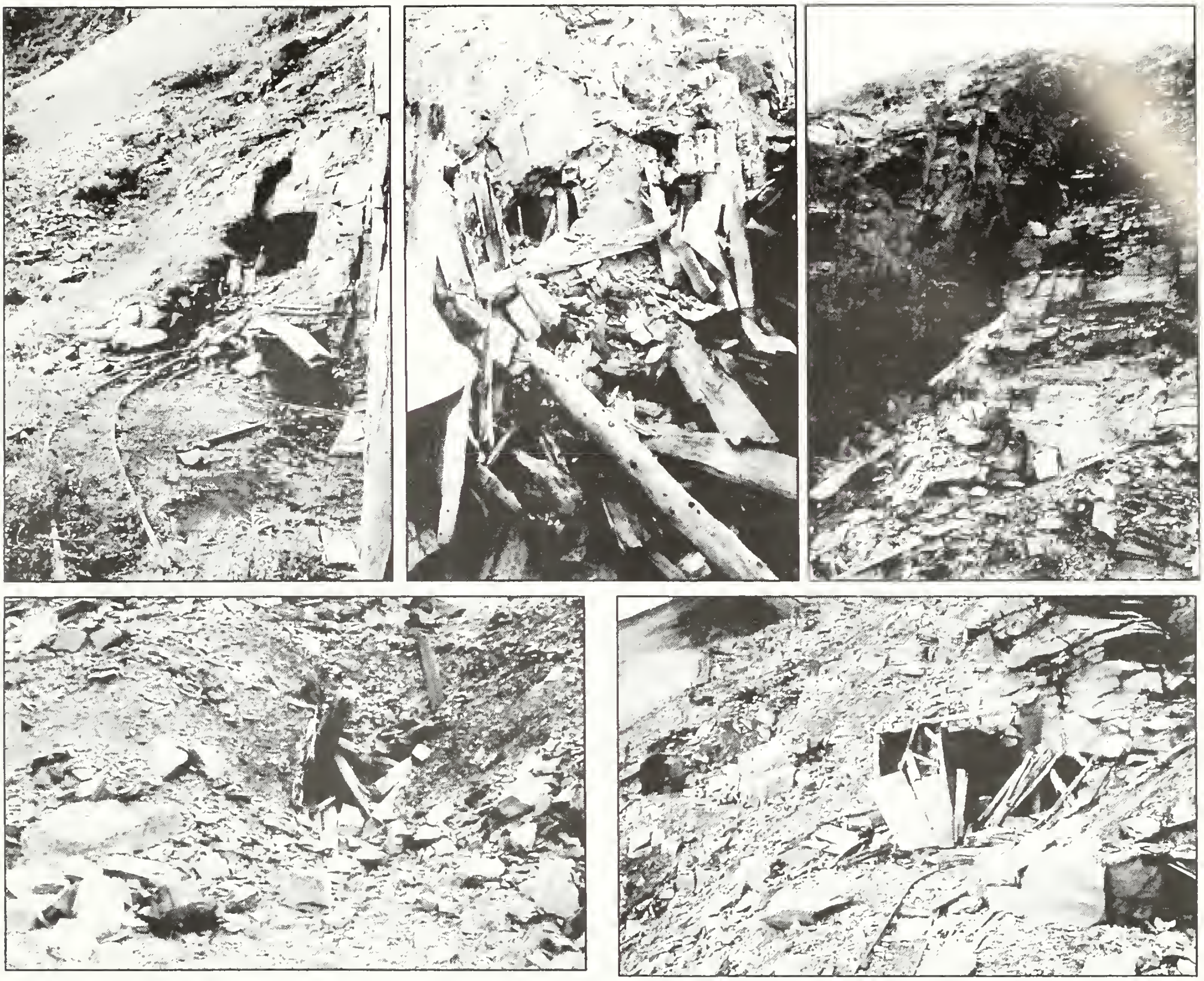
Figure 5.10. Support timbers in the underground workings of the Lucky Girl Mine, such as this square set in the No. 3 Adit, indicate considerable deterioration. The stulls are waterlogged and subjected to annual freeze-thaw cycles. Photo by Logan Hovis, 1998; on file at park office.

a considerable volume of water now issues from the entrance (figure 5.11). Underground stope collapses have formed depressions between the three uppermost adits, at least one of which occurred historically.[6] Examination of accessible adits indicated no mining tools or equipment remain in the workings.[7] Tram tracks, for both the movement of ore to the mill and dumping of overburden, exit from the No. 1 Adit.

The Grand Prize Mine (XMC-115), developed by the Bremner Gold Mining Company between 1931 and 1935, is located one-half mile north of the Lucky Girl Mine at an elevation of 6,300 feet. Positioned on a steep scree slope, the only level ground at the site is an overburden mound immediately outside the mine adit. The adit currently is accessible, although ice fills the tunnel after a distance of approximately 30 feet (figure 5.11). Tram tracks extend from the adit to the end of the mine tailings. The mine includes three existing structures (wood-framed and sheathed with tin), two of which have been subjected to substantial slide damage. The bunkhouse and workshop building (6'2" by 22'3") is in fair to poor condition. Although slides caved-in the roof of the workshop, the shop layout is still preserved beneath the collapsed roof. In addition to the damage inflicted on the workshop, slides collapsed a support structure erected over the adit portal, now in poor structural condition.

The Yellow Band Mine (XMC-107) is located on the east side of the valley one mile north of Standard Creek, at an elevation of 5,500 feet above sea level. Worked between 1935 and 1939, the mine retains an array of mining technology employed in developing the prospect. The site worked two veins by open cuts, pits, a crosscut, and a drift. The drift on the Killian vein has collapsed with ice and rock entirely blocking the adit entrance (figure 5.11). Items scattered in close proximity to the workings include a dismantled rocker box (probably the "old rocker" mentioned by Asa Baldwin in 1936) and shovel. The crosscut and three open pits are located farther up the mountainside on the Meloy vein. These sites have not been formally recorded, and their current condition is unknown.[8] A trail from the Killian drift connects to a campsite and upper tram terminal some 300 feet distant. Sections of the trail blasted from rock remain in good condition, but much of the path has been irrecoverably damaged by rockslides. A miner's candle, cloth, and dynamite box containing blasting caps (removed during hazard mitigation in 1995) are among items cached into small niches in the rock face.

The Sheriff Mine (XMC-106) worked an ore outcrop at the head of a steep cirque one-and-one-half miles northeast of the Yellow Band Mine at an elevation of 6,200 feet. The mine primarily operated between 1938 and 1941, but received some additional work in the late-1950s by Yelinore Inc. The site comprises a small cluster of buildings grouped around three adits and an open cut. Support facilities, constructed between 1939 and 1941, include a blacksmith shop (11'8" by 14'6") and a tool shed, both in poor structural condition. A dry room (converted from a blacksmith shop in 1939) between the bunkhouse and blacksmith shop has entirely collapsed. The adits remain accessible, although ice closes a number of entrances. Underground workings are highly unstable, owing to the pre-existing instability of the



MINE ADITS IN THE BREMNER HISTORIC DISTRICT

Figure 5.11. Underground workings in the Bremner District have deteriorated significantly from the actions of water, ice, and rock collapse, making them extremely hazardous to enter. Mine entrances have also been subjected to frequent rock- and snow slides occurring at the surface. As of 1998, four of the 11 adits in the district remain open. Clockwise from left, Lucky Girl Adit No. 1 (by Patrick Martin, MTU #BL-3.1.9); Grand Prize Mine adit (by author, MTU #BL-7-6-97); Killian Vein adit at Yellow Band Mine (by Patrick Martin, MTU #BL-10.30.98); Sheriff Mine, Adit No. 2 (by Will Updike, MTU #BL-8.25.97); adit in scree slope below the Sheriff Mine (by author; MTU #BL-8.5.97).

rock, deterioration of mine timbers, and explosives demolition. Hazard mitigation in 1998 blasted explosives set in the ice at one of the adits and destroyed a mine drill in the process. A stub tram exiting from the second adit leads to an overburden dump near the privy (figure 5.11).

An adit possibly associated with prospecting activity before the discovery of the Sheriff claims is located on the floor of the hanging valley, more than a thousand feet below the Sheriff Mine. Driven into a scree slope, the adit has entirely collapsed and is not accessible (figure 5.11). The dilapidated remnants of a transformer house (20' by 20'), formerly aiding the transfer of power to the mine, lie farther west. Close by, a Chevrolet truck fitted with wooden rear wheels was probably used to generate power—a canvas belt attached to the wheels would have enabled the motor to power a line shaft or other equipment.

Habitation Sites

Placer Mining Landscape

Five habitation sites associated with placer operations are currently recorded in the Bremner District. All sites are small and exhibit high archaeological integrity but generally poor structural preservation.

A small camp likely associated with site XMC-351 occupies a small terrace at the southeastern extent of a worked creek placer. The site comprises a single tent frame (16' by 23') with a light discard scatter evidenced within and around the structure and down the terrace scarp (figure 5.12). Placer mining equipment, including a monitor, pipe section, and sluice fork, lie within the tent frame. Domestic artifacts within the structure include remnants of a stove, enamel plates, and kitchenware, most likely dating to the 1930s or earlier. Artifacts located in close vicinity include kitchenware, tools, discarded cans, and possible sled runners. Scrub vegetation currently encroaches upon the campsite, but there is no evidence of other major disturbance.

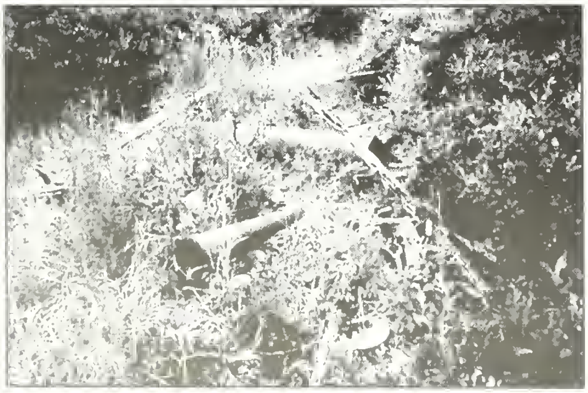


Figure 5.12. Habitation site associated with placer workings on Golconda Creek (XMC-351). In addition to remnants of the tent frame and domestic artifacts, the site includes a monitor and pipe section used for low-pressure hydraulicking. Photo by author. MTU #BP-1.7.97.

A cabin site, located close to the confluence of Golconda and Standard creeks lies in associative context with mechanized operations conducted during the 1970s and 1980s at Isolate 13. The dispersed remnants of the cabin include sections of wood framing, metal-framed beds (perhaps salvaged from the Yellow Band Gold Mines camp), and 1970s-era domestic discard. The site lies on the gravel bar itself and appears to have been exposed to considerable disturbance.

At XMC-119, the habitation area is located in the northwest portion of the site on an elevated terrace alongside the workings. A stone slab across a water drain probably served historically as a bridge to access the site. The campsite includes a stone walled hearth or forge and a flattened area probably used for setting up a tent frame. Remnants of a dog sled and horse sled are located on a second terrace close to the stone slabs. Artifacts dispersed throughout the site include a box stove, enamelware dishes, kitchenware, a wash basin, and discarded cans and bottles. The majority of artifacts likely date prior to the 1930s.

The remains of a modern prospector's cabin lie south of XMC-119, on the west side of Golconda Creek adjacent to the backhoe site. This wood-frame and metal-sided cabin (approximately 16' by 19') lies in poor condition and may have been partially dismantled by the National Park Service after the illegal operations were discovered early in the 1990s. The cabin contains two bed frames, but possibly accommodated three individuals, given the presence of children's clothing and toys. Discard in and around the cabin includes plastic hoses and a neoprene hood, both suggestive of suction dredging. Old crosscut and double-tree saws, as well as the back plate from a pocket watch, suggest the inhabitants reused and looted artifacts from sites in the area.

The only habitation site in the placer mining landscape not immediately associated with a workplace is located approximately one-and-one-quarter miles south of the confluence of Standard Creek and Golconda Creek. This site (XBG-135) includes two tent frames (13' by 13'), a privy, portable forge and blower engine, and two small sleds. One tent frame, sided with boards for three-feet above the ground, remains in structurally fair condition (figure 5.13). Internal furnishings include two beds, a table, wooden chest, and stove. A small monitor outside the collapsed tent indicates the site's association with placer mining activity, probably on gravel bars a short distance south of the site. A substantial dump north of the

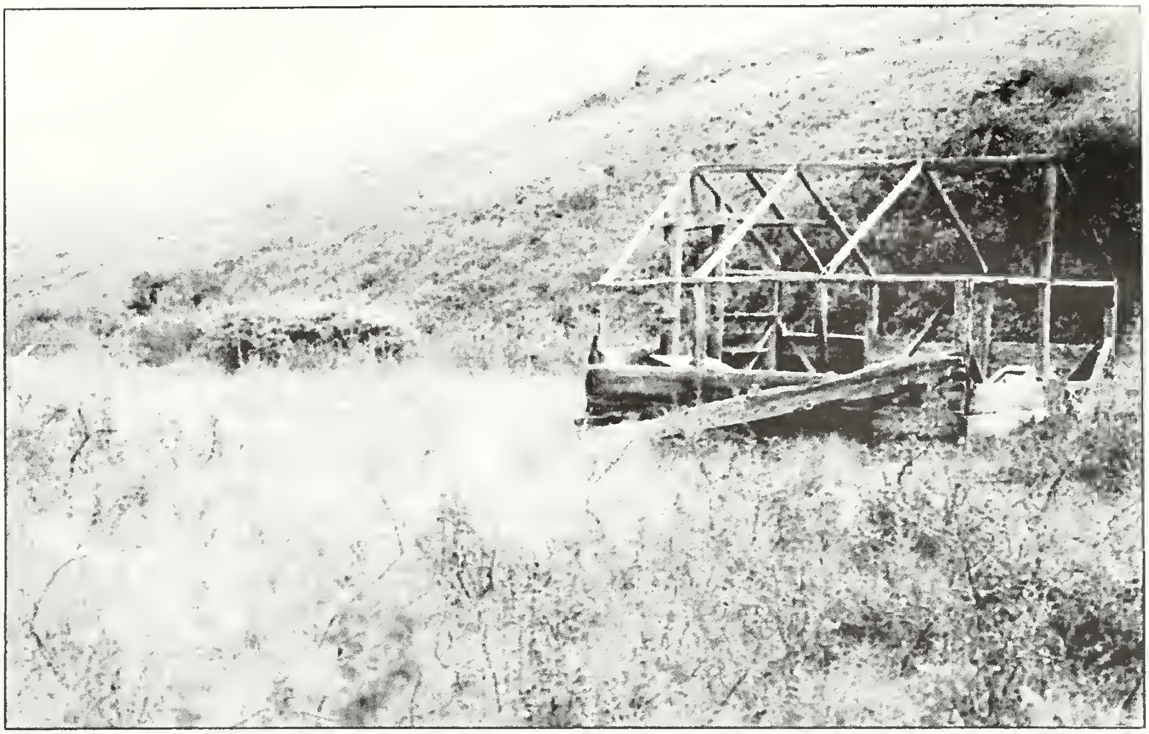


Figure 5.13. Campsite (XBG-135) associated with placer mining activities on Golconda Creek, probably from the 1910s to 1930s. The presence of at least one additional tent site, as well as a portable blacksmith forge (located in the shrubs at photo left) suggests a moderately sized operation, perhaps the base camp for the Golconda Mining Company. Photo by Will Updike, MTU #26978-17.

structures includes artifacts dating to the early twentieth century. The camp's location one-and-one-half miles below Standard Creek, as well as its greater size compared to other placer camps, suggests this site may have served as the base camp for Golconda Mining Company. The site shows little indication of cultural disturbance since its abandonment.

Two habitation sites associated with very recent prospecting activities are found on the west bank of Golconda Creek within one mile south of its junction with Standard Creek. Both sites are located on the gravel bars and indicate short-lived settlement. Camp remnants include fire rings and some associated discard (figure 5.14). The use of historic structural materials for firewood (indicated by an abundance of nails in the ashes) indicate that while modern suction dredging may have low impacts to historic workplaces, associated campsites do pose a substantial threat to the historic placer landscape.

Figure 5.14. Indications of recent prospecting include this habitation site just south of XMC-119. Nails in the fire ashes (seen at center) suggest the burning of historic structural materials. Photo by Patrick Martin, MTU #BP-7.4.98.

Lode Mining Landscape

Habitation sites associated with lode mining operations are located at the mine locations and on the valley floor. Seven campsites are currently recorded, and these comprise practically all historically known sites in the district.

Living quarters at the Grand Prize Mine (XMC-115) comprise one room of a combination blacksmith shop and bunkhouse. The bunkroom (approximately 11' by 12') remains in fair condition with high archaeological integrity. Furnishings include a double bunk and single bunk, table, shelves, stove, and wash basin. A variety of artifacts including tools, foodstuffs, kitchenware and tableware, clothing, toiletries, magazines, and personal items lie in situ on shelves and around the cabin. Two tins of blasting caps, located in a wooden box on the shelf, were removed during 1996 hazard mitigation procedures.

The upper camp of the Yellow Band Mine (XMC-107), in use between 1936 and 1939 is located on a narrow ridge approximately 300 feet southwest of the Killian vein adit. The camp comprises a tight cluster of three buildings: a tent frame, tent site, and blacksmith shelter. The extant canvas wall tent (9' by 11'), in fair condition, is roofed in tin and surrounded by dry-piled stone walls with a porch area on the west side (figure 5.15). Furnishings include a single and double bunk (still with bedding), and a shelf made from a powder box (figure 5.16). Foodstuffs (including rolled oats, dried apples, dried beans, and spices), a stove, and personal items lie on the floor of the cabin and porch area. Dry-stone walls also mark the outlines of a blacksmith shop and platform for a second tent frame. The shop contains a variety of blacksmithing equipment, including a portable metal forge and anvil, and, until removal by the National Park Service in 1995, two full boxes of explosives. A privy is located a short distance south of the camp buildings.

Historic accommodations at the Sheriff Mine (XMC-106) comprise a two-room wood-frame and metal-sided bunkhouse, approximately 14' by 42' (figure 5.17). The northernmost room, constructed in 1939, includes two bed frames, a plank table, shelves, chair and bench, and a large

Figure 5.15. Well preserved tent frame at the Yellow Band Mine (XMC-107), showing use of tin and dry-stone walls to cover the canvas tent. Photo by Patrick Martin, MTU #BL-10.41.98.

Figure 5.16. The tent frame at the Yellow Band Mine upper camp preserves historic furnishings, such as the cook stove and wooden bunks, and a variety of domestic artifacts, including dried foodstuffs, stored at the mine between 1935 and 1941. Photo by Patrick Martin, MTU #BL-10.23.98.

Figure 5.17. "Cliff House" at the Sheriff Mine. Much of the bunkhouse remains intact, although slides have damaged the later extension to the structure (compare with figure 4.22). The collapsed structure in the foreground is the site of the former blacksmith shop, later converted into a dry room. Photo by Will Updike. MTU #BL-8.24.97.

range. The second room, an addition to the original "Cliff House" completed in 1940, has been damaged by slides, particularly in the southeast corner. Furnishings in the room include two bed frames beneath plank bunks, a plank table, and folding chairs. Artifacts in both rooms include kitchenware and tableware, foodstuffs, bedding, toiletries, miners' helmets, and reading material. More recent artifacts, including cardboard boxes and a pressure cooker, likely date to Yelinore's operation in the 1970s. A wood privy (5'6" by 4'), built from dynamite boxes, is located at the southern end of the mine complex.

Remnants of a tent frame (XMC-354) associated with the early development of the Sheriff Mine are located on the north side of a rock glacier near the head of the cirque below the mine (figure 5.18). Similar to the upper camp at the Yellow Band Mine, the tent (approximately 12' by 19') is surrounded by a dry-stone wall up to four feet high. The site indicates considerable damage by snow slides, with the northeast wall section being the most intact. Rubble inside the structure obscures furnishings except a stone block (possibly used for setting a stove on) and section of a small wooden table. Dumps around the structure include food cans, clothing canvas, magazines, and firewood. An open sack containing approximately 40 dynamite sticks (circa 1937) is located southwest of the structure among rock debris. Although snow weights, slides, and glacial movement have damaged the tent frame, the site indicates no disturbance other than through natural causes.

Figure 5.18. Remnants of a wall tent (XMC-354) below the Sheriff Mine workings. The use of dry-stone walls helped insulate the tent from winds and cold temperatures. Photo by Patrick Martin, MTU #BL-8.17.98.

In addition to accommodations at mine workings, the Bremner Historic District preserves the remains of three campsites on the valley floor. These sites served as base camps for the Bremner Gold Mining Company, Yellow Band Group, and Yellow Band Gold Mines.

The Yellow Band Gold Mines camp (XMC-105), one mile south of the pass saddle, includes seven extant structures and two sites dispersed over a total area of 430,000 square feet (figure 5.19). Although Yellow Band Gold Mines created the camp (hereafter termed the "main camp") in 1939, most buildings were relocated from the site of the Bremner Mining Camp constructed five years prior. The principal building cluster includes five structures, all of which retain good integrity. The largest structure, a one-and-one-half-story balloon-frame bunkhouse (32'3" by 17'9") sided with corrugated metal, remains in good condition. A number of its furnishings, including bunks and tables, derive from the Bremner Gold Mining Company. Shelves lined with newspaper dating to 1970 document the later reuse of the building, perhaps by Paul Fretzs. Foundation repairs to the building in summer 1997 included the tacking of wire mesh beneath the floor to inhibit access by rodents. In spite of such efforts ground squirrels have entered the main bunkhouse and caused considerable damage to the kitchen (including chewing through celetex walls). A storage shed (14' by 18'), constructed of sawed boards and sided with flattened drums, lies a short distance south of the bunkhouse. This building contains an old snowmobile, off-road scooter, and various tools and equipment, including equipment left by recent restoration crews. An office building (12' by 14') 100 feet to the west is of similar construction (sawed boards sided with corrugated tin) to the bunkhouse. Furnishings include a drafting table and work bench (constructed of sawed planks). Writing by the door frame dates to the Bremner Mining Company era, when the building was used as an assay shed. A fallen radio mast lies immediately outside the building. A log framed and screen-sided meat cache (7' by 7') west of the bunkhouse is the only structure in the camp in poor condition. A two-hole privy (4'11" by 6') lies east of the bunkhouse. This structure is of frame construction and capped with a shed-style roof. A second and more loosely grouped building cluster resides 500 feet southwest of the bunkhouse. A garage and blacksmith shop (18'5" by 14'6"), constructed of sawed boards, remains in good structural condition. The blacksmith shop retains the forge, blower, and almost all tools. The mechanic shop includes a block and tackle, accessory parts for the Caterpillar tractor, and a compressed air drill. In addition to pipes and cables immediately outside the garage, artifacts include a Ford dump truck on blocks, horse-drawn wagon, Caterpillar bulldozer with trailer, Worthington diesel generator mounted on a sled, and ore buckets. A powerhouse (18'4" by 18'4"), of post and beam construction, comprises the only Bremner Mining Company structure not relocated by Yellow Band Gold Mines in the construction of the main camp. Extant equipment, including a Pelton wheel and Westinghouse AC and DC generators (used in the generation of electricity for the camp and mines), is remarkably well preserved. The ruins of a portable sawmill 150 feet northeast of the powerhouse include a circular saw, log carriage, sawdust pit, and track fashioned from pipe and angle iron. A possible tent site (16' by 16') is located a short distance southeast of the powerhouse. Scrub vegetation (predominantly willow) encroaches on the outskirts of the site and between the two building clusters.

The site of the Bremner Gold Mining Company camp (XMC-111) lies immediately south of the Bremner pass saddle (figure 5.20). Approximately in use between 1927 and 1938, remnants of the campsite are dispersed over a broad area approximating 480,000 square feet. The campsite includes the foundations for at least seven structures, with earthen berms, trenches, and vegetation disturbance implying the presence of six additional features. Most sites are either the foundations of buildings later removed to form the Yellow Band Gold Mines camp or temporary tent frames. However, remnants of at least one log structure include parts of walls and flooring, as well as a section of a gable roof somewhat removed from the site. Aligned rock stacks a short distance south of the main building cluster mark the outline of a large structure (32' by 53') appar-

YELLOW BAND GOLD MINES CAMP (XMC-105)

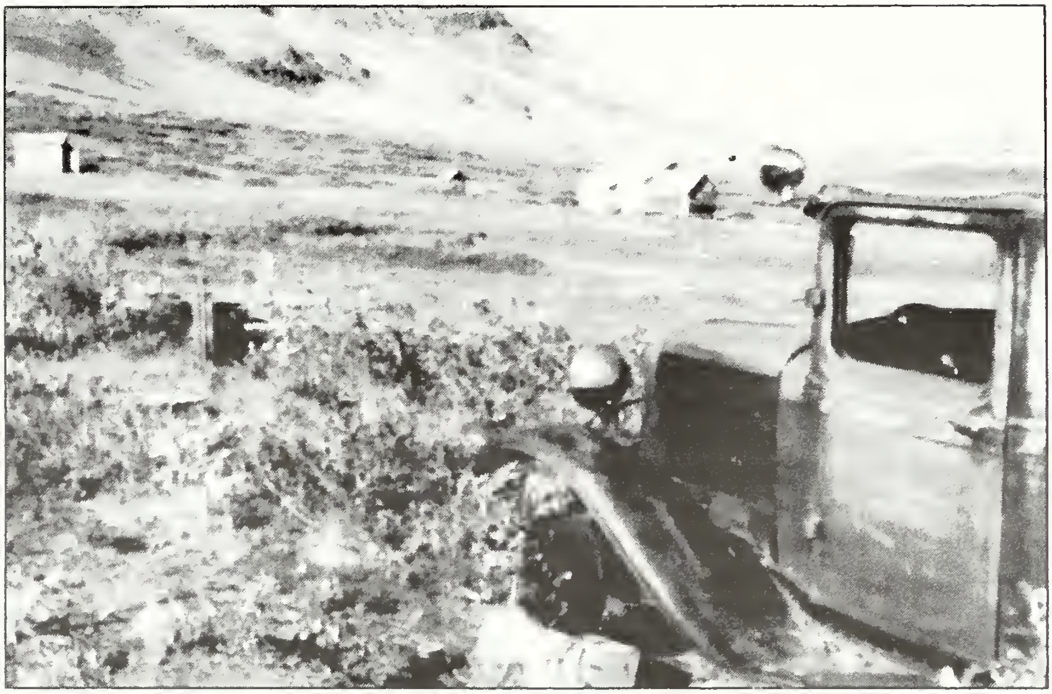


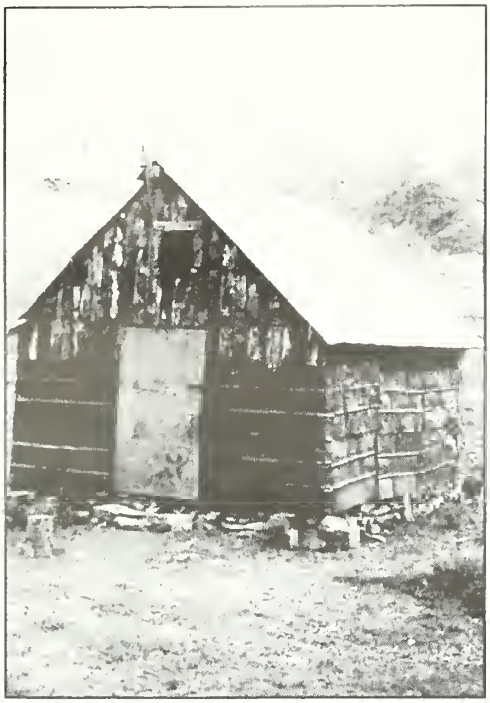
Figure 5.19. The base camp of the Yellow Band Gold Mines, in use from 1939-1941, is among the best preserved sites in the Bremner District.

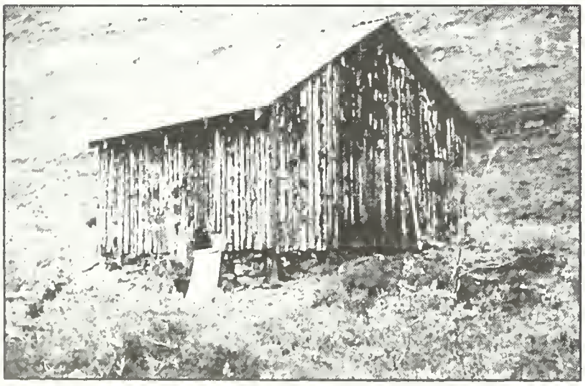
Top: Main camp viewed from outside mechanic's shed, with Model-A Ford dump truck in foreground. Structures from left are the company office, meat cache, bunkhouse, and storage shed. Photo by author.

Center left: Bunkhouse undergoing 1997 restoration efforts Photo by Will Updike, MTU #26976-11.

Center right: Upstairs accommodations in the main camp bunkhouse. Photo by Will Updike, MTU #26976-5.

Left: Bunkhouse kitchen. Damage from ground squirrels is observable by the chewed edges of floorboards. Photo by Will Updike, MTU #26976-8.





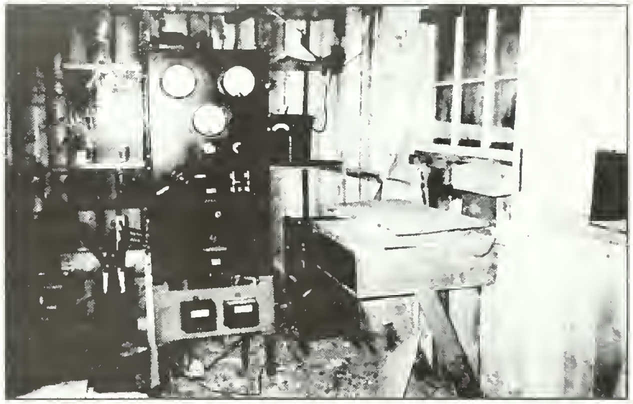


Figure 5.19 continued.

Upper left: Storage shed in close proximity to the bunkhouse. Drum siding was added in the 1940s during the structure's partial conversion into a bathhouse. Photo by Patrick Martin. MTU #BL-1.12.98.

Upper right: Mechanic shop at the Yellow Band Gold Mines camp, with Ford dump truck and No. 35 Caterpillar tractor positioned outside. The truck, set on wooden blocks was moved out of the garage in the1970s during a failed salvage attempt. Photo by Patrick Martin. MTU #BL-1.18.98.

Bottom left: The powerhouse at the Yellow Band Gold Mines camp, constructed by the Bremner Gold Mining Company in 1934-1935, was responsible for generating electricity to the mines, camp, and mill. The outflow for the Pelton wheel is visible on the long side of the building immediately above the foundation level. Photo by Patrick Martin. MTU #BL-1.32.98.

Bottom right: Extant equipment and furnishings inside the powerhouse building. Photo by Will Updike. MTU #26976-22.

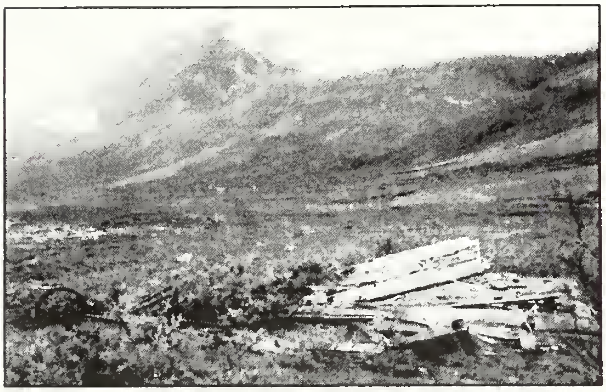


Figure 5.20. Site of Bremner Gold Mining Company camp (XMC-111) located just below the saddle of the pass saddle. View looking southwest with Yellow Band Gold Mines camp in center background. Photo by Patrick Martin, MTU #28171-12.

ently abandoned before foundations were completed. Artifacts dispersed through the campsite include clothing, personal items (tobacco tins, tooth powder, buttons), kitchenware and tableware, and, to a lesser degree, faunal remains. Crucibles scattered among foundation remains east of the main camp indicate the former location of the assay office. Burn piles, wood storage areas, and two sleds are extant around the camp structures. Two substantial can dumps are located south and northeast of the camp buildings.

The base camp of the Yellow Band Group (XMC-118), occupied in the mid-to-late-1930s, lies a few hundred feet northeast of the Yellow Band Mine lower tram terminal. Dispersed over an area of approximately 85,000 feet, the ground surface west of the site is partially swampy, and a small stream runs part way into the camp area. A pole-framed, metal-sided tent-frame (11'6" by 13'6"), probably constructed in the late-1930s or early-1940s, comprises the sole standing structure at the site. Furnishings include some modern artifacts (including a snowmobile, batteries, and plastic cutlery) that indicate the structure's later use for storage and shelter. Six semi-permanent tent foundations are also present, evidenced on the surface by wood frames, canvas fragments, and remnants of tongue-and-groove flooring. Among the artifacts dispersed throughout the camp is a mechanism for sorting gravel. The camp also includes dumps, sled remains, and two possible privy shafts. Water ditches east of the camp (now dry) may indicate measures to reclaim land, or methods to tap water for placer mining operations. A small rock dam (7' long and 18" high) borders a water spring at the northeast end of the site.

Constructed Water Features

Placer Mining Landscape

Systems to direct water to placer workings still exist in the placer landscape, with all currently recorded ditch lines located east of Golconda Creek and south of Standard Creek. Two water ditches tap Standard Creek. The easternmost ditch begins 3,000 feet upstream from the mouth of Standard Creek and travels approximately one mile to a point below site XMC-119 (figure 5.21). This is likely a remnant of the ditch constructed by the Golconda Mining Company in 1911 to supplement hydraulicking operations. Both the diversion dam and flume necessary to channel water into the ditch no longer remain, although a

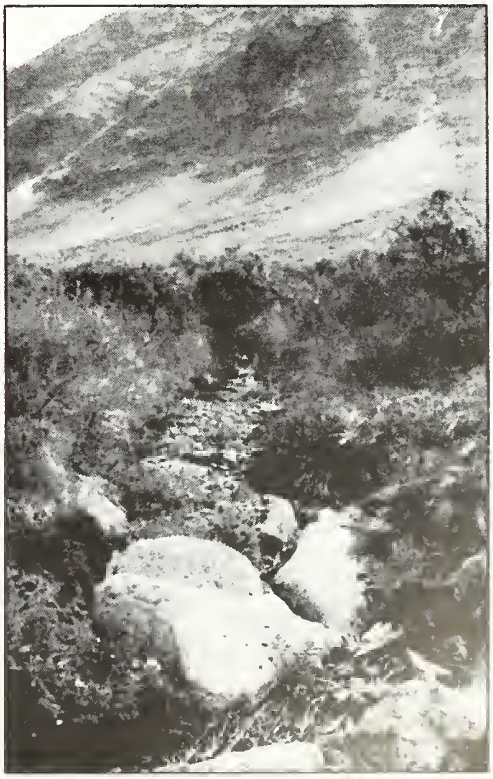
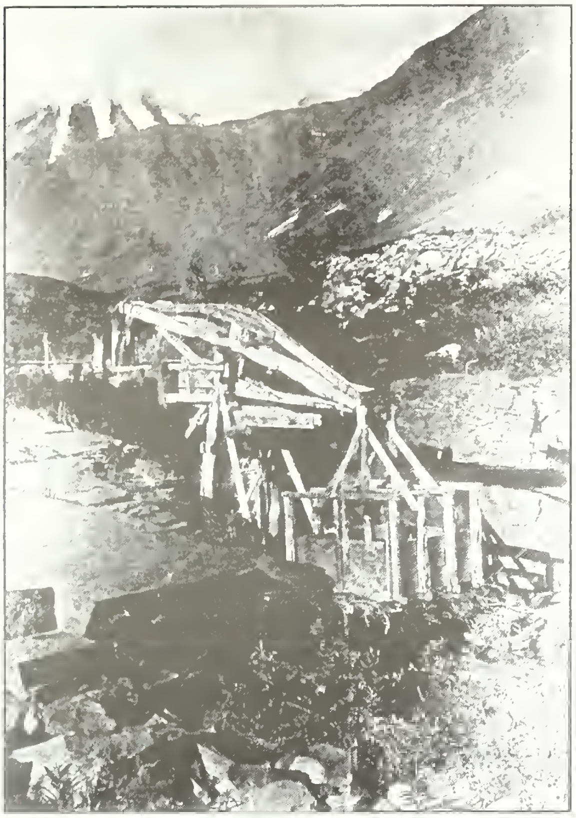


Figure 5.21. The "mile-long ditch" constructed by the Golconda Mining Company. Looking northeast with Yellow Band mountain in the background. Photo by Patrick Martin. MTU #28171-13.



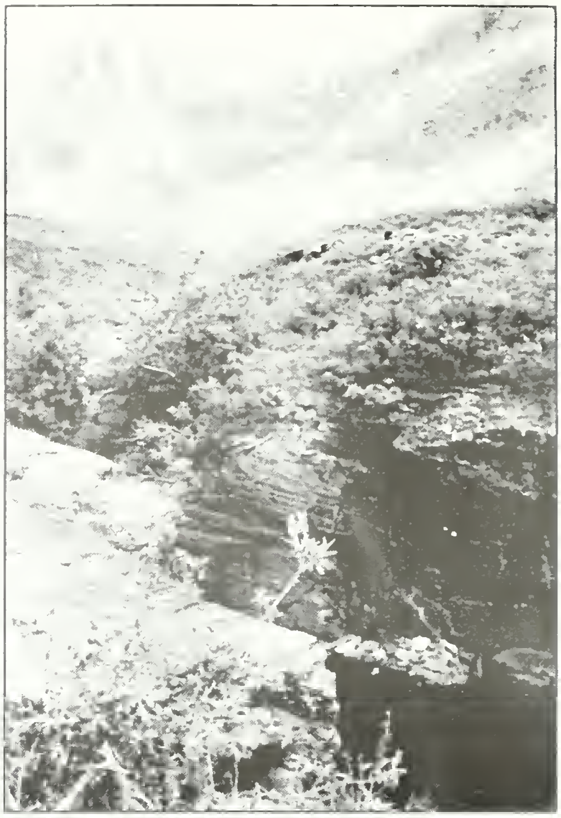


Figure 5.22. Comparison of historical (circa 1911) and present day (1997) views of the site of a boomer dam on Golconda Creek, taken from site XMC-119. Although the boomer dam has gone, the surrounding terrain is remarkably well preserved, save for a slight increase in vegetation cover (source: figure left: Moffit Collection, 508; figure right: photo by author, MTU #26978-24).

likely site for the dam (where Standard Creek exits a small gorge) is found close to the upper terminus of the ditch line. The ditch (now dry) employs both artificially constructed and natural channels along its course. Vegetation almost entirely obscures some sections of the ditch line.

The second ditch begins approximately 70 feet east of the junction between Standard Creek and Golconda Creek. Possibly constructed by John Van Iderstein in 1912, the ditch line follows an artificial channel and runs 1,000 feet south, terminating at the east bank of XMC-119.[9] Similar to the mile-long ditch, this ditch does not currently convey water and is also heavily overgrown with scrub vegetation.

Several small streams south of XMC-119 on the east side of the valley appear to have received cultural modification. This includes straight-sided sections bounded by low banks and cuts occasionally employed to channel water across hillside slopes. Such alterations provide further evidence of the measures employed by placer miners to convey water to work sites.

Little evidence remains of boomer dams once operating in the district. The location of one site (XMC-119) is, however, readily identifiable from historic photographs (figure 5.22). A wooden beam found on a gravel bar one-quarter mile south of the site may be part of a lever arm, although placer operators could equally have salvaged the beam from the debris of the Lucky Girl Mill or Golconda Creek bridge. The poor survival of boomer dams is a likely reflection of timber reuse as well as damage by floods. Given that boomer dams often operated with an automatic trigger mechanism, the wear of parts undoubtedly contributed to their eventual destruction as well.

Lode Mining Landscape

Constructed water features in the lode mining landscape are associated with workplaces and habitation sites and provided for power and a domestic water supply. All currently recorded features lie near the valley floor.

The hydroelectric system (XMC-352) constructed by the Bremner Gold Mining Company on Power Creek (located west of the powerhouse in the main camp) to supply power to the mill, camp, and mines remains in good condition (figures 5.23 and 5.24). A water storage dam, approximately 100-feet long, resides at the head of Power Creek. Although in highly dilapidated condition, remnants of the dam indicate it was wood-faced and rock-filled. Picks and shovels scattered about the site associate directly with dam construction and repair events. Approximately 1,000 feet to the east, a 35-foot long wood crib diversion dam redirected water into a 600-foot long ditch. Although the dam remains in good structural condition, the raised wooden flume connecting the dam to the ditch has entirely collapsed. The ditch line follows a hillside cut (three-feet wide and four-feet deep) with an earthen berm on the east side. Stone walls line the ditch at the eastern end. At the east terminus, the ditch turns sharply to face the penstock. A flume or pipe likely connected the ditch to the penstock, but no surface remains exist. The wooden penstock (7' by 7') remains in good condition. A 1,500-foot long tapered metal pipe, composed of sections of three-foot long metal plates (two plates making the circumference), leads from the east side of the penstock down to the powerhouse in the main camp. Numerous repairs to the pipe section can be seen along its length. Almost all of the wooden trestles employed to raise the pipeline off the ground have collapsed.

The water supply system at the Lucky Girl Mill (XMC-104) remains in fair condition (figure 5.25). Slides have removed the 5,000-gallon water tank formerly residing west of the mill, but the rest of the water system is largely intact. Ditch

Figure 5.23. Remnants of the storage dam at the head of Power Creek, looking north, with glacial lake at photo left. Photo by author, MTU #BL-2.2.97.

Figure 5.24. Lower section of the hydroelectric power system (XMC-352) developed by the Bremner Gold Mining Company in 1934-1935. View looking from the hillside ditch toward the penstock. Photo by author, MTU #BL-2.9.97.

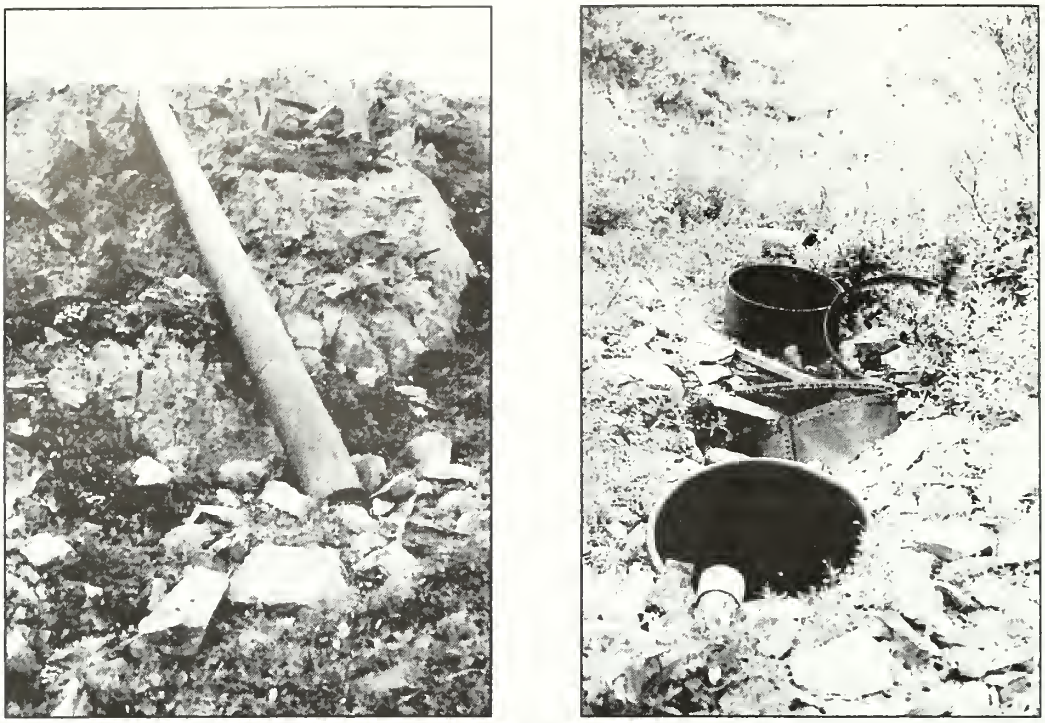


Figure 5.25. Remnants of the mill water supply system. The metal pipe (left) channeled water from a tributary stream into a shallow ditch, which transported water to settling tanks (right) located outside the No. 2 Adit. Photos by author. MTU #BL-4.1.98; #26978-4.

lines west and east of the mill connect streamlets to three settling drums positioned outside the No. 2 Adit. A pipeline exiting the lowest drum connects to a drum above the compressor shed, from which pipes brought water to the mill storage tank and a pump in the compressor shed.

Remnants of domestic water supply systems at the lode mining camps are generally in poor condition. At the Bremner Mining Camp (XMC-111), a water pipe to Golconda Creek is extant, although the only remnants of the water tower comprise a few of the corner posts. Pipeline routes delivering water to buildings in the Yellow Band Gold Mines camp (XMC-105) and Yellow Band camp (XMC-118) have been greatly disturbed, with large sections of pipelines removed. Most damages likely relate to the salvaging and reuse of equipment from the 1930s to the abandonment of Yelinore Inc. operations in the 1960s.

Water features constructed to divert water away from sites are also evidenced in the lode mining landscape. At least eight road culverts span small streams along truck roads connecting the Yellow Band and Sheriff mines to the Lucky Girl Mill. Constructed of wood or stone, culverts tend to be in poor to fair condition. Many, however, are still functional. At the pass saddle, water ditches at the site of the Bremner Gold Mining Company airstrip (XMC-121) indicate measures to create firmer ground conditions. These ditches parallel both sides of the airstrip, leading water south to the headwaters of Golconda Creek.

Circulation

Placer Mining Landscape

The placer landscape retains few remnants of historic transportation systems. An airstrip (XMC-353) possibly associated with placer mining operations in the 1930s is located alongside the east bank of Golconda Creek, just south of its confluence with Standard Creek. The strip is approximately 450 feet long, considerably rutted, and overgrown with vegetation (figure 5.26).

Figure 5.26. Airstrip (XMC-353) located south of Standard Creek, in use for a brief period in the early-1930s. View looking south toward the Bremner River valley. Photo by Patrick Martin, MTU #BP-6.1.98.

At least two vehicle trails currently exist in the placer mining landscape. One trail between the 1939 airstrip and Standard Creek provides easy pedestrian access to the placer sites. The trail, probably supporting placer mining operations in the 1970s and 1980s, is in fair condition with the courses of a few streams south of the Yellow Band camp blurring the road's definition. A second tractor trail on the west bank of Golconda Creek (passing through site XMC-350) is considerably more ephemeral and possibly connected placer bars with the airstrip to supplement the working of claims in the 1970s to 1980s. The growth of scrub vegetation obscures all but a few sections of the trail.

A foot trail on the west bank of Golconda Creek connects the mouth of Standard Creek with placer workings at XMC-119 as well as the modern cabin scatter, located farther south. This probably formed during the reworking of deposits in the 1970s and 1980s, although it conceivably followed an earlier miners' trail.

Other indications of former circulation in the placer landscape include an overgrown sled trail on the east bank of Golconda Creek. The only visible section of this trail passes beside site XBG-135. Animal trails lead through the scrub in the southern part of the Bremner District, but their changeability suggests they do not follow historic routes.

Lode Mining Landscape

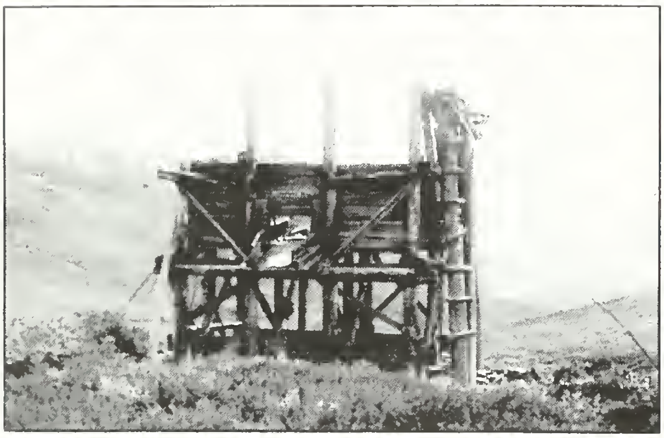
Historic circulation networks have left substantial imprints on the lode mining landscape, including measures to facilitate the transportation of ore, supplies, and workers. Although many features lie in poor structural condition, they are still readily discernible and retain high integrity.

Remnants of the Grand Prize double-reversible gravity tramway (XMC-115) lie in fair to poor condition. The upper terminal, extending outward from and beneath the bunkhouse, includes a cable sheave and brake drum, as well as an ore bucket (figure 5.27). Slides have removed almost all evidence of the lower tram terminus except for a concrete foundation and overburden dump. Towers on the tram line collapsed after cable slackening by the National Park Service in the mid-1990s.

Only insubstantial pieces of the tramway once connecting the Grand Prize Mine's lower tram terminus to the Lucky Girl Mill have been preserved. This includes sections of board, timber, and metal tram parts thinly dispersed over the valley floor east and south of the lower tram terminus.

The Yellow Band Mine aerial tramway (XMC-107) lies in fair condition. Remnants of a stub tram once connecting the adit on the Killian vein with the loading station comprise a 10-foot long section of cable attached to a rock near the adit entrance. The upper ore bunker (approximately 14' by 8'6"), constructed of pole framing and dimensional lumber, is partially collapsed from the weight of snow loads (figure 5.27). A telephone box is fixed to the upper end of the loading station. Tram towers between the mine and the lower tram terminus collapsed from slackening of tram cables by the National Park Service in the 1990s, although the line of the tramway can still be ascertained. The lower tram terminus (12' by 9'6" and 17' high), positioned on a small knoll southeast of the Yellow Band camp, remains in good condition (figure 5.27). Similar to the upper






AERIAL TRAMWAYS IN THE BREMNER HISTORIC DISTRICT

Figure 5.27.

Upper left: Upper tram terminal at the Grand Prize Mine, with ore bucket in foreground. Photo by author, MTU #BL-7.5.97.

Upper right: Upper tram terminus and ore bunker at the Yellow Band Mine. Photo by Patrick Martin, MTU #BL-10.16.98.

Center left: Lower tram terminus and ore bunker of the Yellow Band Mine. The ore chute at photo center facilitated the dumping of ore into a dump truck. Photo by author, MTU #BL-10.3.98.

Bottom left: Lower terminal of the Sheriff Mine, looking east. Photo by author, MTU #BL-8.6.97.

terminus, the structure is pole-framed with dimensional lumber used for constructing the ore bin. The slanted floor of the ore bin is surfaced with flattened drums and galvanized tin, facilitating the transfer of ore to the dump truck.

The aerial tramway system installed for the Sheriff Mine (XMC-106) remains in fair to poor condition. The upper tram terminus (12'6" by 12'6") lies southwest and below the level of the Cliff House. While in poor structural condition, all machinery remains intact. The lower tram terminus and orebunker, rebuilt in 1940 with a rock-filled base, is in fair condition (figure 5.27). Although all tram towers have collapsed, fallen cables still connect the upper and lower mine terminals and indicate the general route of the tramway. All tram towers are constructed of wood with one exception, a tram tower near the

Figure 5.28. Site of the Bremner Gold Mining Company airstrip (XMC-121) constructed in the early-1930s. The landing area runs diagonally from center left to right. Photo by author, MTU #BL-12.7.97.

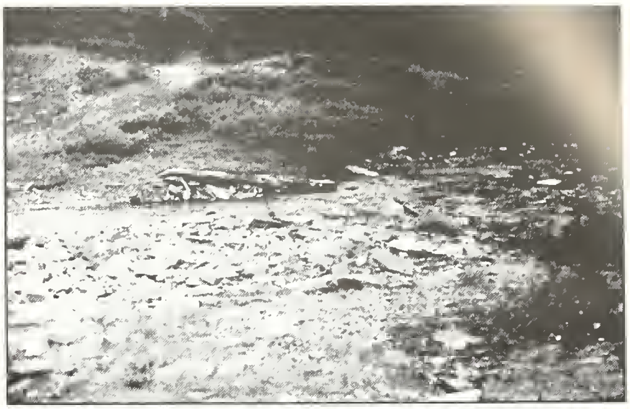


Figure 5.29. Remnants of a low wooden bridge (center) over Golconda Creek on the Yellow Band-Mill road. Yellow Band Gold Mines camp buildings are visible in the background at right. Photo by author, MTU #BL-12.3.98.

west scarp of the rock glacier made from bundled pipe sections, possibly salvaged from the main camp water system. Its jerry-built construction, coupled with the presence of aluminum pulleys, and obvious use of salvaged parts indicate a second tramway was in use after the Yellow Band Gold Mines, probably erected by Yelinore Inc.

An airstrip (XMC-121), constructed in the district in 1935 by the Bremner Gold Mining Company (and now disused), is located at the saddle of the Bremner pass (figure 5.28). The airfield is swampy, in keeping with the historical condition of the site (as drainage ditches either side of the strip testify). A second airstrip (XMC-122), completed by the Yellow Band Gold Mines Inc. and the Alaska Road Commission in 1939 (still in use), occupies a gravel terrace close to the flanks of Yellow Band Mine. A cabin site located just north of the airstrip may have served a storage function.

Three roads associated with lode-mining activities traverse the north portion of the Bremner District. Two truck roads, constructed in 1938 and 1939, enabled the transfer of ore to the concentration mill. Both roads are ditched and graveled for their entire length. Beginning at the lower tram terminus of the Yellow Band Mine, the Yellow Band-Mill road passes alongside the 1939 airstrip and main camp, reaching the top of the mill after a switchback. At the mill terminus, the road widens from nine feet to 21 feet. This may indicate the existence of a supporting deck above the mill allowing the truck to dump ore directly into an ore bin. A turning bay located several hundred feet east of the mill enabled the ore truck to approach the mill in reverse. Along the length of the road, at least eight culverts cross small streams. More substantial bridges were likely constructed in three places along the road to span larger streams and gullies. None currently survives, but the remnants of a low bridge over Golconda Creek lie south of the crossing site (figure 5.29). Scrub vegetation currently encroaches on the mill road, particularly in patches north of the airstrip and north of the main camp (figure 5.30). The road generally remains dry, with some boggy patches where culverts have been blocked.

The Sheriff-Mill road connects the lower tram terminus of the Sheriff Mine with the Yellow Band-Mill road at the site of the Golconda Creek bridge. The stretch of road between Golconda Creek and the floor of the hanging valley below the Sheriff Mine includes two switchbacks and one road culvert. This road remains in good condition, except for the encroachment of scrub vegetation near Golconda Creek terminus.

A tractor road, constructed by the Alaska Road Commission between 1939 and 1941, branches from the mill road at a point north of the main camp and terminates at Monahan Creek. The road is graveled for some of its length and

Figure 5.30. Section of Yellow Band-Mill road north of airstrip showing overgrowth by willow shrubs. Photo by author, MTU #BL-12.2.98.

includes bank cuts and a switchback near its Monahan Creek terminus. Near the saddle, the tractor road passes through the Bremner Mining Company campsite (XMC-111), indicating that sections of the road were probably formed earlier. Scrub vegetation obscures the road in two main areas, between the pass saddle and mill road, and north of the lake at the mouth of Pocket Creek.

In addition to the ore and logging roads, small road sections connect buildings in the main camp, and remnants of bulldozer trails extend from bottom of the mill to the mill road and from the Bremner Mining Camp to the Grand Prize lower terminus. The region south of the saddle is also bisected with portions of bulldozer and sled trails of uncertain vintage.

Historic trails to mine sites have been almost entirely obliterated by slides. Small sections of trail can still be seen en route to the Yellow Band and Sheriff mines, but are only visible at a short distance. Trail sections are approximately two feet wide, formed by excavating a cut in the talus slope to create the terrace.

Current visitor circulation on the valley floor generally conforms to historic systems. Roads are followed except where dense patches of vegetation encourage detours. In a few of these places, primarily on the Yellow Band-Mill road, modern trails are in the process of leaving a visible imprint. Visitor circulation to the mine sites does not conform to historic routes given the near total loss of historic trails. The looseness of scree slopes generally covers footprints, and no organized routes have formed.

Small-Scale Features

Placer Mining Landscape

Except for artifacts and equipment found in the immediate vicinity of workplaces, the placer landscape is largely devoid of small-scale features. A gas can, riffle box, and post (unknown function) are located approximately 120 feet from the northern end of the airstrip south of Standard Creek.

A dispersed artifact scatter (XMC-350) approximately one-and-one-half miles northwest of the mouth of Standard Creek includes a collapsed rock cairn, a metal pipe rammed into the ground, and the remnants of a small sled. Two rock cairns are located near the Golconda Mining Company camp (XBG-135) in the lower portion of the Bremner Historic District. Both the cairns and the metal pipe likely served as boundary markers for placer claims.

Lode Mining Landscape

In addition to small-scale features associated with sites (including sleds, vehicles, and artifact scatters) the lode mining landscape includes nearly 90 features not directly associated with sites. The remnants of 44 power poles (one still standing) and two pole bases indicate the routes of former powerlines on the valley floor from the powerhouse to the main camp, Lucky Girl Mill, Bremner Gold Mining Camp, and Sheriff Mine lower tram terminus.

Figure 5.31. Rock cairns located north of Bremner Pass. Both photos by author. MTU #26975-5; BL-13.3.97.

Approximately 30 rock cairns still stand in the district, with the majority found north of the main camp (figure 5.31). The rock cairns range between two to three feet tall and three to four feet in diameter, identical to those in the placer landscape. Other small scale features include two sleds (one by the Bremner Gold Mining Company airstrip and the other near the collapsed transformer shed by the Sheriff Mine lower tram terminal) and a scatter of three roughly fashioned skis (made from 2" by 4" planks with attached metal points) near the mouth of Pocket Creek.

Additional Considerations

The potential for finding additional sites associated with mining activities in the Bremner Historic District is high. Prospectors and speculators undoubtedly tested and staked placer claims along the entire length of Golconda Creek, and prospectors probably scoured the district for payable quartz seams. With the excellent integrity of sites so far recorded in the Bremner District, it is likely that many of these sites still survive. No lode prospecting sites are currently recorded, but four historically known sites, the Clyde Brown and Dieterlie claims, the LeTendre prospect, Red Slide, and workings on the Meloy Lead, could be located.

Two recorded habitation sites lie immediately outside National Register boundaries. A tent frame (XMC-349) is located on the east bank of former Gillis Creek, approximately one-half mile downstream from its head. Remnants of wooden flooring demarcate a foundation approximately 16 feet by 23 feet. While the structural condition is poor, this site has high archaeological integrity, and a number of artifacts, including kitchenware and tableware, are scattered nearby.

A cabin (XMC-117) is located 2,000 feet south of the confluence of the unnamed creek and Monahan Creek at the termination of the Alaska Road Commission road from the pass saddle. Built by the Bremner Gold Mining Company, this cabin (14'4" by 11'6") served as a way station for summer road construction, logging, and supply crews in the 1930s and 1940s (figure 5.32). The cabin remains in fair structural condition, with part of

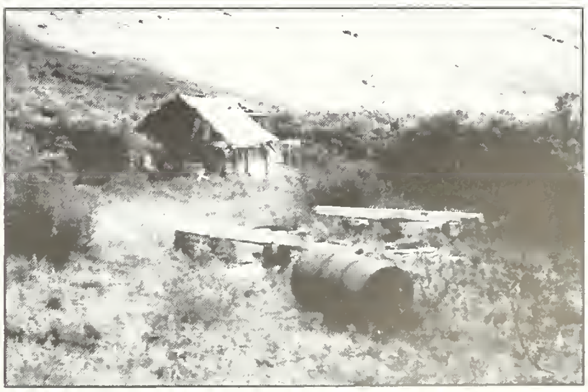


Figure 5.32. Cabin site (XMC-117) on Monahan Creek near the terminus of the Monahan Creek road. A well-preserved freight sled is visible in the foreground. Photo by author. MTU #26975-7.

the roof having collapsed. The building is constructed of sawed boards (some stamped B.G.M.C.) over a canvas frame, the roof of the tent being sided with tin. Archaeologically, the site retains considerable integrity. Cabin furnishings include two bunks (one folded flat), a wood stove, kitchenware, and tableware. Two additional folded bunks are propped against the outside wall of the cabin. Empty drums and a well-preserved freight sled lie a short distance outside the cabin. Small-scale features between the recorded tent and cabin sites include a rock cairn, probably marking a placer claim boundary and a heavily deteriorated freight sled, located down the hillside from the switchback above the Monahan Creek cabin.

The Alaska Road Commission road near the Monahan Creek remains in fair condition, with patches of dense scrub obscuring the path of the road almost entirely. At the terminus of the road, a tractor trail continues north up the west side of Monahan Creek toward timber cutting lands and McCarthy. The site of a cabin (presently unrecorded) lies approximately five miles along the tractor trail, near the mouth of Monahan Creek. From the air, a Caterpillar tractor, in all likelihood the second tractor owned by the Bremner Mining Company and Yellow Band Gold Mines, is visible outside the cabin. In addition to the tractor trail, two foot-trails, possibly associated with placer mining activity, lead south and east of XMC-117, but are heavily overgrown.

Summary

The Bremner Historic District exhibits remarkable aboveground preservation of two mining landscapes developed from the early-twentieth century. Viewed as a total unit, the Bremner District preserves almost all facets of mining operations—including workplaces, base camps, transportation, power and water conveyance systems, and refuse areas—as well as considerable variety within each form.

At a more specific level, the preservation of extant structures varies from good to poor. The primary disturbances to structures have occurred from snow slides and animals, which is in some cases severe. Other damages, such as vegetation growth and snow weights, also weaken structural preservation. The cheap construction of most structures in the district exacerbates the effect of damaging agents.

Workplaces in the placer and lode mining landscapes have sustained damages from rock falls, snow slides, and flooding. Nevertheless, site preservation is high, and most sites show indicate their extent and/or technologies employed to work them.

As sites have generally degraded of their own accord, the integrity of archaeological sites, including the locations of once existing structures, remains very high. Both isolation and the alpine environment have benefited the preservation of a wide range of portable artifacts associated with daily operations, extending from equipment used in prospecting and developing prospects to the preservation of dried foodstuffs, clothing, and personal items. Recent human impacts to sites are presently minimal, but may constitute a significant threat in the near future if visitor numbers increase, or the scale of recreational mining becomes more extensive.

CHAPTER V: ENDNOTES

[1]Newspaper accounts record the location of coarse gold at Shovel Creek and a stampede to the mouth of Golconda Creek in 1902. "The Bremner," *Valdez News* (12 July 1902); "More News From Bremner," *Valdez News* (16 August 1902).

[2]Reworking, for example, could follow old sluice lines, modify them slightly, or obliterate them altogether. Instances of contemporaneous techniques include the later use of mechanized machinery, such as bulldozers and backhoes, to support sluicing or hydraulicking operations. Some recent efforts to develop archaeological typologies for placer mining sites include Barry McGowan "The Typology and Techniques of Alluvial Mining: The Example of the Shoalhaven and Mongarlowe Goldfields in Southern New South Wales," in *Australasian Historical Archaeology*, vol. 14 (1996), 34-45; Logan Hovis, *Historic Mining Sites: A Typology for the Alaskan National Parks*, draft manuscript 31 January 1992; Judy D. Tordoff, *The Evolution of California's Placer Mining Landscape*, paper delivered at Society for Historical Archaeology conference 1996.

[3]Barry McGowan ["The Typology and Techniques of Alluvial Mining" (see n. 2)] argues the meticulous arrangement of tailing mounds on Bob's Creek in the Mongarlowe goldfield, New South Wales, Australia, implied the presence of Chinese workers. Historically, Chinese were often relegated to the reworking of gravels or working ground considered too poor to be payable.

[4]B. D. Stewart (*Mining Investigations and Mine Inspection in Alaska, Biennium Ending March 31, 1933*) mentions Fred Tagstadt working on Golconda Creek about 3-1/2 miles below the head and 1 mile above Standard Creek.

[5]The *Valdez News* (12 July 1902 and 12 August 1902) noted John Van Iderstein and his partner Butler worked Number 4 Above Discovery on Golconda Creek. The workings, reported as a "high bar and bench deposit similar to west limit benches further upstream on Standard Creek," is similar to site XMC-119.

[6]The mine inspector's report for 1936 notes one of the raises in the Number 2 adit broke through to the surface. Refer J. C. Roehm, *Preliminary Report of Bremner Mining Company, Hanagita-Bremner Mining District, August 14, 1936*, (U.S. Bureau of Mines Microfilm Records 5, 7, ARL), 3.

[7]Logan Hovis, personal communication, 1998. National Park Service staff conducted this survey in July 1998 to gather information preparatory to proposed adit closures.

[8]These workings on the Meloy vein were not visited during the 1997 or 1998 existing conditions survey.

[9]The *Chitina Leader* (1 March 1912) mentions in 1912 that Johnny Variderstein [sic] finished a ditch and brought water to his claims. Although it did not specify the location of the site, this has elsewhere been postulated as the Maze site.

Chapter VI: Analysis

Introduction

This chapter reviews landscape elements identified in the existing conditions survey in terms of historical and current conditions which define the Bremner Historic District's cultural landscape. This section also highlights current threats to landscape integrity for consideration in the district's management.

Response to Natural Features

Placer Mining Landscape

The dependence on natural systems and features exerted a major influence on the development and operation of placer mines in the Bremner District.

The presence of ore was of central importance to the formation of the mining landscape, albeit the location of placer workplaces derived less from the physical location of gold-bearing veins than from the sites of their secondary deposition. In the Bremner District, glacial and alluvial erosion redeposited gold among gravels primarily along the central section of Golconda Creek near its confluence with Standard Creek. Mining concentrated in this area within the first year of the district's discovery. The gradual impoverishment of placer gravels brought changes in mining techniques to permit profitable extraction. New techniques typically allowed the working of placer deposits at greater scales. All recorded placer sites in the Bremner District indicate, through features and artifacts, the application of more than one mining technique to work deposits.

Water not only performed a critical role in the formation of deposits, but in their working as well. The use of water in sluicing operations enabled miners to separate gold from gravels and remove waste from work sites. Prospectors adapted to the frequent occurrence of low water levels by constructing water systems (including dams and ditches) to supplement supply. In designing the layout of ditches and flumes, placer miners paid close attention to the local topography and natural hydrological drainages. Occasional high water volumes inhibited the working of deposits by flooding gravel bars and, in some instances, damaging mining equipment. Prospectors who worked creek placers could do little to mitigate this except to temporarily abandon their workings and prospect other areas.
All placer sites in the Bremner District retain evidence of water conveyance systems -principally as channels and ditches cut through the worked bar. The concentration of water conveyance features at site XMC-119, including a ditch from Standard Creek and the site of a boomer dam, are indicative of the range of techniques employed in the district to control and direct water.

Climatic conditions affected the duration of mining activity. The lack of running water for sluicing operations from late-fall to early-spring, coupled with low winter temperatures, limited the working of deposits to a four to five month season each year. The seasonality of work in the district is reflected, in part, by the lack of permanent accommodations throughout the placer landscape. Miners, nevertheless, proved remarkably adaptive to the restrictions imposed by climate, and placer operations in Alaska were still year-long activities. Prospectors brought food supplies to last them the entire working season and distributed tasks on a seasonal basis. The presence of sleds at placer habitation sites (namely XBG-135 and XMC-119) suggests the activity of placer miners during the off season and early Spring.

Timber stands near the mouths of Golconda and Monahan Creeks supplied wood for the construction of equipment (sluice boxes), supporting infrastructure (flumes and dams), and campsites (tent frames). Vegetation cleared from habitation areas, workplaces, and trails included dense thickets of willow and alder. This wood likely provided little utility to prospectors except as a fuel source and that its removal reduced insect numbers. Regrowth has obscured historically cleared areas, and the full extent of clearings has become indistinguishable.

Despite the best efforts of miners, the overall remoteness of the Bremner District kept operations at a small-scale. Consequently, placer mining did not significantly alter the character of the physical environment.

Lode Mining Landscape

Natural conditions had major impacts on the location and technology of lode mining in the Bremner District. The working of lode deposits required close attention to local geology. In the Bremner District, veins carrying gold in payable quantities were located in the north half of the district at a wide range of elevations (from 100 to 2,000 feet above the valley floor). The difficult accessibility of most developed locations prompted the use of aerial tramways for the transportation of ore, supplies, and miners. Although the topography raised development costs, mining infrastructure was well adapted to run effectively under these conditions. The mill and aerial tramways employed gravity as a motive force, a common mining adaptation to rugged environments—and indeed practiced elsewhere in the Wrangell region.

The location of mine sites and mining infrastructure on steep hillsides exposed them to frequent slide damage. Lode mining companies mitigated this with some success by extending building rooflines to cliff faces and constructing snow sheds, albeit few examples survive. (figure 6.1).

Water played a vital role in the district's lode mining operations. Snowmelt provided water for general operations, such as milling and domestic use. Companies also tapped water for a hydroelectric power system. While this reduced running costs, operations were susceptible to water availability. Unlike other locations in the region, lode mining in the Bremner District ceased during the winter months. Lode mining operations adapted to climatic conditions by allocating seasonal tasks, both the Bremner Gold Mining Company and the Yellow Band Gold Mines using the winter months to freight supplies, procure timber, and prepare facilities for the next season.

Figure 6.1. Few measures could lessen the destructive force of large slides. The compressor room at the Lucky Girl Mine has lost much of its structural integrity, although the extended roofline, covering dead space between the back wall of the building and the cliff face remains intact. Photo by Patrick Martin, MTU #BL-3.9.98.

Remnants of water systems at domestic sites and industrial workplaces are largely intact. Ditches and other water conveyance methods comprising the hydroelectric (XMC-352) and mill water (XMC-104) systems, while no longer operational, are easily discernable.

Vegetation in the lode mining landscape generally consisted of alpine tundra and mosses, of little application to operations or subsistence. Alder and willow shrubs in close proximity to the north and south of the pass saddle probably were used for fuel, and also provided a habitat for ptarmigan, an emergency food supply. From the early-1930s, lode mining companies exploited timberlands near the mouth of Monahan Creek for the construction of buildings, dams, tramways, and underground supports.

As with placer mining, the remoteness of the Bremner District kept operations at a small scale. Present conditions indicate lode mining operations caused only minimal impacts to the physical environment. The natural hazards that lode prospectors endeavored to overcome are readily apparent and continue to pose significant threats to the survival of lode mining sites.

Spatial Organization

Placer Mining Landscape

Placer mining in the Bremner District formed a linear landscape with semi-dependent nodes of activity. Mining involved the close juxtaposition of four principal components: workplaces, constructed water features, habitation sites, and circulation networks (figure 6.2).

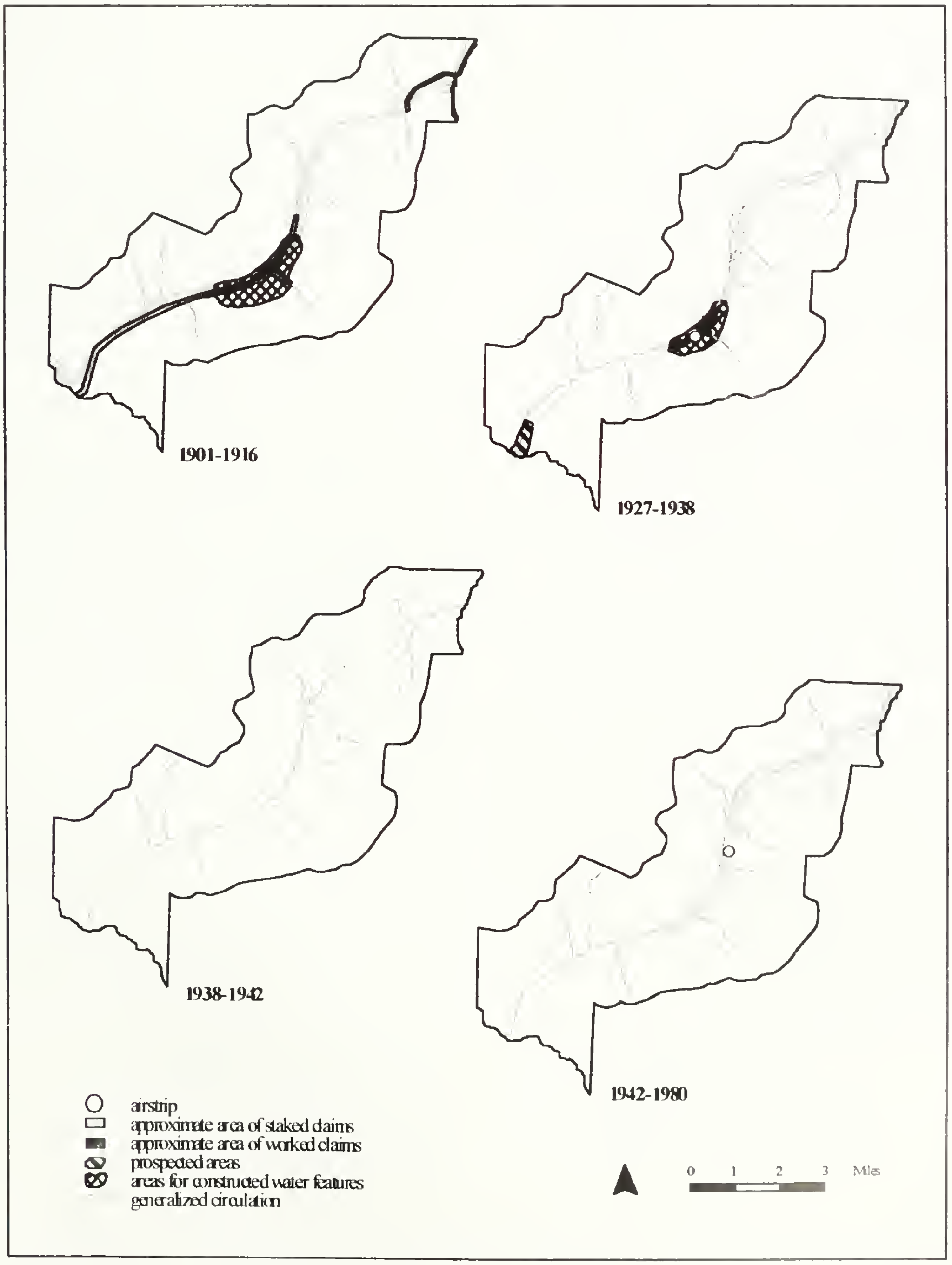


Figure 6.2. Spatial organization of the placer mining landscape and change through significant historic periods.

Mining operations paralleled streams since alluvial processes had concentrated gold into paystreaks on the valley floor, and also that water had significant application for the working of deposits. Constructed water features occurred near claims, with most systems modifying pre-existing hydrological drainages. Miners located habitation sites close to workplaces, in part, because of the convenient location of water for domestic use, but principally because the working of deposits comprised the sole reason for settlement in the area. In addition, the close positioning of campsites and workplaces probably served as a visual reminder of claim ownership and as a security measure against the pillage of gold from sluice boxes. Individual nodes of activity were possibly linked to other workplaces by the sharing of constructed water systems, but also through circulation networks (trails) connecting workplaces along the lengths of streams. In areas that remained unprospected or little worked, trails followed the valley floor where the grade proved easier.

The close juxtaposition of placer mining elements is particularly evident at site XMC-119. Here, in addition to the proximity of habitation and work areas, miners may have tapped water conveyance systems (the mile-long ditch) designed to supply other sites. Conversely, site XBG-135 exhibits greater separation between habitation and work areas, perhaps reflective of a larger number of claims worked concurrently along Golconda Creek.

The fundamental organization of the landscape did not change significantly through time, except in terms of scale. From the late 1920s, placer operations may have been supplemented by air transportation, benefiting from the needs of lode mining operations in the northern part of the valley. Placer operators in both periods probably continued to use winter haul roads for the transportation of heavy equipment.

The spatial organization of the placer landscape is evident archaeologically by the preservation of workplaces, habitation sites, and constructed water features. Circulation, particularly in the southern part of the district has degraded, and in some places been entirely lost, from the encroachment of vegetation.

Lode Mining Landscape

Lode mining activities in the Bremner District were spatially organized to accommodate the extraction, transportation, storage, and processing of ore. Lode mining focused on the development of four ore bodies, located on both sides of the valley. Three of the prospects were relatively inaccessible, positioned almost 2,000 feet above the valley floor. As one consequence of the geographic separation of ore bodies from the valley floor, the organization of the lode mining landscape differed substantially from that generated by placer mining activities (figure 6.3).

The distance between the mines and the valley floor, and the distance of operations from transportation networks in the Chitina Valley, influenced the construction of three forms of accommodation.

Base camps were positioned in locations central to operations. Prime considerations in locating camps were access to valley circulation networks (including proximity to aviation fields) and mine workings. Although miners in the Bremner District later petitioned for the full development of one airstrip central to both placer and lode operations, landing fields in the early-1930s were cleared in areas close to individual operations (the Bremner Gold Mining Company airstrip located at the pass saddle and an airstrip constructed south of Standard Creek to supplement placer operations or lode prospecting). The importance of centrality is well reflected by the movement of the Bremner Gold Mining Company camp in 1939 one mile south to serve as the Yellow Band Gold Mines headquarters. The integrity of core areas in the Bremner District is well preserved for the Yellow Band group, Bremner Gold Mining Company, and Yellow Band Gold Mines. Standing structures at XMC-105 make the core-periphery landscape of the Yellow Band Gold Mines most amenable to public interpretation.

Camps constructed at mine locations were somewhat independent of core areas, and included cooking, sleeping, and dry-room facilities (the best example of this occurring at the Sheriff Mine upper camp, where a camp cook was also hired). These facilities enabled miners to work for almost the entire season at the mine site.

Way stations comprised a third accommodation type developed in the lode mining landscape. Road camps were positioned on trails out of the district to accommodate supply haulage and timber cutting activities at the beginning and close of the open season. Site XMC-117 is the most easily accessible of three way stations constructed on Monahan Creek. Although the cabin remains standing, the growth of vegetation around the site has concealed the historic haul road and ob-

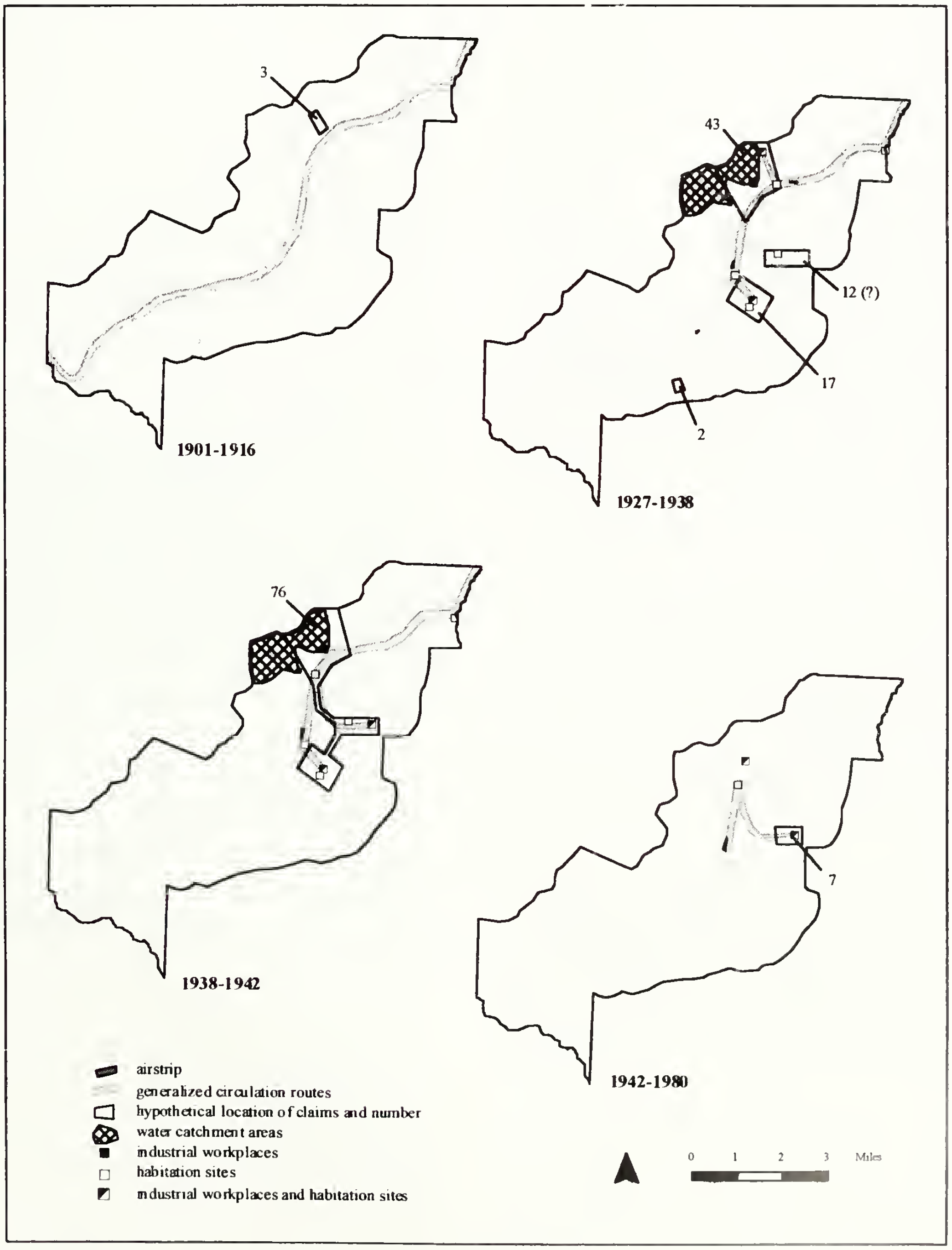


Figure 6.3. Spatial organization of the lode mining landscape, showing development through significant periods.

scured the purpose of the structure.

Water availability proved critical to the duration of lode mining activities, but its physical location did not elicit the same influence on landscape development as it did on placer mining. Rather, water tapped for power generation was converted to electricity at the power site and conveyed to workplaces and campsites up to two miles distant by powerlines. Components of the power conveyance systems are in good condition, although the felling of power poles during salvage activities in the 1960s and 1970s has limited the visibility of the actual system.

Along with workplaces, circulation played the most critical factor in the organization of the lode mining landscape. Circulation networks initially followed placer trails on the valley floor, but the original routes became modified by the construction of permanent roads and tractor trails, and somewhat later usurped by the large dependence on aerial transportation. As a system, the circulation patterns of the lode mining landscape are clearly evident on the landscape, albeit vegetation growth and slides have made the condition of certain stretches variable.

Visitor movement conforms to historic landscape patterns. The airstrip in current use is the same one used by miners from the early 1930s to 1940s, historic roads and trails are used to access sites, and the Yellow Band Gold Mines camp also supports occasional use for accommodations.

Industrial Workplaces

Placer Mining Landscape

Prospectors have worked placer deposits in the Bremner District intermittently from their first discovery in 1901 until today, with boom periods correlating to the Klondike Gold Rush and periods of raised gold prices.

Mining operations in the Bremner District devoted attention to the working of creek and high bar deposits, the most promising of which were situated on Golconda Creek within one-and-one-half miles of its confluence with Standard Creek. The proximity to water and greater concentration of paystreaks made creek and high bar deposits easier and more profitable to work than bench placers also examined in the district. Both creek and high bars yielded sufficient profits to support the reworking of claims in the 1930s and 1970s.

Placer miners worked separate claims individually and in small groups, but also bunched claims to increase profits. To work the claims, miners employed common techniques practiced by other enterprises in the Copper Basin, although the methods did not approach the large-scale operators in the Nizina District. This equipment was either transported into the district, constructed on site, or salvaged from prior operations. Over time, the techniques employed by placer miners changed to overcome the diminished returns of successively worked claims. In the 1901-1916 era, placer miners worked gravels by pick and shovel, ground sluicing, and booming techniques, with some attempts at hydraulicking. In the 1927-1938 period, miners employed ground sluicing methods assisted with low-pressure hydraulicking. From the 1970s, mechanized equipment, including bulldozers and backhoes, assisted operations. Current mining activity uses suction dredging methods and focuses attention on working the active bed of Golconda Creek. Throughout all these periods, the reuse of equipment and timber was likely a significant activity.

The placer mining landscape presently retains evidence of most methods historically employed to work deposits. Site XMC-119, for instance, indicates techniques of ground sluicing combined with low-pressure hydraulicking. Isolate 13 retains most evidence associated with working by mechanized equipment in the 1970s. Most features and artifacts at placer worksites represent an agglomeration of methods, not necessarily divisible into separate techniques.

For most sites, the different techniques employed, as well as the temporal development of operations, can be interpreted to some extent from the organization of tailings and limited preservation of extant equipment at workplaces and habitation sites.

The dominant threat to the integrity of workplaces derives from natural processes—principally flooding and vegetation encroachment (figure 6.4). Flooding has removed most sluice boxes and all dams from the placer landscape not salvaged or dismantled by miners. Vegetation generally encroaches upon the outskirts of gravel bars, reducing the visibility of tailing stacks, but probably affording some protection to tailings during flooding. The size and nature of artifacts and features associated with placer workplaces (such as sluice grates and rock piles), coupled with the small scale of recent mining operations, has minimized loss of integrity from looting and reworking by suction dredging.

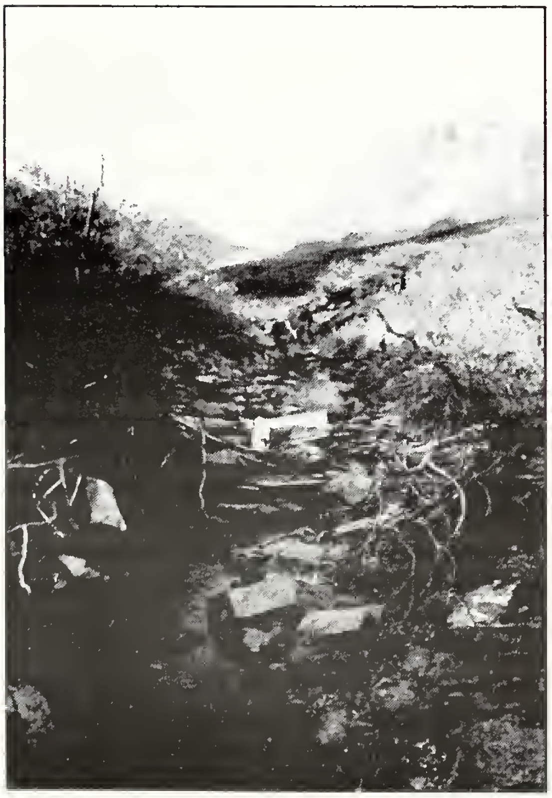


Figure 6.4. Vegetation growth, notably alder and willow, and water action are two forces gradually altering the appearance of the placer landscape. Although vegetation reduces the visibility of work sites, roots aid the stabilization of stacked and piled tailings from stream erosion. The small sluice box at photo center likely dates to the 1960s-1970s. Photo by author. MTU #BP-1.2.97.

Lode Mining Landscape

Although prospectors often staked lode claims in the early-twentieth century, gold lodes in Alaska did not receive much attention until the 1920s and 30s. Efforts to work the Bremner District's lode deposits primarily occurred between 1927 and 1942, when raised gold prices and improved transportation defrayed the high start-up costs involved in working lodes. Within that narrow period, three companies, the Bremner Gold Mining Company, Yellow Band Group, and Yellow Band Gold Mines, invested considerable energy in attempting to work deposits profitably. By 1938, the latter company consolidated all lode claims in the district. Attempts to work gold deposits effectively ended in 1942 with the passing of Limitation Order L-208. Conditions affecting the mining industry at the national scale, such as the high cost of labor after World War II, as well as difficulties in transportation at the regional and local scale, foiled attempts to restart operations, although the upkeep of the property and prospecting for new deposits did continue.

Mining practices in the Bremner District followed a standard progression of prospecting, development, and extraction. In the absence of adequate financial backing, operations required the simultaneous extraction and processing of ore to obtain enough capital for work to resume the following season. Working high-grade veins and fully processing the ore served to further reduce mining costs. Restricted finances likely encouraged the adaptive reuse of a wide range of materials, including water pipes, barrels, and motor vehicles, throughout all mining periods.

Mining and milling methods followed well-established techniques appropriate to the development of small mines. Preliminary work during the 1901-1916 period included open cuts along vein exposures, probably by hand-picking and clearing slide deposits. Mining techniques in the 1927-1938 period involved picking, hand-drilling, and compressed air drilling. The amalgamation mill constructed by the Bremner Gold Mining Company used commonly available technologies suitable for use as a start-up plant for the milling of free gold. Adaptations to the mill, such as using finer-sized screens, responded to changes in the ore body and general concerns to improve milling efficiency.

At the consolidation of operations in 1938, the Yellow Band Gold Mines continued underground development at two locations by using equipment formerly owned by the Bremner Gold Mining Company. Efforts in the 1950s by Yelinore Inc. mainly cleaned up workings at the Sheriff Mine, but did not pursue rigorous development work.

The Bremner Historic District preserves numerous aspects of lode prospecting and mining activity. A wide range of surface and underground workings at the claims (including open cuts, pits, shafts, and adits), associated buildings and infrastructure, and artifacts are evidenced at all lode mining sites. Structures associated with the working of deposits generally lie in fair to poor condition, the deterioration primarily caused by natural processes. The compressor shed and mill at the Lucky Girl Mine received substantial damage from snow slides during the 1942-1980 period, which removed most of the superstructure. Blacksmith shops at the Grand Prize and Sheriff Mines have similarly received slide damage. The layout of facilities, however, is still discernible, and archaeological integrity of lode mining workplaces remains high with numerous tools and equipment preserved.

Some underground workings are still accessible, although they are unstable and typically filled with ice a short distance from the adit portal. Instability derives partly from the character of the host rock and general deterioration of workings, but also from the detonation of explosives in hazard mitigation procedures. Two adits at the Lucky Girl vein and one adit below the Sheriff Mine have entirely collapsed, and ice and rubble effectively close one adit at the Yellow Band Mine. Open adits remain at the Sheriff, Lucky Girl, and Grand Prize Mines.

The instability of underground workings poses a significant hazard to visitors. Although explosives mitigation has been conducted at all mine sites, blasting caps and other explosives will undoubtedly be found around the workings and on open cuts as well. The liberal use of mercury throughout the milling process means that some equipment, as well as tailings located immediately below the mill, may present a potential hazard, although the small scale of operations suggests the threat is minimal.

Habitation Sites

Placer Mining Landscape

Placer mining campsites in the Bremner District were small and dispersed throughout the placer landscape. Reflecting the mobility of operations, campsites generally consisted of temporary dwellings, which enabled miners to relocate to other claims with ease.

While other placer districts in the Copper Basin supported makeshift towns, the Bremner District never generated enough attention or profits to support non-mining enterprises in the valley. Placer campsites generally consisted of one or two tents positioned in immediate proximity to the claims. At least until mid-1902, when reports of the Nizina strike drew most rushers away from the Bremner District, it is likely that prospectors erected wall tents using both pole and wood-frame methods. Prospectors who remained in the district generally formed a more established camp, including tent frames, a privy, and probably supply caches. The probable site of the Golconda Mining Company camp (XBG-135) indicates the use of tent frames partly sided with wood, a slight improvement to the warmth and durability of accommodations.

During the reworking of Golconda Creek deposits from the 1970s-1990s, placer miners constructed wood-frame cabins sided with tin. Similar in character to tent frames, these structures were small and retained a sense of impermanence.

Habitation sites currently recorded in the placer landscape include wall tents and cabins, with all cabins dating to the most recent period of placer activity. No sites of pole-erected tents are currently recorded, the temporary nature of accommodations would be unlikely to leave easily discernable surface remnants. Although habitation sites generally exhibit poor structural preservation, sites retain high archaeological integrity. Three sites (XMC-119, 351, XBG-135) include parts of tent frames (XBG-135 containing an extant frame in fair condition) and substantial discard areas. Artifacts discarded near habitation sites include furnishings, can scatters, and enamelware plates and pots (likely preferred for their lightness and durability), as well as items associated with working deposits.

Owing to the insubstantial accommodations and limited period of activity, the archaeological integrity of habitation sites in the placer landscape is fragile. Threats to sites include the general deterioration of wood by rot or by animals, snow weights, and the encroachment of scrub vegetation (figure 6.5). Campsites associated with recent prospecting activity on Golconda Creek indicate historic habitation areas may be seriously threatened by the removal of structural timbers for firewood.

Figure 6.5. The ephemeral remnants of temporary camps, such as these remains of a wall tent below the mouth of Pocket Creek, can be easily disturbed. While looting is a threat, the removed location and structural collapse common to most placer habitation sites in the district decrease the visibility of sites from established routes. Photo by author, MTU #BL-11.1.97.

Lode Mining Landscape

Habitation sites associated with lode mining operations in the Bremner District include both semi-permanent and permanent accommodations, located on the valley floor and at lode outcrops.

Tent frames found their most widespread application in the Bremner District during the prospecting and early development of claims. Tent frames not only reduced expenditure for prospecting outfits, but enabled considerable flexibility. Prospecting activities by the Yellow Band Group in 1935 included the establishment of a tent base camp on the floor of the valley and a second camp located farther up the mountainside. The relocation of the upper camp (after slides damaged an earlier camp) led to the unusual adaptation of surrounding the tent frame with piled dry-stone walls, perhaps to protect against snow loads and the exposed location. This innovation was also repeated at a campsite below the Sheriff Mine. After the construction of permanent camps, companies still supplied tents to laborers unable to be accommodated in the bunkhouse.

The Bremner Gold Mining Company constructed the first permanent accommodations in the district in 1934 and 1935. Structures in the company camp were not standardized in design, with both wood-frame and log construction methods evident. Different construction methods probably reflect the relative age of structures. Metal-sided balloon-frame buildings (powerhouse, assay shed, and bunkhouse) were, for instance, likely constructed after log structures (storage shed and mechanic shop), since they required the greater use of imported supplies and/or the establishment of a sawmill. The use of Celotex cane board insulation in the main bunkhouse, a building material widely used for permanent structures in the Copper Basin (including buildings at the Nabesna Mine), may also suggest the existence of regional design forms. The use of flattened drums for siding the storage shed also indicates discarded materials were adaptively reused for building maintenance and construction.

Accommodations at workplaces were restricted to small one- or two-roomed dwellings with basic facilities (cooking and sleeping) to support miners for the working season. These structures did receive additions, but the small-scale nature of operations and limited space at the mine sites limited the size of buildings. Base camps on the valley floor were considerably more commodious, including cooking and dining rooms and some separation of bedrooms.

Currently one tent-frame and nearly all permanent structures remain standing in the Bremner District. Although structural preservation is generally in fair to poor condition, the buildings exhibit remarkable integrity. Furnishings are still preserved, as are bedding, clothing, tools, personal possessions, cooking items, and foodstuffs. The decay of structures is accelerated most notably by the infestation of ground squirrels. Restoration efforts by the National Park Service have improved the condition of structures in the Yellow Band Gold Mines camp, although pest control is still a problem.

Constructed Water Features

Placer Mining Landscape

While natural systems and features strongly influenced the nature of operations in the Bremner District, miners employed a variety of techniques to reduce or circumvent limitations of the environment.

The manipulation of water played a significant role in the working of placer claims. The inadequate water supply of Golconda Creek led prospectors to construct drainage ditches and flumes to channel supplementary water to operations and dams to temporarily improve water velocity. Most work occurred in the 1901-1916 period. By 1904, at least one boomer dam may have operated on Golconda Creek. The working of high bar deposits necessitated the construction of water conveyance ditches, the most notable system constructed in 1911 by the Golconda Mining Company. This "mile-long ditch" utilized wooden flumes, hillside cuts, and natural tributaries. Prospectors also enhanced smaller tributaries by straightening natural courses and altering flow patterns with small hillside cuts. In the 1927-1938 and 1942-1980 periods, constructed water features were of considerably smaller in scale. These comprised wing dams, constructed of stone or sod and located near workplaces.

The working of placers also involved the construction of transitory sluices and drainage features, shifting as prospectors worked other sections of the claims. These features typically included a bedrock floor with previously worked gravels forming the sides. In the 1901-1916 and 1927-1938 periods, walls were commonly hand stacked, or stacked with the aid of monitors. In the 1942-1980 period, most drains were formed with the assistance of mechanized equipment, the drains being wider and tailing stacks less well-formed.

Constructed water features survive today in varying degrees. Evidence of dams and ditches is most abundant between the mouth of Standard Creek and site XMC-119. All dams have been destroyed, although two sites (diversion dam for the mile-long ditch and historically photographed boomer dam) are identifiable. Other dam sites can be predicted at narrow points along Golconda Creek, but the dearth of physical evidence (such as anchor holes in side walls) means only those identified with historic photographs have certainty. Water features at the workplaces themselves suggest hand-stacking, hydraulic stacking, and mechanized stacking techniques. Longer conveyance ditches, including the "mile-long ditch," can be followed for almost their entire course, the greatest change to their historical condition being caused by the overgrowth of willow and other scrub vegetation.

Lode Mining Landscape

Constructed water features appeared early in the development of the lode mining landscape. Between 1934 and 1935, the Bremner Gold Mining Company constructed a hydroelectric system to provide power to operations. This involved the construction of a storage dam, diversion dam, ditch, and pipeline system on Falls Creek, approximately one-half mile south of mine workings. Climatic conditions necessitated frequent repairs to the pipeline to stop leaks (figure 6.6). In the 1940 and 1941 seasons, the Yellow Band Gold Mines also conducted repairs to the storage dam with the intention of extending the duration of power supply.

Figure 6.6. Minor equipment repairs were a frequent occurrence at the lode mines, and circulation systems were no exception. The conveyance of water from Falls/Power Creek was particularly essential to operations given the large reliance on hydroelectric power. Repair methods were not standardized, and a variety of materials and sealing techniques were employed. Photo by author, MTU #BL-2.14.97.

In addition to building a power system, the Bremner Gold Mining Company also constructed a water supply system for the mill. This tapped two seasonal tributaries on either side of the Lucky Girl vein and conveyed the water to a mill storage tank by ditches and iron pipes. The company may also have tapped water exiting from adits to supplement supply.

The Bremner Gold Mining Company, Yellow Band Group, and Yellow Band Gold Mines tapped Golconda Creek and its tributaries to bring water to base camps. These systems were not elaborate, but used pipe sections to re-channel water to the campsite. The Bremner Gold Mining Company camp included a water tower, which necessitated the use of a mechanical pump.

Since the closure of operations in 1942, all water systems have sustained damage. The rupture of the storage dam before the late-1970s probably destroyed the wooden flumes directing water from the diversion dam into the hillside ditch. The hydroelectric system, nevertheless remains remarkably intact. The general absence of scrub vegetation is also in keeping with its historical appearance.

Slides at the Lucky Girl Mill removed the 5,000-gallon water storage tank, and the operations of Yelinore Inc. in the 1950s appear to have salvaged pipe sections from the Yellow Band Gold Mines camp for the construction of a tramway to the Sheriff Mine. Despite these damages, all water systems are still readily visible and retain good to fair integrity.

Circulation

Placer Mining Landscape

Because of the mobility involved in prospecting and the attraction of miners to un-prospected regions, placer mining, to some degree, did not initially require well-developed transportation systems. Once promising deposits were located, however, the development of trails and "opening up" of the district proved essential to reducing the overhead involved in bringing supplies to claims. Well-established trails also facilitated the movement of heavier mining equipment, such as involved with hydraulicking operations. The freighting of supplies typically occurred in winter, with frozen rivers often serving as sled routes.

Circulation in the placer landscape closely followed patterns set by the hydrological drainages of major rivers and creeks. The party that first staked claims in the Bremner District selected a route following the right banks of the North Fork of the Bremner River and Golconda Creek to the pass saddle. By 1902, however, the establishment of mining districts in the Chitina Valley prompted the abandonment of the Bremner Valley route in favor of sled/pack trails to the Nizina District and Hanagita Valley. By 1911, the trail led north from the pass saddle along the right bank of Gillis and Monahan Creeks, switching to the left bank of Monahan Creek near its mouth.[1]

As placer mining activity waned in the mid-1930s, lode mining operations probably widened the trail in the north part of the district to accommodate tractors. Lode mining activities likely influenced placer mining circulation by aiding the construction of airstrips in the district.

During the resurgence of placer activity in the 1970s and 1980s, the use of bulldozers in placer operations also aided the formation of trails. This included a trail between the main airstrip to the mouth of Standard Creek and possibly a second route along Golconda Creek's right bank.

Except for the relatively modern trail connecting to Standard Creek and roads built by lode mining operations, remnants of historic circulation in the placer district lie in poor condition. The site of an airstrip south of Standard Creek is considerably overgrown—in spite of its rough historical condition—with the field noticeable principally by changes in vegetation. Former sled trails are visible only in short sections close to campsites (such as at site XBG-135) and artifact scatters (XMC-350). The density of scrub vegetation in the southern section of the district indicates that the loss of historic trails is not recoverable from ground evidence alone. The poor survival of circulation routes is also a partial reflection of the low number of miners who worked the district—since no substantial roadways were constructed to link claims.

Lode Mining Landscape

The paucity of regional transportation networks proved a critical obstacle to the development of lode mines in Alaska, of which the Bremner District proved no exception. The advent of lode prospecting in the Copper Basin was closely tied with the development of the Copper River and Northwestern Railway in 1911, and the working of deposits in the 1930s and 40s intensively used local air services. While companies conducted some initial clearing of airstrips, the development of the principal and safest airstrip in the district was made possible with government funds on two occasions. Unlike the Nabesna Mine, no all-season roadway was completed to the Bremner District.

Road systems were, nevertheless, utilized to assist the movement of heavy equipment and timber into the Bremner District. Both the Bremner Gold Mining Company and Yellow Band Gold Mines used bulldozers to bring in supplies from McCarthy. By 1939, a well-established tractor road extended to the mouth of Monahan Creek, bringing mining operations within five miles of timber resources.

Within the valley, truck roads were constructed to link the base camp to the powerhouse, airstrip, and mine sites. Later, the Yellow Band Gold Mines enhanced this network to facilitate the movement of ore from mine sites on the east side of the valley to the mill. Improvements to roads included ditches on each side and a graveled surface to improve drainage. Low bridges and culverts along the roads enabled the dump truck to cross gullies and small streams with ease.

Due to the local topography, the transfer of ore from mine locations also involved the construction of aerial, gravity tramways at the Grand Prize, Yellow Band, and Sheriff Mines. Tramways doubly served to transport ore to the valley floor and to haul supplies and workers up to the mine sites.

Between 1934 and 1935, the Bremner Gold Mining Company constructed a hydroelectric power system. From the powerhouse at Falls Creek, powerlines connected to the Lucky Girl Mill, Grand Prize Mine, and Bremner Gold Mining Company camps. In 1939, additional lines were constructed to reach the Yellow Band Gold Mines camp and the Sheriff Mine. Salvage operations during the 1942-1980 period removed copper wire from the lines.

Present survival of circulation networks in the lode mining landscape is generally high, with roads and trails created in the 1927-1942 period easily discernible and presently used by visitors.

The overgrowth of vegetation along some of the roads has led to the formation of pedestrian detours. Given the delicate nature of plant communities in the pass region, these pathways could become firmly established features in the landscape.

The power system is in poor condition, with only one power pole still standing. However, as felled power poles remain in situ, the system retains high integrity and power routes are still discernible.

Small-Scale Features

Placer Mining Landscape

Small-scale features in the placer mining landscape contributed significantly to daily operations. Small-scale features contributed to circulation and, perhaps more significantly, to the division of land.

Sleds enabled the movement of supplies into the district during winter months, and their current survival serves as one indicator of the seasonality of mining tasks. The placer landscape retains five sleds, almost all in highly dilapidated condition (the best preserved example partially suspended over a cliff at XBG-135). Despite their condition, remnants of sleds indicate they were employed as dog- and horse-pulled sleds (three examples of the former). Additional indications of the use of horses for transportation also include horseshoes at the Golconda Mining Company campsite. The survival of dog sleds and horse sleds provides one measure of assessing the scale of mining operations (the former likely used by individuals or small groups).

Cairns performed an integral role in the division of mineral claims and are among the earliest cultural features in the Bremner District. Most cairns attributable to the placer landscape were built in the 1901 and 1902 seasons. Additional cairns may have been constructed in the remainder of the 1901-1916 period, as well as in the 1927-1938 period. During this time, prospectors may have also removed earlier cairns when re-configuring claim boundaries. Almost all cairns are constructed from local rock piled into a generic form (approximately three feet wide and three feet high). Stylistic variation, such as the addition of vertical slabs against the cairn sides (refer figure 5.31), probably resulted from materials on hand, but may have functioned as a means to individualize markers and aid the identification of ownership. In addition to acting as a visual marker for the discrimination of claim boundaries, one cairn per location typically stored a written description of the location.

The use of durable materials combined with simple construction have made cairns highly resistant to weathering, and almost all cairns are in good condition. Approximately 18 cairns in the Golconda Creek and Gillis Creek watersheds can be attributed with some certainty to placer claim boundaries. An additional 11 cairns in the pass region may relate either to the placer or lode mining landscape. Almost all known cairns are located in the north section of the district, where the majority of archaeological surveys have been conducted and where vegetation growth has not impeded visibility.

Lode Mining Landscape

Small-scale features in the lode mining landscape contributed significantly to circulation systems and also reflected cultural traditions and responses to natural hazards.

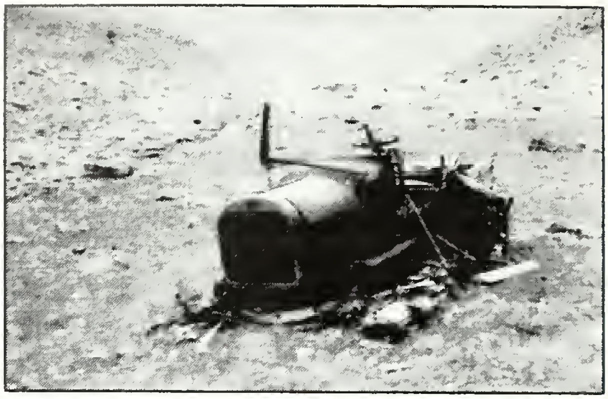
Motor vehicles performed an important function in daily operations. The Bremner Gold Mining Company and Yellow Band Gold Mines used two Caterpillar tractors for multiple applications, including hauling supplies in winter, snow clearing, and road and airstrip construction. During the 1938-1942 period, Yellow Band Gold Mines additionally employed tractors to move camp buildings and serve as a backup power source to extend the mill's operation. A dump truck transferred ore from the lower bunkers of the Yellow Band and Sheriff mines to the mill ore bin. A second truck, located at the Sheriff Mine lower complex, may have been brought in during the 1942-1980 period. Vehicles exhibit good preservation, although considerable expenditure would be required to restore any of them back to operable condition.

Sleds aided the movement of timber and supplies into the district for lode mining operations. For the most part, lode mining companies used bulldozers to pull the sleds. This also enabled the use of larger freight sleds, a number of which were jointed to allow greater maneuverability over terrain. Like the placer landscape, many sleds have deteriorated from environmental conditions. Well-preserved sleds are located in the main camp (XMC-105) and at the way station near Monahan Creek (XMC-117).

Cairns performed an identical function in the lode mining landscape as they did in the placer landscape. Perhaps as a means to distinguish lode from placer claim markers, a few cairn sites on the valley floor involved the clustering of two or three rock stacks.

Snow sheds were constructed by the Yellow Band Gold Mines to protect aerial tramways and mine structures from damage by slides. These were constructed from timber and flattened barrels. No snow sheds are currently documented, and all may have been destroyed by slides.

Practices of adaptive reuse incorporated small-scale features into all aspects of the mining system. The Bremner Gold Mining Company and Yellow Band Gold Mines, for instance reused barrels for siding structures, lining chutes, and creating equipment (figure 6.7). Yelinore Inc. reused water pipes in the construction of an aerial tramway to the Sheriff Mine. The reuse of otherwise redundant materials indicates the limited finances available for the purchase and replacement of equipment, and considerable ingenuity at the workplace.



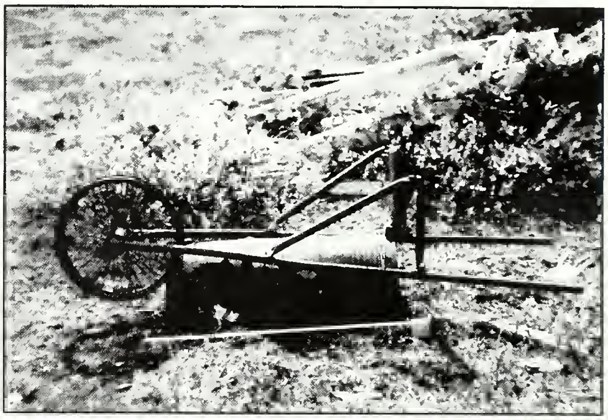


Figure 6.7. Among artifacts preserved in the Bremner Historic District are numerous examples of adaptive reuse, some of which are probably unique. Such adaptations powerfully convey the tenacity of lode prospecting efforts in the Bremner District

Top: Chevrolet truck, located in the valley leading to the Sheriff Mine, apparently used as a portable motor, with rear wheels serving as belt wheels. Photo by author, 1997.

Bottom: Wheelbarrow at the Bremner Gold Mining Company camp constructed from a cut drum, piping, and bicycle wheel. Photo, 1991, WRST 91.008, Roll 11, #12, on file at park office.

Cultural Traditions

Closely following the development of other placer mining districts in the gold-rush era, the staking of placer claims in the Bremner District occurred rapidly and largely through the abuse of power of attorney by a few prospectors. Prospectors often staked entire lengths of streams without fully assessing their value. This enabled them to assess the worth of claims without competition.

Evidence of mining law stipulations, as well as means to circumvent them, are still readily apparent in the Bremner District. In both the placer and lode mining landscapes, prospectors built cairns to serve as claim boundary markers in cases where obvious natural boundaries were not apparent. In all recorded instances in the Bremner District, cairns were constructed from local stone, conspicuous on the landscape by their neat stacks. While the size of an individual claim was set at 20 acres, the number of claims contained within boundary markers was determined by the size of the locating party (up to a maximum of eight claims). While the limited number of cairns recorded in archaeological surveys prevents the reconfiguration of placer boundaries, the presence of cairns in un-worked areas (such as in the north section of the Bremner District paralleling Gillis Creek) are indicative of the mass-staking of streams between 1901 and 1902.

A second effect of prospecting activity is seen in stream names (figure 6.8). In common with most placer mining districts, stream names in the Bremner District reflected prosperity (Golconda as a source of great riches, Summit and Standard for their connotations of achievement). They were also named after the prospectors themselves (Banta, Gillis, Monahan, Bob's Creek, and Beaton's Gulch). The naming of streams in the 1901-1916 period circumvented mining law by allowing the greater disbursement of water rights. Such fine hydrological divisions also yielded impressions of the area's profitability and intensity of work, but the low numbers of prospectors in the district after 1902 quickly negated their use. By 1927, the designation of Summit, Gillis, and Banta Creeks were dropped.

Streams named informally during lode mining operations in the 1927-1938 and 1938-1942 periods reflected functional attributes. Falls Creek, and its later derivative, Power Creek, both alluded to the stream's importance at supplying hydroelectricity. Other terms, such as Jack Snipe Lake and the second "Pocket Creek," were casual designations for commonly seen landscape features.

Four watercourses (Golconda, Pocket, Shovel, and Standard Creeks) currently retain names in the Bremner District. All pertain to names coined during placer mining activities, and none of the informal designations used in the 1930s survive.

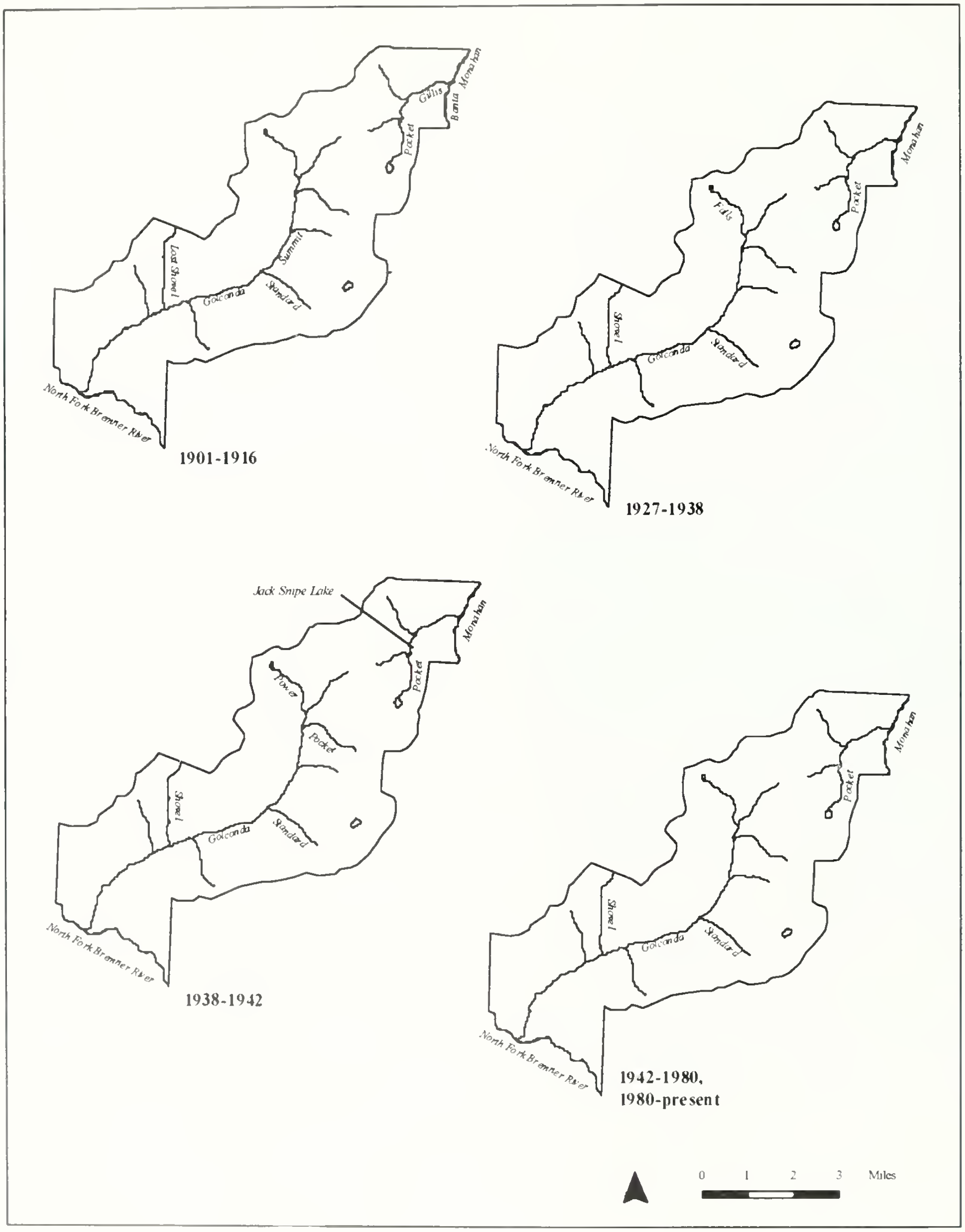


Figure 6.8. Stream names during significant historic periods.

Management Zones

The Bremner Historic District incorporates more than 20,000 acres (unadjusted for topography) of the Golconda Creek and Pocket Creek watersheds. Known cultural resources are concentrated in an area approximately one-sixth of the district's total acreage, with sites particularly abundant in the vicinity of Bremner Pass.

As not all sites in the Bremner District are equally accessible or amenable to the same preservation and/or interpretation strategies, the Bremner Historic District is here separated into five management zones (figure 6.9). Zone boundaries incorporate areas of similar site density, accessibility, and potential threats. Where possible, these zones thematically distinguish between historic lode and placer mining activities.

Zone Descriptions

- Zone I: Easily accessible area (approximately 1,100 acres) containing sites of high historical and archaeological significance, particularly to lode mining operations. Landscape modified throughout all historic periods, primarily between 1927 and 1942. Includes sites **XMC-104, 105, 106** (lower workings), **107** (lower workings), **111, 115** (lower workings), **118, 121, 122,** and 352.

This zone encompasses the width of the valley floor between the pass saddle and Falls/Power Creek and the east side of the valley floor for two

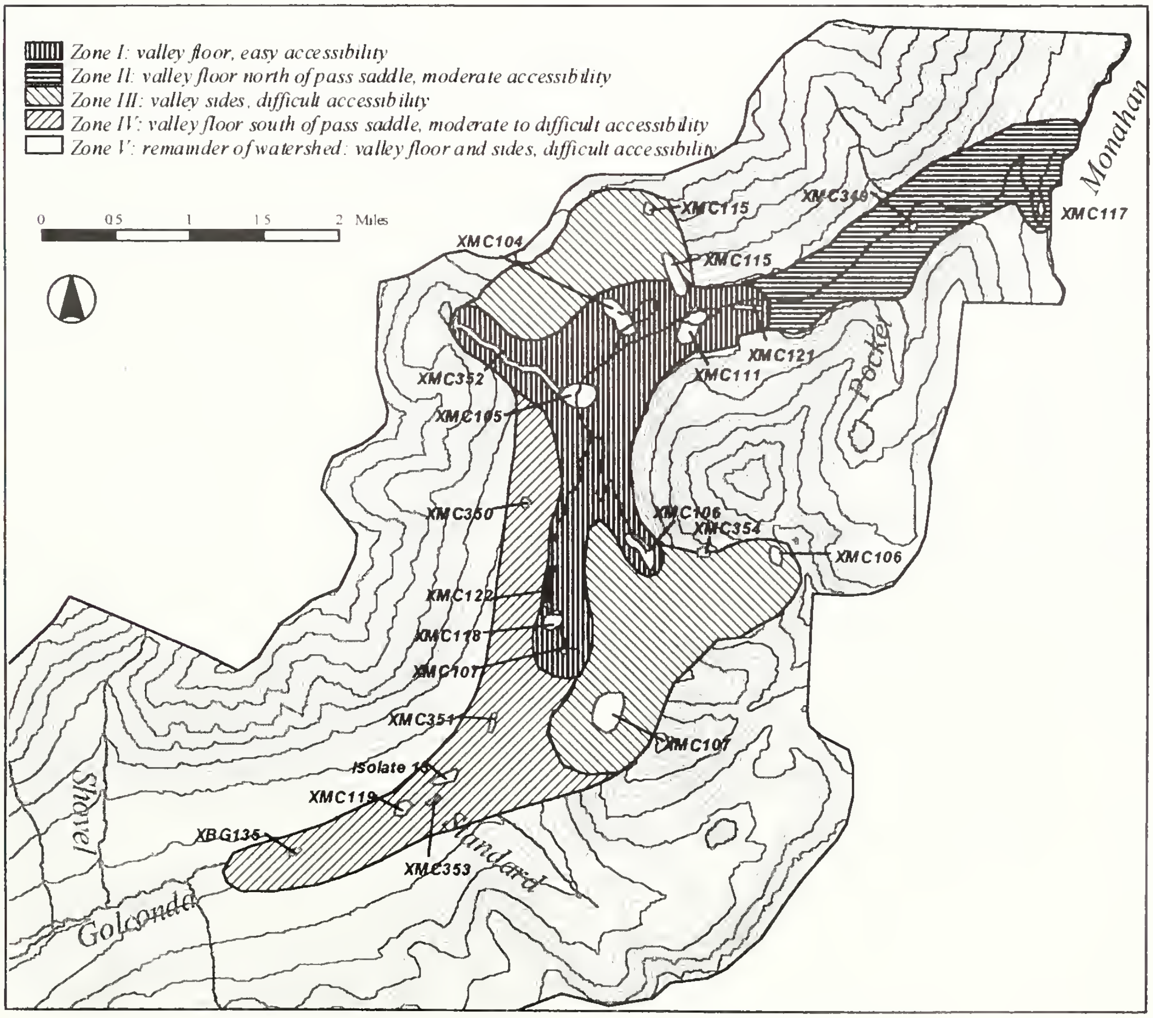


Figure 6.9. Proposed management zones for the Bremner Historic District.

miles farther south. This region also includes the floors of hanging valleys to the northwest and southeast, from which Falls/Power Creek and "Pocket Creek" originate. The central valley area performed a significant role in all periods as a land route for the movement of supplies and prospectors. The Bremner Gold Mining Company, Yellow Band group, and Yellow Band Gold Mines utilized this zone for the movement of supplies and ore (Yellow Band and Sheriff Mine lower bunkers and haul roads, Bremner Gold Mining Company and Yellow Band Gold Mines airstrips), power generation and supply (storage dam, pipeline, powerhouse, and powerlines), ore concentration (Lucky Girl Mill), as well as settlement (Yellow Band, Bremner Gold Mining Company and Yellow Band Gold Mines base camps). This area currently preserves extant structures from all lode mining operations and includes the only currently operable airstrip in the district. Vegetation predominantly is alpine tundra, with most landscape features readily visible and accessible. The overgrowth of scrub occurring on most historic roads has caused the formation of occasional pedestrian detours.

- Zone II: Moderately accessible area (approximately 800 acres) containing sites of high historical and archaeological significance to placer mining and lode mining operations. Landscape formed throughout all historic periods. Includes sites XMC-117 and 349.

This zone extends the width of the valley floor between the saddle of the Bremner Pass and Monahan Creek, including an area outside of national register boundaries. In the 1901-1916 period, prospectors subdivided much of this region into claims, but no claims were developed extensively. This region found important use throughout all historic periods as a primary supply route into the district, connecting to the Hanagita and McClellan trails and, after 1911, to the Copper River and Northwestern Railway. Lode mining operations and the Alaska Road Commission transformed five miles of the pack trail into a vehicle road as a step to improve the district's accessibility to timber-cutting lands and the Chitina Valley.

This section of the Bremner District is characterized by few structural remains, but high overall integrity of the historic landscape, including cultural traditions (at least eight cairns attributable to placer property boundaries) and circulation (the 1939 tractor route). No industrial workplaces or constructed water features are recorded. Willow and alder scrub inhibits the visibility of cultural features, particularly within one-half mile of Monahan Creek.

- Zone III: Area of difficult accessibility (in excess of 2,500 acres, unadjusted for topography) retaining high historical and archaeological significance to lode mining operations. Landscape modified throughout all historic periods, but primarily between 1927-1942. Includes sites XMC-106 (upper workings), 107 (upper workings), 115 (upper workings), and 354.

This zone incorporates two areas, both characterized by the high archaeological integrity of lode mining workplaces and habitation sites, including extant structures. The north section includes the mountainside above the Lucky Girl Mine and Grand Prize Mine lower terminus. Remnants of lode mining activity in this area (occurring between 1927 and 1938) include the Grand Prize Mine and aerial tramway. In addition, the area likely retains evidence of small-scale prospecting activity on the Lucky Girl and Grand Prize veins, including open cuts, as well as boundary markers.

The second area, lying to the south, saw mining operations primarily from 1935 to 1941. Sites include the Sheriff and Yellow Band Mines and a prospecting camp.

Both regions are not easily accessible due to steep topography. In addition, all sites indicate some damage by slides. Despite the difficulties of access, sites in these areas likely receive moderate visitation. These sites have not yet been subjected to intensive looting.

- Zone IV: Area of moderate to difficult accessibility, retaining high historical and archaeological significance and integrity to placer mining activities. Modified throughout all historic periods, primarily from 1901-1916 and 1942-1980. Includes sites XMC-119, 350, 351, and 353, XBG-135, and Isolate 13.

Sites in this zone were worked by placer miners from the time of discovery to recent times. This region comprises the most intensively worked area of all placer activity in the Bremner District. Much of the technology of mining from different periods remains on work sites, habitation sites, and constructed water features.

This zone contains placer sites on Golconda Creek nearly two miles south of its junction with Standard Creek, as well as constructed water features ("mile-long ditch" and smaller placer mining earthworks), workplaces, and habitation sites (including the Golconda Mining Company camp). Some placer mining claim markers are located in this region, with the number largely determined by the area's accessibility. Circulation in the district is limited to a tractor road between the present airstrip and the mouth of Standard Creek and a foot trail accessing placer sites on the right bank of Golconda Creek below Standard Creek. Dense stands of willow and alder restrict present day circulation to formed trails and encroach on most sites in the area.

- Zone V: Area of difficult accessibility (16,500 acres, unadjusted for topography) with no currently recorded sites. Likely contains placer and lode mining sites of moderate historical significance and high archaeological integrity. Landscape primarily formed between 1901-1916 and 1927-1938.

This zone accounts for all other areas in the Bremner Historic District not assigned to Zones I-IV and includes areas outside of national register boundaries. Historically, this area received prospecting by placer and lode miners, and it also included part of the original Bremner River Route. The southern portions of this area comprised some of the first locations prospected in the Bremner District. As much of this area was soon abandoned in favor of placer and lode deposits in the north half of the Golconda Creek drainage, sites in this area did not play a significant role in the overall development of the district, but are highly significant for early twentieth century prospecting activity. No sites have been recorded in the area, but this is a direct reflection of the absence of survey. Many of these sites are likely to be ephemeral, but of high archaeological integrity. Steep topography and dense vegetation growth on the valley floor make pedestrian access very difficult.

Statement of Significance

The Bremner Historic District meets all four significance evaluation criteria for the national register, defined as association with important events, significant individuals, the embodiment of distinctive characteristics, and potential to yield important information.

Mining in the district closely followed national gold mining trends during the Alaska Gold Rush, World War I, Great Depression, and World War II eras. Mining practices reflected a number of themes important to America's mining history, including changes from placer mining to lode mining, the use of air transportation, and the shift in the control of operations from self-taught miners to university-trained mining engineers. Gold mining in the Bremner District was also firmly connected with significant places and events in the Copper Basin, including the Kennecott Copper Corporation, Copper River and Northwestern Railway, and the Nizina and Nabesna gold mining districts (all of which at least partially reside within park boundaries). Conversely, the discovery of gold in the Bremner District triggered a small rush that encouraged additional prospecting in the region and aided the establishment of regional transportation networks and support industries.

The district is intimately associated with Asa C. Baldwin, a significant figure in Alaska's heritage. In addition to working mining claims in the district between 1935 and 1942, Baldwin served as a field officer in the 1910-1913 Alaska Boundary Survey and played an important role in the Chitina Valley region as a contract surveyor for other mining companies, including the Kennecott

Copper Corporation, Nabesna Mining Corporation, and various mines in the Nizina District.

During its operation, the Bremner District incorporated technologies in accordance with contemporary small-scale mining techniques. The district preserves placer mining and lode mining activities from all periods of operation. The preservation of mine sites, milling machinery, habitation sites, claim boundary markers, water conveyance systems, and other supporting infrastructure provide unique insights into understanding the diversity and texture of early-to-mid-twentieth century mining practices.

The excellent preservation of the Bremner Historic District yields an invaluable resource for the study and interpretation of Alaska's mining heritage. In the absence of non-mining related activity, and the minimal impact of mining operations after World War II, the Bremner Historic District preserves a near-pristine historic mining landscape. Consequently, the district has the potential to contribute significantly to the understanding of technological adaptation and change, abandonment processes, and human social behavior applied to the small-scale mining industry. In addition, the Bremner District provides a wealth of information (both documentary and archaeological) pertaining to mining operations during the Great Depression, a significant period in the history of the United States that has not yet seen active preservation or interpretation.

Summary

Because of the lack of non-mining related enterprises, the present condition of the Bremner Historic District preserves many of the components important to its historical development. As environmental conditions have not changed significantly, most threats to sites (including slides, snow loads, and floods) were also faced by the prospectors and companies who operated in the district.

The responses of miners to environmental and cultural factors are well preserved in the spatial organization of the placer and lode mining landscape. The importance of air transportation and communication systems, for instance, is readily visible in the positioning of circulation networks and campsites. In addition, many of the innovations to artifacts and structures that miners used to better cope with their environment are, and can be made, apparent by the diversity of artifacts presently preserved in the district.

Both placer and lode mining landscapes in the Bremner Historic District retain high archaeological integrity. The preservation of standing structures coupled with the near absence of scrub vegetation at the Bremner Pass has, furthermore, kept the lode mining landscape close to its historical appearance.

CHAPTER VI: ENDNOTES

[1]This route is indicated on a map accompanying Fred Moffit, "Geology of the Hanagita-Bremner Region, Alaska," *USGS Bulletin 576* (Washington: GPO, 1914).

CHAPTER VII: TREATMENT RECOMMENDATIONS

Introduction

The National Park Service currently has no long-term strategy for managing the Bremner Historic District, although some direction is expected to be provided by an upcoming report addressing the management of cultural resources within wilderness areas of the park.[1] This document represents the initial step in developing a cultural resource management plan for the district.

Since the generation of a List of Classified Structures in 1994, the park has undertaken to preserve accessible existing structures in the Bremner District. Currently, almost all structures in the Yellow Band Gold Mines camp (XMC-105) have undergone stabilization treatments. These efforts have not only helped to impede further deterioration, but have provided emergency shelter for visitors to the area. Most work conducted in the Bremner Historic District has, however, primarily involved hazard abatement. The mitigation of hazards has so far entailed the removal of explosives and toxic chemicals from the main camp and mine sites, and the installation of hazard signs outside the No. 1 Adit of the Lucky Girl Mine. Some procedures (such as slackening of aerial tramway lines, and secondary damage caused by setting-off explosives) have caused minor damage to historic resources. The park has scheduled adit closures to begin in 1999, favoring the use of a foam sealant method, a reversible procedure for full portal closures.

The Bremner Historic District is not promoted by the National Park Service as a visitor destination, and no interpretation facilities exist. Visitor numbers into the Bremner District, estimated from flight operators in McCarthy (McCarthy Air and Wrangell Mountain Air), likely do not exceed 100 per annum, less than one percent of visitors to the park. Importantly, these estimates do not account for other tour outfitters in the region and for private planes. While the average length of stay is unknown, it is likely to approximate one to three days.

The following treatment recommendations take into consideration concerns for managing mining landscapes and previous National Park Service efforts in the Bremner Historic District. These recommendations represent the initial step in developing an appropriate management strategy for the district and help prioritize strategies for the continued protection of the historic landscape.

Managing the Historic Mining Landscape

Within the last decade, efforts to preserve and manage America's mining heritage have increased dramatically. This occurs, in part, from a growing awareness of the continued destruction of industrial sites, but also as an outgrowth of multi-disciplinary attention toward vernacular landscapes.[2] The preservation of vernacular sites recognizes that "ordinary landscapes" (such as farmsteads and industrial sites) are often effaced under an assumption of their abundance, and that preservation policies are inclined to preserve "first" and "finest" sites while ignoring those sites with representative qualities.

The effective preservation and interpretation of historic mining sites and districts presents a wide range of management problems. Three issues of particular import to the Bremner Historic District involve difficulties of preserving site integrity, improving visitor safety, and developing effective public displays.

Maintenance of Archaeological Integrity

The remote locations of many mining districts have typically been beneficial to structural preservation and the integrity of archaeological remains. This can, however, create conflicting strategies for preservation and protection of cultural landscapes. Sites considered to have high integrity as archaeological resources benefit from the minimization of impacts, including public accessibility, yet visitor interest in standing structures generally warrants some stabilization measures to improve the safety and longevity of on-site displays.[3]

Increased visitor presence at interpretive sites can seriously impact site integrity, particularly in remote areas with minimal managerial presence. In cases where visitor routes have followed historic pathways, such as the Klondike Gold Rush National Historic Park, artifacts were found to be looted despite substantial mitigation efforts by the National Park Service.[4] Low-cost alternatives, such as the rerouting of interpretive trails away from potentially dangerous or archaeologically sensitive areas is a possibility, although such trails alter the integrity of historic circulation networks.

The institution of regular monitoring programs for archaeological sites can provide some indication of site disturbances. Alternatively, archaeological mitigation through excavation or representative collection may, in some instances, be appropriate for remote areas with moderate visitation.

Visitor Safety

The large scale of mining landscapes hinders the ease with which site managers can hope to guide or closely monitor visitor movement. This is of particular concern given the various hazards that typify mining sites. That mining landscapes present serious threats to safe public display can be expected since mining sites were dangerous places during their operation. The historical record is replete with references to the injury and death of workers. Uncoordinated hydraulicking operations could cause serious injury, as might unstable bedrock and overhangs in underground mines. The unknown life expectancy of operations, coupled with narrow profit margins and the desire for greater profits, led management to occasionally circumvent established safety standards. Some manifestations of this included a paucity of mine timbering and underground support pillars, jerry-built construction, close spacing of milling machinery, poor ventilation, and inadequate safety education of workers, the latter three noted by mine inspector J. C. Roehm when reviewing the Bremner Gold Mining Company workings in 1936.[5]

The public presentation of historic mining sites faces similar safety hazards of unstable underground workings, presence of explosives, unmarked shafts, and chemical contamination (such as mercury and cyanide in concentrating machinery and tailings). The precipitous location of many mine workings also presents difficulties in site accessibility.

Government responsibility for the safety of site displays on public lands has resulted in a wide range of attempts to mitigate hazards, in some cases, resulting in considerable loss of historical and archaeological integrity. Hazard mitigation of open shafts, arguably the most dangerous feature on mining landscapes, include low-cost solutions such as signs, fences, and nets, with higher expenditure solutions involving capping or total filling. Adits are often closed with gates, entirely blocked, or blown shut. Other forms of hazard mitigation include the removal of dangerous chemicals and explosives and, in more extreme cases, the removal of tailings

Public Interpretation

Characteristic of industrial sites, mining sites are not only typified by extensive and complex remains, but their development was intricately linked to trends and processes occurring at regional and national scales. The Lucky Girl Mill, for instance, yields information on what machinery was installed, how each machine operated, what economies were made, and how the actual efficiency of the mill met with the expected efficiency. The mill also used a setup common to other companies in the region, and its operation was highly significant to the running of the mining enterprise. Although these factors were highly important to mining operators, they are not easily conveyed to the public in a succinct manner appropriate to low-impact site displays.

To enable visitors to gain a sense of discovery, the level of interpretive information at sites in the Bremner Historic District is preferably minimal. While this does not prevent the use of outside displays, it does promote the use of other strategies for interpreting sites.

Management Philosophy

The Bremner Historic District is an important archaeological and historical resource in the Wrangell-St. Elias National Park and Preserve. In addition to exhibiting high archaeological preservation, the Bremner Historic District retains numerous extant structures and much of its historic character as a small-scale mining landscape. The integrity of many cultural resources is fragile, and a number of sites in the district can be damaged easily through only minimal disturbance. Consequently, the district is most appropriate for low impact public use and interpretation, with a primary emphasis on protecting the district as an archaeological resource.

Preservation efforts should endeavor to retain the diversity and integrity of mining landscapes formed throughout all significant periods. No attempt should be made to restore the landscape to any one particular period, and preservation should extend to include those sites formed in the 1960s and 1970s. Sites formed after 1980 could be removed on the grounds of illicit activity, although these sites significantly indicate the persistence of small-scale prospecting in the valley for nearly 100 years.

A limited National Park Service presence in the Bremner Historic District deems that stabilization and maintenance efforts should comply with procedures offering long-term preservation and minimal upkeep. Where possible, treatments should select low-cost solutions that are reversible and visually imperceptible from the historic landscape.

Some provision is necessary, however, for hazard mitigation procedures. While some procedures may slightly alter the visual integrity of the district, they are of critical importance to improving visitor safety.

Given the district's high integrity as an archaeological resource, any alterations to the landscape should involve mitigation procedures, in keeping with *Secretary of the Interior's Standards for the Treatment of Historic Properties*. As continuing deterioration caused by looting and natural processes of natural decay is inevitable, the preservation of the district's diversity and integrity should involve representative artifact collection for off-site curation and display.

Not all areas of the Bremner Historic District possess the same interpretive value, accessibility, and safety for public display. Components of the lode mining landscape situated near the Bremner Pass are most appropriate for public interpretation. Interpretative displays and/or visitor facilities should in all cases be of minimal intrusiveness to the visual integrity of the historic landscape, with preference given to the adaptive reuse/partial rehabilitation of structures and trails rather than development of entirely new facilities (figure 7.1).

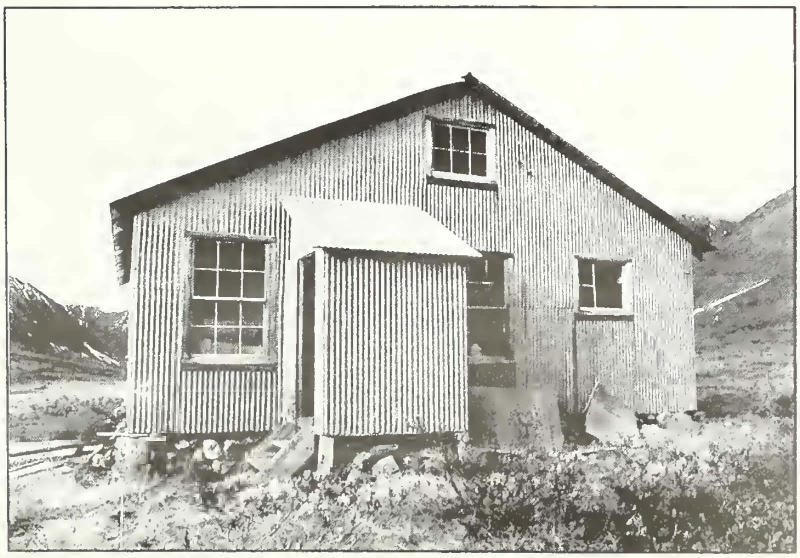


Figure 7.1. Valley floor structures associated with lode-mining activities in the Bremner Historic District are amenable to public use/interpretation. If necessary, visitor facilities and accommodations can be developed in standing structures at low cost, and with minimal impact to the visual integrity of the landscape. Photo by R. Bland, 1993, roll 14, #8; on file at park office.

Proposed Treatments

Treatment alternatives presented here use low-cost and long-term solutions that ensure the Bremner District will retain value both as an important archaeological resource and as an interpretive resource for the public. Appropriate site treatments are based on low visitation into the district, as currently indicated, with provision for a moderate increase. Should the Bremner District become actively promoted as an important visitor destination in the park, alternative treatments should be considered.

The following four treatments are proposed as primary methods for the continued preservation of the Bremner District's placer and lode mining landscapes.

1. Hazard mitigation

In the interests of visitor safety, the continued mitigation of hazards in the Bremner Historic District is essential. Treatable hazards in the lode mining landscape include abandoned explosives and unsafe underground workings. No hazards have yet been identified in the placer landscape, although the presence of explosives is a possibility.

The removal of abandoned explosives from mine workings will follow established National Park Service standards. Where possible, explosives are to be detonated off site where effects of potential blasts will not impact at-risk resources. If explosives are unsafe to move, detonation should be delayed until appropriate data recovery and archaeological mitigation is conducted.

Full closure techniques should be employed for the sealing of all open adits in the district. Foam sealant and gated closure methods are preferred because of their reversibility. Where the foam sealant method is adopted, procedures should also distribute rubble around the closure to disguise the seal, giving an impression of natural collapse.

Despite reversibility of procedure, the blocking of adits by full portal closures will likely prevent access permanently, and it may be necessary or desirable to conduct archaeological surveys of the underground workings prior to closure. These surveys should record methods of timbering the drifts, crosscuts, and stopes, and note any deviation of underground workings from historic maps and descriptions. Representative mining equipment found in the workings should be considered for collection and off-site curation.

2. Structure stabilization

To preserve the appearance of the Bremner District's cultural landscape in as close to current condition as possible, the continued stabilization of standing structures is recommended. Procedures will comply with Secretary of the Interior standards. As no attempt will be made to restore structures to any one period, stabilization is to follow standards for rehabilitation.

3. Archaeological collection

The Bremner Historic District (and, most notably sites associated with lode mining) represents one of the few remaining areas in the park where mining artifacts are still in relative abundance. The extensive looting of portable artifacts from popular destinations, such as Kennecott and Chititu Creek, has significantly jeopardized their archaeological integrity.

As even regular monitoring of the district will not prevent either the natural degradation or unlawful removal of artifacts, the National Park Service should give consideration to the collection of representative artifacts for display and storage. Artifacts collected should represent the diversity of materials currently preserved, including clothing and personal items, tableware and kitchenware, and mining technology. Some larger items, such as sleds, should also be considered for collection, given their important historic function to the district. It is, however, undesirable that any artifact collections be extensive or significantly alter present conditions. On-site artifacts comprise one of the Bremner District's key resources, and any collection, whether by the National Park Service or by looters, will detract from the discovery experience.

4. Vegetation management

While no treatment is the simplest option for managing archaeological sites in the Bremner

District, benign neglect will deteriorate the quality and diversity of materials currently preserved. While not all natural processes detrimentally affecting site preservation can be alleviated, the careful management of vegetation cover (encompassing clearance, trimming, as well as selective encouragement of growth) will lessen processes of above and below ground disturbance. Management strategies should be assessed for each site location. In cases where vegetation growth is encouraged, exotic species should not be introduced, so as to preserve the integrity of the natural landscape.

Recommended Zone Treatments

- Zone I: Protection and stabilization of extant structures, preferably using or replicating original materials and structural design to maintain integrity of their existing condition. Clearance of vegetation around structures and historic and modern circulation routes where applicable. Reduction of hazards with preference to reversible procedures. Archaeological sites protected by vegetation management and indirect access.

Industrial Workplaces

As the most accessible of all mine sites in the Bremner District, the Lucky Girl Mine (XMC-104) can be expected to receive high visitation numbers. Consequently, continued hazard mitigation efforts are advisable. Mine adits and areas in close proximity should be investigated for additional blasting caps and other explosives. Given the instability of underground workings from water damage, it is recommended that all currently accessible adits be closed. If foam sealant is applied, provision should be made for drainage holes to prevent the buildup of water behind the closure. The foam sealant method is recommended for the closure of the No. 3 Adit, but another alternative could be considered for the No. 1 Adit. This adit serves as a drain for almost the entire underground workings and currently issues a considerable volume of water. Although water levels would likely recede with the removal of rubble at the adit entrance, a foam closure even with drain holes may not adequately drain workings, which could itself lead to the seal's bursting. As the most accessible open adit in the Bremner District, the visibility of the No. 1 Adit is also desired for public display, helping to convey a sense of historic processes and site integrity. A metal grate option would be a suitable alternative in that it would not entirely remove the adit's visibility and allow it to continue functioning as a drain.

The compressor and assay shed, positioned outside the No. 1 Adit, should undergo limited stabilization. The assay room represents an essential component of Yellow Band Gold Mine's operations in the district and the walls should be stabilized. Collapsed doors could also be reattached to inhibit disturbance from ground squirrels and marmots. The compressor room is not recommended for treatment given its extensive damage from slides.

No treatment is recommended for the Lucky Girl Mill as considerable expenditure would be required in any stabilization effort. Mill tailings, as well as the general area surrounding the mill, may require testing for hazardous chemicals such as mercury. If proven hazardous, tailings should probably not be removed, given the likely release of contaminants during the process of removal, as well as their importance to the operations of the Bremner Gold Mining Company and the Yellow Band Gold Mines, and high archaeological value. Rather, more passive mitigation measures, such as the posting of signs, or cautions in displays or guidebooks are preferred.

Habitation Sites

Given the visibility and easy accessibility of campsites on the valley floor, the Yellow Band Gold Mines (XMC-105), Yellow Band Group (XMC-118), and Bremner Gold Mining Company (XMC-111) camps will be among the most visited locations in the Bremner District. Stabilization of all extant structures in these camps is a priority for treatment. Current visitor numbers do not indicate a need to convert any extant structures into visitor accommodations. Any proposed renovation or restoration, however, should aim to keep the buildings' original function and character. The continued infestation of the Yellow Band Gold Mines camp bunkhouse by ground squirrels is a serious threat to the structure's integrity and appropriateness as a visitor shelter and requires mitigation. Extreme measures may be necessary, but should only be used as a last resort. The flimsy construction of the cabin at the Yellow Band Group campsite will thwart attempts to prevent further animal infestation without the substantial investment of labor and materials. Stabilization efforts at this site should, therefore, center on protecting the structure from weather damage, principally by reattaching any loose siding.

Constructed Water Features

Water features in this zone, including the supply systems for hydroelectric power generation, mill, and camps, require minimal intervention. Vegetation overgrowth and slides have in places obscured some of the ditch lines. However, as it is likely that the removal of vegetation would encourage further erosion, no treatment is recommended.

The diversion dam and penstock (XMC-352) are the only currently known features of their type surviving in the Bremner District. These features represent significant components of the power system essential to the operations of the Bremner Gold Mining Company and Yellow Band Gold Mines and should be assessed for appropriate stabilization.

Small-Scale Features

No stabilization treatment is proposed for sleds, trucks, or cairns. To ensure the long-term preservation of the Ford dump truck at the Yellow Band Gold Mines camp (XMC-105), however, it is recommended that it be moved back into the garage after reattaching its wheels. This would restore the truck to its original location and slow processes of deterioration.

Circulation

Visitor circulation presently conforms to historic patterns, except in patches where overgrowth and flooding have made adherence to historic routes difficult and encouraged the creation of detours. To discourage further establishment of newly formed trails, the clearance of scrub vegetation is necessary on all historic roadways in this zone. Work is particularly required on the section of the Yellow Band-Mill road between the Yellow Band Gold Mines camp and Lucky Girl Mill, and on the tractor road leading over the pass saddle. An historic road connecting the sawmill and powerhouse with the mechanic shop in the Yellow Band Gold Mines camp should also be cleared of overgrowth. Sections of road subject to flooding should be investigated for blocked or collapsed culverts, in which case the culverts should be cleared or restored. In places where no historic culverts are extant, new culverts could be created in the interests of maintaining circulation along historic routes. In such instances, culverts should conform with historic materials and designs. Wooden bridges formerly spanning small streams and gullies should not be restored, given the considerable expense and difficulty of replicating original designs with accuracy.

The Yellow Band lower terminal (XMC-107) comprises the only aerial tramway structure not damaged by slides and should be stabilized. The collapsed state of the Sheriff Mine lower terminal may warrant some stabilization effort (such as repiling rocks) if its condition degenerates further.

Powerlines formerly linking the Yellow Band Gold Mines camp, Bremner Gold Mining Company camp, Grand Prize, Lucky Girl, and Sheriff Mines lie in poor condition but do not require restoration. This is, in part, because the degradation of the power poles themselves would require extensive reconstruction and also because reerected poles would likely require annual maintenance to keep them standing. Vegetation clearance is not recommended for the easier discernment of powerline routes or the tramway connecting the Grand Prize Mine with the Lucky Girl Mill, as this could lead to the creation of new foot trails. Rather, the presence of these systems could be indicated effectively through displays.

Archaeological Survey and Sampling

As sites in Zone I have been the focus of intensive archaeological surveys since the 1990s, the likelihood of locating new highly significant sites in the area is low. No further intensive surveys are critical. Presently unrecorded sites in the area include the remnants of tent sites around the main camp (primarily flattened terraces with no visible artifacts), small discard scatters, and cairns. Roads and sled trails created by the

Bremner Gold Mining Company may be evident near the pass saddle and between the company camp and the Grand Prize Mine.

The high accessibility of this region and its expected intensive use suggest the need for the National Park Service to collect representative artifacts, including discard scatters, clothing, kitchenware and tableware, tools, and personal items, particularly for the Yellow Band Gold Mines camp (XMC-105) and Bremner Gold Mining Company camp (XMC-111). At the Lucky Girl Mill, some assaying equipment, including some tools and crucibles could be sampled. Some potentially valuable artifacts in the mill, such as a copper pan associated with the Clark-Todd Amalgamator, could be removed for curation.

- Zone II: Limited stabilization. Archaeological sites protected by vegetation management and absence of defined access. Reduction of hazards only where reversible procedures can be applied.

Habitation Sites
The two habitation sites recorded in this zone require minimal treatment. The Monahan Creek cabin (XMC-117) requires some stabilization given its deteriorating condition and historical significance as a way station. Full restoration is inappropriate due to the site's low visitation as well as the cost of undertaking any extensive repairs. Stabilization efforts should secure loose boarding to the sides and roof of the building where original materials can be located. Vegetation should also be cut back to hinder its encroachment onto the site.

The tent site (XMC-349) approximately one-half mile downstream from Pocket Creek Lake offers minimal significance for visitor interpretation and should be managed as an archaeological resource. Vegetation clearance around the site is unnecessary. The potential for visitor disturbance will be reduced considerably if the Monahan Creek tractor road is cleared and made more discernable.

Small-Scale Features
Small-scale features, comprising two sleds and nine rock cairns, represent significant elements of the placer and lode mining landscape; but they do not require maintenance. Cairns are considerably durable, and sleds can probably be left to degrade by natural processes, with some well-preserved examples removed for curation (refer Archaeological Survey and Sampling section).

Circulation
Circulation between the pass saddle and the Monahan Creek currently follows a tractor road formed in 1939-1940. After the lake at the mouth of Pocket Creek, one-and-one-half miles northeast of the pass saddle, however, scrub vegetation largely obscures the roadway. This vegetation should be cut back to allow continued accessibility on the trail.

From the Monahan Creek cabin (XMC-117), one trail leads to Monahan Creek, and a second trail travels north toward the junction of Monahan and Gillis Creeks. Both trails are covered in brush, but were likely used by both placer and lode miners. These are not vital to the public interpretation of the district and do not need clearing.

Archaeological Survey and Sampling
Further archaeological survey of this region, particularly along the length of Gillis Creek, may indicate additional placer mining or prospecting activities. If so, this would likely relate to the 1901-1902 period of initial claim staking in the Bremner District. Surveys on the banks on either side of Gillis Creek may also indicate additional claim boundary markers and tent sites.

At the Monahan Creek cabin, the trail paralleling Monahan Creek also continues south past the cabin through heavy brush. This may be a remnant trail created by placer miners in the 1901-1916 era. This trail could be surveyed and cleared if future management involves the creation of hiking trails in the general area.

Anticipated low visitation numbers and the low density of archaeological sites in this zone lessens the need for the mitigative sampling of artifacts. However, some well-preserved artifacts, such as the freight sled at site XMC-117, could be considered for collection and off-site curation. While the sled is of similar style to sleds in the Yellow

Band Gold Mines camp, the sampling of a sled away from the main camp would not create any visual loss to the integrity of more frequently visited sites.

- Zone III: Minimal stabilization of extant structures, with selective restoration of site protection measures used historically.

Industrial Workplaces
The sites of the Grand Prize, Sheriff, and Yellow Band Mines, represent the Bremner District's most spectacular and high risk locations. Despite difficult access, these sites can be expected to receive occasional visitation. As historical evidence and current conditions testify, the exposure of mine site structures to high impact environmental threats, such as snow slides and rock slides, will impede the longevity of most stabilization measures. However, the susceptibility of workplaces to damage means the neglect of treatment will aid the rapid loss of integrity. As the inaccessibility of mine locations will impede stabilization measures that require new construction materials to be brought up to sites, only minimal treatment of lode mining workplaces is recommended. Restoration would include repairs to structures where displaced materials are easily discernible and are in condition to be reused. In the interest of preserving the layout of workplaces, this may involve restoring collapsed roofs where the rest of the structure otherwise remains in restorable condition (the Grand Prize Mine workshop may be one candidate).

Given the instability of underground workings, adit closures are recommended at all mine sites. Closures should be reversible, with the foam sealant method preferred. Explosives mitigation at the Sheriff Mine has unfortunately made the workings extremely unstable, and for reasons of safety an underground survey is not recommended.

Habitation Sites
Domestic structures at the mine sites represent one of the most significant components of the cultural landscape of the Bremner District. The bunkhouses are highly informative of daily life at the mines and readily demonstrate the small-scale nature of operations. The outstanding preservation of artifacts in the bunkhouses helps to illustrate living conditions, leisure activities, and foodways. In addition, the use of dry-stone walls at the Yellow Band Mine upper camp (XMC-107) and Sheriff tent camp (XMC-354), are not evidenced elsewhere in the park and represent a rare, if not unique, adaptation of miners to Alaska conditions.

With these considerations, some measure of stabilization is imperative. Given the isolation of these sites and difficulty of access, the proposed treatment is identical to other mine site structures, namely reattaching loosened boards and siding and fixing rooflines.

Circulation
Pack trails to mine sites and prospects have almost entirely been removed by slides, with only a few short sections still extant on routes to the Sheriff and Yellow Band Mines. Due to construction expense, impact to landscape integrity, and uncertain safety, no formal trails should be established between the valley floor and the mines. This keeps a sense of discovery for the mine sites and reduces visitor numbers.

All aerial tramways are in poor condition, although the routes are still discernible. No attempt should be made to re-erect tramways given the construction expense, susceptibility of tramways to slides, and danger to aircraft.

Powerline routes are still present on the mountainside between the Sheriff Mine and lower terminal. No treatment is required.

Archaeological Survey and Sampling
Additional archaeological survey is likely to find open cuts and prospect pits at most of the mine sites. In most cases, these will represent some of the earliest assessment work on the claims. Remnants of snow sheds constructed by the Yellow Band Gold Mines from timbers and flattened drums may survive above the Sheriff Mine and on the mountainside above the aerial tramline.

Artifacts could be sampled from all sites in Zone III, bearing in mind that many of the artifacts such as magazines, foodstuffs, and other commodities contribute significantly to visitors' experience at the mine sites. However, some particularly well preserved but easily portable items (such as tools, hardhats, unopened matchboxes) could be considered for off-site conservation.

- Zone IV: Archaeological sites protected by vegetation management and absence of defined access. Vegetation management and regular site monitoring proposed for readily accessible areas.

Industrial Workplaces
Workplaces in this zone are highly significant as the main area of placer activity throughout all periods. As most sites reflect more than one period of placer mining, any stabilization effort should act to preserve the current condition of sites, rather than restore workplaces to any one period. Evidence of working during the 1970s-1990s, for instance, should not be removed, but incorporated as part of any interpretation of the placer landscape, expressive of a continued, yet intermittent, interest in the mineral resources of the Bremner District. Vegetation encroachment will inflict some damage to work sites, but it may serve to reduce loss during flooding. No vegetation clearance is recommended.

Habitation Sites
Habitation sites associated with placer workings consist of tent frames, typically near workplaces. Habitation sites are representative of all periods of placer activity in the Bremner District. As only temporary accommodations, these sites are particularly sensitive to disturbance. Habitation sites, therefore, should be managed as archaeological sites. While the encroachment of vegetation currently poses the greatest threat to site integrity, it will aid site preservation in the long term. No vegetation clearance is recommended, unless a site is considered suitable for display purposes.

Constructed Water Features
Placer mining activities in this area employed ditches and dams to control and distribute the flow of water. Vegetation currently covers ditches and has, in places removed surface evidence of the existence of water features. Vegetation growth could be left, or cut back from ditch lines, to allow secondary reuse of ditches as trails leading to placer mining sites. The latter method, while appropriate for site display, is not recommended because of increased erosion. All dams have been destroyed, although the sites of two dams are known. No treatment is recommended for dam sites.

Small-Scale Features
Cairns played an important role in the division of space in the placer mining district. These cairns, even when fallen, are easily identifiable. No treatment is recommended.

Circulation
In the southern section, vegetation should be cleared from the tractor trail to Standard Creek, and the foot trail to other placer sites may require some improved definition by cutting back vegetation. These trails would open up more sites to potential damage from visitation, but would allow the interpretation of the Bremner District to also address the placer mining landscape.

A cache of drums located in the smaller ditch close to the mouth of Standard Creek may hold hazardous waste and should be investigated.

Archaeological Survey and Sampling
Intensive archaeological surveys in this region would probably locate more habitation sites and aid the identification of bounded workplaces. Surveys on banks away from Golconda Creek may reveal the penstock of the mile-long ditch and additional boundary markers.

Habitation sites associated with placer mining are among the most fragile archaeological sites in the Bremner District. While maintaining high archaeological integrity suggests that cultural disturbance be discouraged, the easy accessibility of these sites requires some mitigation measures at regularly visited workplaces. Sampling at site XMC-119 could include some of the early solder-top food cans found at the workings, as well as domestic artifacts associated with the habitation site. Site XBG-135 may also require sampling; for although it is largely inaccessible, it is easily visible from the air. Sampling could also include removing a well-preserved dog sled perched over the cliff west of the extant tent frame. Other well-preserved habitation sites, such as XMC-351, do not require sampling because both are inaccessible and inconspicuous.

- Zone V: No preservation treatment currently recommended. Portions of this area, however, are recommended for archaeological survey, in which case some protection and monitoring may be warranted.

Archaeological Survey

The general difficulties of access coupled with the low intensity of historic activity in the region mean that archaeological sites in this region are under no immediate threat from visitor disturbance. Historical evidence notes limited placer mining activity at the mouths of Golconda Creek and Standard Creek; and placer sites may have been worked, or at least claimed, on Banta and Monahan Creeks near the confluence of Gillis Creek. Surveying for lode prospects will prove considerably more arduous, requiring surveys to locate and follow veins. Likely areas for potential sites lie in the southeastern section of the district, where prospectors may have followed the orientation of outcrops at the Sheriff and Yellow Band prospects. Given the difficulties of surveying sites in this region, they should only be conducted to record sites discovered by happenstance.

Site Monitoring

Sites and structures in the Bremner District are remarkably well preserved after the passage of more than 60 years, but increased visitation will bring new demands on the landscape. Decay is likely to accelerate, particularly in the most accessible areas (Zones I, II, and IV), and also at mine sites in Zone III.

The establishment of a site-monitoring plan for the Bremner District is imperative if landscape treatments and site impacts are intended for evaluation. Regular site monitoring yields information on differential site preservation, both between and within sites, and also provides a more accurate gauge of the range and relative severity of site impacts.

Current staff levels of the park make the institution of any intensive site-monitoring program unfeasible for the Bremner District. While it is unlikely that visitation to the Bremner District over the next five years will reach levels that necessitate the establishment of a ranger station, an intermittent ranger presence, could be instituted to better gauge visitor numbers, note changes to site integrity, and assist site interpretation.

An accurate assessment of visitation and impacts is an essential step to developing a suitable monitoring plan. Present visitation statistics for the Bremner District derive from the records of local flight operators (Wrangell Mountain Air, McCarthy Air, and Ultima Thule, for example), but are too inconsistent and generalized to be of analytical use. Visitation by other operators and private planes is likely, but their frequency is not. Given the need to gauge visitor numbers accurately, other tour operators should be contacted. A logbook at the main camp bunkhouse (or assay shed if it is to be used for display purposes) could enhance coverage.

While the National Park Service administers the Bremner Historic District as part of the Wrangell-St. Elias National Park and Preserve, the effective stewardship of the district's cultural resources can best result from a collaborative effort between the park and local businesses. Air charter services provide the main form of transport into the district, and local guides undoubtedly have a greater presence in the district than currently attainable by the National Park Service.

If negative impacts to resources increase, it may become necessary to limit the number of visitors to the district. Since some tour operators are impartial to or unaware of the activity of looters, it is strongly recommended that the park provide some level of interpretive information about the cultural resources of the Bremner Historic District to local operators if on- or off-site interpretation strategies are to be implemented. Additional information and awareness of cultural resource values could be provided to operators through the established concessions and incidental business permitting process.

Visitor Interpretation Facilities

Interpretation facilities in the Bremner Historic District, if developed at all, should be low maintenance and non-intrusive, key elements in retaining the visual integrity of the historic landscape. Although the simplest option is to have no interpretation, some information either at the site or off-site is essential, given the low visibility and complexity of many features appropriate for interpretation. Facilities are most needed for sites in Zone I, the most accessible section of the district, although select sites in Zones II, III, and IV could also be developed for public interpretation.

Visitor movement should be passively guided by the clearance of vegetation from historic roads, although the singular orientation and general absence of branch routes may entice visitors to stray from trails. With low visitation numbers, wandering poses only a minor threat to the historical integrity of the district, although it may endanger archaeological sites not presently accessible by the road system (including XMC-349, 350, 351, and small-scale features). A stern "please adhere to historic paths" in written presentations or displays could well encourage the opposite behavior. However, the promotion of historic trails could be developed more attractively on brochures as a "walk into the past."

The development of interpretation facilities will increasingly make the Bremner Historic District marketable as a visitor destination. In the interests of continued archaeological preservation, any proposed plan for establishing or improving visitor facilities needs to be coordinated with preservation planning efforts.

The following three options are proposed as appropriate interpretive strategies for the public display of sites in the Bremner Historic District.

OPTION 1: SIGNAGE
The construction of information signs could serve as a limited measure for interpretation in the Bremner Historic District. Signs are not recommended for the interpretation of sites and structures as they will detrimentally impact the visual integrity of the historic landscape and detract from the discovery experience. Signs could, however, usefully serve to orient visitors as they arrive in the district. A sign at the airstrip could provide visitors with a sketch map highlighting important cultural and natural resources in the district. It should also convey information on water availability and potential hazards, as well as more standard information on backcountry camping and safety.

OPTION 2: ON-SITE MUSEUM
A second alternative could reuse an existing structure as a low-maintenance information center. Along with providing a general background on the history of the district, displays could indicate, both visually and through textual references, the locations of important sites (such as placer site XMC-119, the Grand Prize (XMC-115), Lucky Girl (XMC-104), Sheriff (XMC-106), and Yellow Band (XMC-107) Mines). Directions to any sites should promote the use of historical routes. An on-site museum improves on the first alternative by removing any detrimental visual impact that signs posted at sites may have to visitor experience. However, information conveyed at an on-site museum would remain fairly general, and some posted signs may be necessary to supplement information derived at the museum with more site-specific information.

An on-site museum would, nevertheless, have greater interpretive space in which to develop a fuller site context. A sheltered location would also enable the use of a wider range of materials (paper, glass, and so on) for use in displays. Some representative artifacts could be incorporated into displays, albeit highly collectible artifacts are not recommended for use. Not only would these likely be stolen, but their presence may encourage the continued looting of archaeological sites.

Although an interpretive center would be relatively costly to install, the protection of displays from outside elements would require less upkeep than posted signs. Furthermore, a low-cost display could be developed to meet current visitor numbers, to be modified or expanded as increased visitation warrants. If followed through, a structure in the Yellow Band Gold Mines camp (the office or a room in the bunkhouse are particularly appropriate) is a suitable candidate to house an information center given the camp's high visibility, structural integrity, and central location to accessible sites in the district.

OPTION 3: BOOKLETS
Information on the cultural (and natural) resources of the Bremner Historic District can be conveyed most thoroughly through the generation of a booklet or pamphlet made available to visitors on site, at park headquarters, and at air charter offices.

A booklet, represents the least limited option in terms of available interpretive space, with only the number of pages limiting the depth of site context. A booklet could include a considerable range of supplementary materials, such as reproductions of historic photographs, letters, and other documents (figure 7.2). One or two booklets would be left in the main camp for visitor use. A logbook included at the back of the booklet could help provide some measure of visitor numbers, and allow for feedback regarding visitor experience in the district. While the booklet would be intended as a communal resource, not to be taken from the district, copies should be made available at the park office for interested visitors (providing a second avenue for visitor feedback).

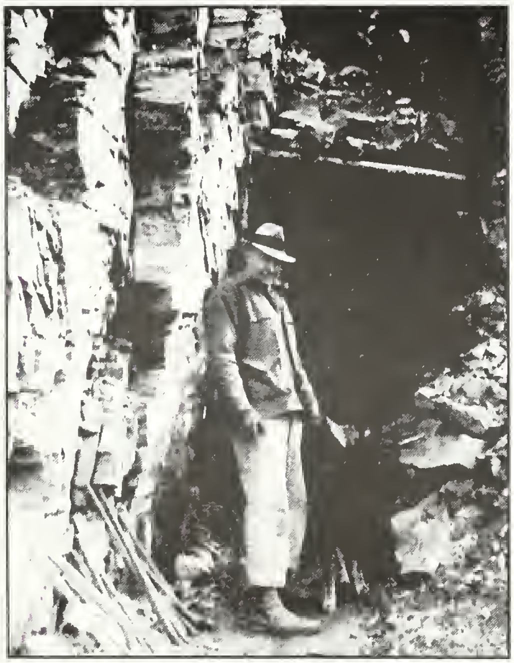
An interpretive leaflet could be cheaper to produce than a booklet, although the level of in-depth treatment would be reduced (probably less than information given in the sign or interpretive display options). This option would allow visitors to retain a souvenir, which may, in itself, help reduce the loss of portable artifacts from the district. Like the booklet option, leaflets could be made available at the park office, air charter services, and in a structure in the main camp (in the on-site museum if Option 2 is adopted). If Option 1 is employed, leaflets could also be provided in a weatherproof box attached to the orientation sign.
Both leaflets and booklets are advantageous in their ability to guide visitor movement through the provision of a trail map. Their portability will also enable visitors to take the information directly to sites.

Figure 7.2 (overleaf). The development of an interpretive booklet allows for the greater development of site context, as well as the discussion of circumstances important to the daily operation of mines yet not directly manifested in material culture. The following is excerpted from a draft booklet intended for placement in the main bunkhouse.

A YEAR AT THE LODE MINES

Ideally, during any working year, a mining operation explores new veins, extracts and processes known ore, conducts necessary repairs to machinery and equipment, and makes general improvements to the property. A season's work should also generate enough capital to allow work in the following year, keep stockholders content, and make the property attractive to other potential investors. At Bremner, the majority of these tasks depended upon the work accomplished within a period of four to six months. Such a short working season made it especially critical to schedule tasks efficiently.

Yellow Band Gold Mines organized tasks into essentially monthly blocks. Key activities at the mine—mining, milling, freighting, and preparation—were staggered. In April, a small crew, including Baldwin, arrived at the mine to ready the camp for the upcoming season. Preparatory work included freighting supplies from the winter cache near Monahan Creek to the camp by Caterpillar bulldozer, snow removal by Cat and by hand, repairing structures damaged by slides or snow loads, and removing protective cover planks from ore bunkers.



Mining in the Bremner District usually occurred between May and August each year. The photograph shows miner Jack O'Neill and his dog at the Killian Vein (circa 1938), the principal lode deposit worked at the Yellow Band Mine. The mine entrance has since collapsed.

In May, the company hired three or four miners to work the veins. Some tasks at the mine, such as drilling, blacksmithing, and machine repair, demanded high levels of proficiency. For such a small operation, two miners rarely performed the same task simultaneously, although skills did overlap. Unlike large-scale twentieth century mines, where work had become highly task-specialized, small-scale mines employed—and depended upon—a multi-skilled workforce. By employing workers that knew at least two skilled tasks, Yellow Band Gold Mines had the option of stepping up a particular aspect of production, or, if necessary, sustain operations in the case of serious injury, while still keeping the number of miners employed relatively small, and thus relatively inexpensive.

By June, enough ore had been mined from the workings to transfer ore to the mill. Snowmelt from warmer temperatures improved overall water supply and by May-June, the volume was sufficient to generate electricity at the powerhouse. The company often brought in a millwright to conduct the first runs of the mill and make minor adjustments

Mining on the veins ended in mid-August. Over the next few weeks the crew finished milling, prepared the camps for winter, and undertook repair/construction duties.

Miners, including Baldwin, worked nearly every day and sometimes through the night in order to accomplish tasks. Many held shares in the company, and thus had a vested interest in working overtime. The Fourth of July was taken as a rest day for all crew.

During the closed season, the company employed a few workers to freight supplies from the town of McCarthy to a point south of the Chitina River. These workers also cut lumber from company-owned timberlands near the mouth of Monahan Creek, ten miles north of the main camp. Baldwin spent the winter bookkeeping, interesting other stockholders, and employed in other jobs.

Even the best scheduling could go wrong. In 1941, for instance, the mining crew did not arrive in May, as anticipated, because of technical problems with the plane service. The delay threatened to reduce the amount of work that could be accomplished at the mine for the year, but it also had more serious consequences for those already in the Bremner District. The following excerpts are selected from Asa Baldwin's 1941 diary.

Friday 2 May
Joe and Bill replanking Sheriff lower bunkers
Adrian & John shoveling snow from running cable between No.s 1 & 2 Towers—from 10 to 15 feet in snow.
Cook gets some rooster ptarmigan on Monahan Cr.
I shovel through 8 feet of snow just above the Golconda Creek bridge and get WATER.
No plane and no radio.

Monday 5
Joe hurt back while working on Sh. lower bunker day before yesterday—log feel [sic] on him. Did not work today.
Bruno, Adrian & Joe[sic, probably John] set dead man and shieve on big rock above flume and got 1/4" running cable around it—preparatory to hauling up logs for storage dam.
In pm, they shoveled snow off the saw mill.
No plane today.

Sunday 18
John laid off today. Said he could not throw 15 feet without something to eat.
Joe, Bruno, Adrian and I continue work at Storage Dam. Now have all but about 10 feet of bedrock cut exposed. No plane yet.

Wednesday 21
Men worked half day at Storage Dam a/c nothing they could take for lunch.
No plane today. The cook and I go down to Monahan Cr. after dinner and get 8 ptarmigan.

Thursday 22
Men again work half day at dam site. Cook in bed with bad tooth and earache. About 1:30 pm the plane from Copper Center came and "bombed" 13 packages including 2 drums of gas. Everything recovered and in good shape except 1 drum of gas which split in two places letting out about ½ the gas.

Friday 30
Men take one sled load up hill with Cat, then get BB hoist going and begin to pull logs toward dam.
Cook gave notice he was quitting when plane comes.
Go down to field this morning and evening and do some ditching. Field now practically dry.

Sunday 1 June
Men working at hauling material to storage dam.
Lyle finally came with plane at 10:15 am. Made three trips from Chitina bringing gas, grub and 4 miners [or men]—Klas, Otto, Nelson, Ernie and Mrs. Smith.
Smith changed his mind and is going to stay after all.

Aerial transportation could be a mixed blessing to an isolated mining operation. Planes transported equipment, supplies, and people with greater ease than land freighting. Their widespread adoption, however, also fostered a greater dependence on plane services, any disruption of which could have severe repercussions to mining operations. This photo was taken of the first plane to land on the Yellow Band Gold Mines airstrip, completed in 1939 by the Alaska Road Commission.

CHAPTER VII: ENDNOTES

[1]Wilderness/Back Country Management Plan, Anne Worthington, personal communication, 1998.

[2]Examples of recent literature specifically addressing vernacular landscapes include Richard V. Francaviglia, *Hard Places: Reading the Landscape of America's Historic Mining Districts* (Univ. of Iowa Press: Iowa, 1991); Paul Groth and Todd Bressi (eds.), *Understanding Ordinary Landscapes* (Yale Univ. Press: New Haven, 1997).

[3]Refer "What do we do next?: Discussion and Evaluation, Management, and Planning for Preservation," in *Proceedings of the Workshop on Historic Mining Resources: Defining the Research Questions for Evaluation and Preservation*, (South Dakota, National Park Service, 1987) 108-30.

[4]Ibid.

[5]Refer J. C. Roehm, "Preliminary Report of the Bremner Mining Company, Hanagita-Bremner Mining District," *Alaska Territorial Department of Mines Propert Examination 87-5*; and J. C. Roehm, "Investigations: McCarthy, Nizina, Bremner, and Chisana Mining Districts . . ." (U.S. Bureau of Mines microfilm, 1936, ARL), 11.

Appendix 2: Glossary[1]

Amalgam: An alloy or union formed between mercury and another metal used in gold mining to enhance the recovery of *free gold*. The mercury was then driven off by distillation.

Amalgamation: the process of using mercury to form an *amalgam* with another metal (as a means to aid the extraction of the latter metal). Amalgamation was commonly used in the working of placer deposits, and was also a frequent technique used in the milling of gold ores (particularly prior to the 1900s).

Amalgamator: An apparatus employed in milling operations to bring ore, generally by agitation, into close contact with mercury in order to form an *amalgam*.

Arsenopyrite: A sulphur-arsenic form of iron (FeAsS), containing upward of 46 percent arsenic.

Assay ton: A weight used in assaying, approximating 29.166+ grams. As the assay ton bears the same relation to a milligram that a ton of 2,000 pounds does to the troy ounce, the weight of precious metal in milligrams gives directly the number of ounces to the ton.

Assaying: The process of testing ores or minerals by chemical or blowpipe examination to determine their composition. The assaying of gold and silver ores also required cupelling which involved melting the ore to remove impurities.

Auriferous: Gold-bearing rock or mineral.

Ball mill: A cylindrical mill of relatively large diameter used for the grinding of ores to milling size. Ball mills differed from tube mills in that they were shorter and used ball bearings, rather than pebbles, to break up rock.

Booming: The accumulation and sudden discharge of water, made possible through the use of a temporary water storage dam (fitted with manual or automatic triggers). Used frequently by placer mining operations in areas with limited waterpower.

Classifier: A machine for separating ore from gangue by density, used to grade the feed to other milling equipment.

Clean-up: The periodic collection of all valuable material produced in a mill or sluice.

Concentrate: A substance reduced to a state of purity or greater concentration by the removal of nonessential or diluting material.

Concentration table: A table used for the separation of gold in the milling process. While designs varied, the general technique introduced a stream of finely crushed ore and water at the head of the table fitted with riffles. As the table shook, denser ore caught by the riffles flowed into a separate compartment at the end of the table.

Corduroy blankets: A method of gold-capture using the corrugated surface of corduroy material to act similarly to riffles in catching gold. In gold mills, corduroy blankets were often installed at the end of the mill circuit to act as a final recovery technique.

[1] Adapted from Albert H. Fay, *Glossary of the Mining and Mineral Industry*, Bureau of Mines Bulletin 95 (Washington: GPO, 1920); Harold Barger and Sam H. Schurr, *The Mining Industries 1899-1939: Output, Employment, and Productivity* (National Bureau of Economic Research, Inc.: New York, 1944); J. V. Howel (ed.), *Glossary of Geology and Related Sciences* (Washington, D.C.: American Geological Institute, 1957).

Crosscut: A small tunnel driven at right angles to a *drift*, with the purpose of connecting underground workings or exposing veins.

Dressing: The processes of ore milling and concentration. Originally, the term referred to the picking, sorting, and washing of ores preparatory to their reduction.

Drift: An underground horizontal passage following a vein.

Feeder: A device, usually motorized, for feeding ore uniformly to a rock crusher.

Free gold: Gold uncombined with other substances.

Galena: A lead sulphide containing 86.6 percent lead. The commonest lead mineral.

Gangue: Minerals in an ore that are either non-metalliferous or non-valuable.

Giant: A nozzle used in hydraulic mining. Term used interchangeably with *monitor*.

Glory hole: A large open pit from which ore is or has been extracted, often when a raise breaks the surface.

Grizzly: An iron grate used to prevent larger stones from passing through a sluice. Also used for the screening of ore prior to mill crushing.

Ground sluicing: A small-scale placer mining technique using water (often assisted by *booming*) to transport gravels to a sluice.

High grade: An arbitrary term for rich ore, on the order of $100 per ton or greater for gold ores.

Hydraulic mining (Hydraulicking): A method of placer mining directing a pressurized jet of water to erode a bank of gold-bearing material and carry it into sluices.

Lagging: A lighter form of mine timbering (often round 4-to-6-inch poles, half-round mill slabs, or 2-to-4-inch planks) used to prevent falls of ground between timber sets.

Launder: A trough, channel, or gutter, used to convey water or powdered/pulped ore between milling equipment.

Lode: A vein of metalliferous material fixed in place between deposits of non-metalliferous rock.

Low grade: ore relatively poor in the particular metal mined (AF 409).

Milling: The processes of grinding, concentrating, and separating metallic ores prior to smelting.

Monitor: see *Giant*.

Muffle furnace: A furnace with a box of fire clay (muffle) used for heating assay samples evenly.

Mucking: The process of removing muck (earth, including dirt, gravel, and rock to be excavated) and loading it into tramcars for removal. While an onerous job, mucking generally determined the speed at which drifting and crosscutting could be accomplished in a mine.

Open cut: A surface cut into a vein often driven during the prospecting of deposits.

Ore: A metal-bearing mineral or rock valuable enough to be extracted profitably.

Overburden: Waste rock.

Paystreak: The portion of a vein carrying profitable ore, or, in placer mining, the concentration of free gold, commonly following streambeds.

Penstock: A sluice or gate for regulating the flow of water, or a closed conduit used for delivering water to a waterwheel or placer operation.

Placer: An alluvial or glacial deposit containing gold or other valuable material.

Raise: An upward driven mine shaft.

Retort: The treatment of material, such as gold *amalgam*, to drive off mercury and recover the gold.

Riffle: The corrugated lining of a sluice floor or table surface. Often made of wooden blocks or slats.

Rocker: An apparatus for concentrating gold ore by agitation, common for lode prospecting and placer mining.

Sluice: a long, inclined trough. In gold placer mining, sluice floors were often paved with riffles and dressed with mercury to aid the entrapment of gold.

Sluice fork: A multiple tined fork used to remove obstructions from a sluice.

Stope: An excavation from which the ore has been extracted, either above or below a level.

Stripping: The removal of overburden prior to the working of the vein.

Stringer: A narrow and often irregular mineral vein.

Stulls: Round timbers (8-24 inches in diameter) comprising the main timber supports in a mine.

Tailings: Processed material discarded from a mill or mining operation.

Tramming: The moving of mine cars between the workface and ore bin.

Troy ounce: The measure designated in assay returns for gold, silver, or other precious metals. A troy ounce is one-twelfth part of a pound of 5,760 grains, equivalent to 1.09714 avoirdupois ounces.

Wilfley table: A side-jerk *concentration table* used in ore dressing. The table is tapered toward the feed end, and the riffles become progressively longer toward the tailings side.

Windlass: A crank mechanism erected above shafts or prospecting pits to facilitate the removal of material from the workings.

Winze: A steeply inclined passageway in a mine.

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