Summer 2012

The Identification and Historic Context of Mining Archaeology of the Wenatchee Mountains within the Alpine Lakes Wilderness

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THE IDENTIFICATION AND HISTORIC CONTEXT OF MINING ARCHAEOLOGY OF THE WENATCHEE MOUNTAINS WITHIN THE ALPINE LAKES WILDERNESS

A Thesis

Presented to

The Graduate Faculty

Central Washington University

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

Resource Management

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by

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June 2012

CENTRAL WASHINGTON UNIVERSITY

Graduate Studies

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ABSTRACT

THE IDENTIFICATION AND HISTORIC CONTEXT OF MINING

ARCHAEOLOGY OF THE WENATCHEE MOUNTAINS

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A historically important metal mining region within the Alpine Lakes Wilderness of the Wenatchee Mountains was studied employing archival research and systematic pedestrian archaeological survey. The objective of the study was to provide a historical context for hardrock mining activities within the study area and vicinity and document any new historic archaeological sites within the study area. The results serve the scientific, scholarly, and general public by providing both a more complete archaeological record and aid in the formulation of land use policy within the Alpine Lakes Wilderness. Three loci of activity containing a total of 27 features with associated artifacts were identified that date as far back as the mid-1880s. Using a "mining landscape" approach to identify linkage between features and artifacts separated by time and space, coupled with appropriate interpretation through detailed documentary research, revealed the value ensconced within historical archaeology as a methodology for data collection.

ACKNOWLEDGEMENTS

I would like to give special thanks to my loving family for supporting me throughout this endeavor, especially my wife Jessica and our son Maxden. I would also like to thank committee members and my professional colleagues for their time, advice, patience, and encouragement. If it were not for Dr. Patrick Lubinski's support, time committal, guidance, and knowledge, this thesis would not have been possible. I am indebted to Brandon Sybrowsky, who provided time, labor, expertise, and all the while friendship while in the field. There is a long list of other people who contributed to the completion of this project and I am eternally grateful for all your help and support.

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CHAPTER I

INTRODUCTION

From Montana to Washington, in the mining circle he was known.
Some mines he managed but he often worked his own.
Mount Stuart was the district where most time was spent away,
[S]earching for that mother lode--awaiting his lucky day.
His interests were many--several properties in his hold,
[A]ll to be most promising the big strike, copper or gold!
Did he cross-cut the tunnels? How deep did he drive?
Did he find the main ledge and pure air to keep him alive?
Are the ore dumps still with you? Could we find them if we tried?
Talk to us Mount Stuart, tell us if you can,
[A]bout this hard rock miner, a kind and gentle man [Charles 2005:5].

The Wenatchee Mountains have witnessed extensive mining of precious metals for a long period of time, which continues up to the present day. The region was initially explored and settled by Euro-Americans largely due to the occurrence of gold, discovered near the present-day city of Ellensburg in 1853 (Overmeyer 1941) and was probably the first non-Native American discovery of gold in the state of Washington (Martin and Martin 1995). Archeological sites and artifacts associated with early mining practices are still visible on the surface of the ground down in the creek bottoms as well as in high-country environments located in cliff-bound benches exceeding 6000 feet in elevation. Many of these cultural resources have been documented in the former Swauk, Blewett, and Cle Elum Mining Districts on U.S. Forest Service administered lands, as required by law to make lands eligible for timber sales, trail building, and other activities. However, there has been less documentation of historic mining archeology in the Alpine Lakes Wilderness within the Wenatchee Mountains. This is mainly due to budget constraints faced by the Cle Elum Ranger District of the Okanogan-Wenatchee National Forest and lack of federal undertakings within the Alpine Lakes Wilderness.

This thesis is intended to fill this knowledge gap through a coherent analysis of what has been previously recorded within the Wenatchee Mountains, coupled with newfound archeological data from this study. Documentation of historic archeological sites and artifacts in the study area was intended to give a more accurate and thorough understanding of the location and cultural history of early miners and the material remains of their activities in the region. Research and analysis of both primary and secondary historical documents provided a platform from which a historical context may be developed in the future.

Unlike most archaeological investigations undertaken today, research for this study was not carried out as part of Section 106 of the National Historic Preservation Act compliancy mandates (i.e. "contract archaeology" carried out for National Register of Historic Places evaluation and eligibility under Criterion D). However, the framework and guidelines were adopted or synthesized for the thesis research from National Register Bulletins (Derry et al. 1977; Little et al. 2000; Noble and Spude 1992; O'Donnell 1992) in order to retain the potential the thesis may have as a significant contribution to the scholarly and scientific community. Archaeological facts are not intrinsically valuable; importance is determined and assigned in light of their ability to advance our understanding of human history (Costello 2007:4). Using a framework borrowed from current scholarship in the field of historical archaeology, while at the same time drawing upon a multitude of other disciplines, resulted in a product that reflects both the scientific and humanistic value potential of mining archaeology.

Accurate identification and interpretation of archaeological mining sites within their historical context is a formidable task. Their visual complexity requires abstract thinking in order to recognize what you are looking at, "In fact, there may be too much information in any one vista for the viewer to comprehend without being confused, unless he or she is selective. Therefore, it is advisable visually to diagram the scenes we see" (Francaviglia 1991:13). The unique potential to derive humanistic value from the archaeological record of mining sites was indicated by Hardesty (1988), "The goals of traditional industrial archaeology do not seem broad enough to take advantage of the information contained in the archaeology of mining sites" (17). Francaviglia (1991) suggest a landscape approach be taken to documenting historic mining sites, given their spatially extensive nature, and this is the approach taken in this thesis.

This thesis documents the historical and cultural context of gold and other precious metal mining within the study area and adjacent region, as well as the archaeological remains of historic mining activities within the study area. The primary objectives of this thesis were: 1) to provide a historical context for the exploration of ore bodies and hard rock mining practices in the Wenatchee Mountains within the upper Cle Elum River watershed through archival research; 2) to document historic archeological sites in the study area employing pedestrian survey techniques as a methodology; and 3) synthesize the historic research with the archaeological data in order to create a coherent analysis that may be used as a platform to aid in the evaluation of NRHP eligibility criteria.

The information gathered from this study will help aid in the formulation of land use policy within the Alpine Lakes Wilderness: a context for a context if you will. The *National Register Bulletin* pertaining to historic mining properties states, "The documentation . . . of these historic mining properties–especially those that are neglected or threatened–is the key to their better protection and management" (Noble and Spude 1992). It also represents an unusual approach to the documentation of historical archaeology, with the use of a landscape approach often mentioned but rarely employed in CRM archaeology. In terms of history, this thesis documents a small mining district that may not be as significant as larger and better known regions like the California Sierras, but represents important microcosm of the history of extractive industry in the Pacific Northwest and historic mining in the American West.

The organization of this thesis will be as follows. Chapter II will introduce the natural and geographical setting in which the study is located. Chapter III begins by providing a "hard rock mining cultural background" before moving on to a generalized discussion of historic mining methods and techniques used in the American West. Chapter IV discusses the historical and archaeological methods that I used in this study.

In Chapter V, the archaeological results are given and Chapter VI consists of results of my historical research. Chapter VII is my interpretations and conclusions.

CHAPTER II

STUDY AREA

Natural Setting

The study area is located in the Wenatchee Mountains, which is a subrange along the eastern slopes of the Cascade Mountains, in the Yakima River drainage basin, within central Washington, approximately 15 miles north of Salmon la Sac, Washington (Figure 1). The focus of my study is in the upper Cle Elum River watershed above the 5000 foot contour line and near the Kittitas-Chelan County line. For reasons of site confidentiality, the exact legal location is suppressed here. Elevations range from 5000-6200 feet. Accessing the highest elevations in the study area requires a 2800 foot elevation gain over a distance of 4.5 miles, much of which is off-trail.

The predominant landform is a southeastern exposure mountainside with 35% to 65% slopes, consisting of rock outcrops, boulder fields, avalanche chutes, abandoned cirques, and nivation hollows. The steep mountainside landforms have been extensively modified by glaciation (Hopkins 1966), forming a landscape of high elevation benches and cirques, which in turn provides a habitat for human occupation in an otherwise extremely steep landscape. The geologic setting of the study area is extremely complex and has been subdivided, grouped, and mapped by different investigators over time (Frost 1973; Pratt 1958; Southwick 1962). More recently, it has been generalized to a fractured and mineralized contact zone between the ultramafic rocks (commonly called serpentine

Figure 1. Study area in Kittitas County, Washington. Courtesy of Kevin Vaughn.

and serpentinites) of the Ingalls Tectonic Complex and the granodiorite of the Mount Stuart Batholith (Tabor et al. 1982). At a regional geologic scale, the study area lies east of the Straight Creek Fault Zone, a major geologic structure that separates the pre-Tertiary igneous and metamorphic rocks of the North Cascades subcontinent from the younger accreted terranes to the west (Alt and Hyndman 2002). An understanding of locale-specific geology is extremely important, if not essential, when investigating historic hardrock mining sites because the mines themselves are almost always located along or near geologic contact zones (Figure 2).

Figure 2. Photograph of geologic contact zone near the northeast sector of study area. The light colored granodiorite of the Mount Stuart Batholith is on the left and the dark brown ultramafic rocks of the Ingalls Tectonic Complex on the right. Photograph by author in summer 2009.

The most pertinent aspect of the regional geology to this thesis is the distribution of ore bodies that might have drawn metal miners to the area. In the study area, the major mining targets were pure gold veins (called free-milling gold) in a quartzite gangue (the valueless rock in an ore) and more complex ores (e.g. sulfide minerals, including arsenopyrite), which require smelting and other beneficiation processes. The gold, silver, and copper ore was prospected and mined at the contacts where the many scattered small dikelike bodies and bosses (smooth, rounded mounds of resistant bedrock) of silicic and intermediate granitic rock intrude into ultramafic rock along the periphery of the Mount Stuart Batholith (Gualtieri and Simmons 1989; Woodhouse et al. 2002).

Soil structure and deposition in the study area varies by landform type, but nearly all of the study area is mapped as Esmeralda-Rock outcrop association (National Resources Conservation Service [NRCS] 2011). This unit typically consists of 40% rock outcrop, 45% bouldery surface, and 15% colluvium with an admixture of volcanic ash. The typical profile is slightly decomposed plant material from 0-1 in, very gravelly ashy loam from 1-3 in, very cobbly ashy sandy loam from 3-44 in, and extremely cobbly sandy loam from 44-60 in (NRCS 2011).

The high and exposed landforms experience drought in summer, cold winters, and extreme diurnal temperature ranges. The mean annual precipitation is 50 to 75 in, the mean annual air temperature is 37° to 41° F, and it has a frost-free period of 60 to 90 days of the year (NRCS 2011). Snow depth varies on a year-to-year basis from moderate to heavy, with a depth of 103 in recorded in March 2012 from a weather station located approximately 2000 vertical feet below the study area (NRCS 2012).

The study area encompasses different ecological classes and their respective plant associations. Numerous ecotones make defining boundaries difficult, and microhabitats exist within classes (Lillybridge et al. 1995). In the northeast of the study area, where the rocky and windswept ridge summit makes up the study area boundary, whitebark pine (*Pinus albicaulis*) is intimately intermixed with subalpine shrublands and meadows. Immediately adjacent to the northeast boundary, granitic-loving subalpine larch (*Larix lyalli*) predominates. In the southwest of the study area subalpine fir (*Abies lasiocarpa*) is intermixed with mountain hemlock (*Tsuga mertensiana*) in the lower elevations. Throughout the study area commonly encountered shrubs include common juniper

(*Juniperus communis*) and a variety of huckleberries (*Vaccinium* spp.). Various herbs, grasses, sedges, mosses, and ferns inhabit the various ecological zones. These include subalpine daisy (*Erigeron peregrinus*), maidenhair fern (*Adiantum pedatum*), yarrow (*Achillea millefolium*), northwestern sedge (*Carex concinnoides*), lupine (*Lupinus* spp.), stonecrop (*Sedum* spp.), Idaho fescue (*Festuca idahoensis*), and dwarf bramble (*Rubus lasiococcus*). The presence of the serpentine rock is an important factor in plant growth and distribution, as serpentine soils support highly endemic species, and strongly affect the growth of plants with wider distributions (Kruckeberg 1964; Maas and Stuntz 1969; Whittaker 1954). The boundary between serpentine soils and adjacent non-serpentine soils is useful to the archaeologists because vegetational differences serve to delineate geologic discontinuities, obvious to even the casual observer (Cannon 1971; Russell 1900; Whittaker 1954).

Cultural Setting

From a prehistoric archaeological perspective, the study area falls within an area known as the Plateau Culture Area and was occupied by the Kittitas Indians, part of the Confederated Tribes and Bands of the Yakama Nation (Hunn et al. 1998). Evidence of very early native use of the surrounding area (ca. 12,000 years ago) comes from a Clovis point found by a local collector on Lake Cle Elum within twenty miles of the study area (Hollenbeck and Carter 1986). Little is known about the later prehistoric occupation of the Cle Elum River basin due to the lack of recorded sites with temporally sensitive materials. It is known from the ethnographic record that Native Americans utilized the study area and vicinity extensively on the seasonal round for huckleberry gathering, hunting, and fishing (Bell 1975; Marsh 2004; Operation Uplift 1955; Zweifel and Reid 1991).

The earliest reference to Euro-American use in the vicinity of the study area is 1837, when a small party of French Canadians, Scotchmen, and Englishmen from the Hudson Bay Company camped along the Cle Elum River while wintering near Snoqualmie Pass (Bethune 1892). Fur trapping began the pattern of extractive utilization of natural resources in the Pacific Northwest and rivalries between the various fur companies competing for access to the resources would open the region to mineral exploration (Rickard 1932). An account of the fur trade and the resulting international disputes "is necessary to an understanding of the beginnings of mining in the Northwest, because, as in the Mississippi valley, at an earlier period, the fur-trader prepared the way for the prospector" (Rickard 1932:310). During the early exploration and fur trade period in the early nineteenth century, Hudson Bay Company trappers collected fur and traveled through the study area (Elsner 1972). No known archaeology from this early period exists. This is in part due to the transient nature of long-line trappers and to the trapping methods themselves (Bancroft 1884). Targeted furbearers in the study area changed over time in relation to animal populations and market demand (Schefke 2004; Stewart 1957). They included marten (*Martes americana*), ermine (*Mustela erminea*), lynx (*Lynx canadensis*), fisher (*Martes pennanti*), wolf (*Canis lupus*), wolverine (*Gulo luscus*), bobcat (*Lynx rufus*), silver fox (*Vulpes fulva*), and coyote (*Canis latrans*) (Whitaker 1997). From an archaeological perspective, it is important to note that trappers employed species-specific trapping methods, which can help indentify fur trapping related features and artifacts.

After the early trappers from the fur trade era the next Euro-American presence in Upper Kittitas County pertinent to this thesis was the expedition of Captain George B. McClellan in 1853 (Overmeyer 1941). He was appointed by Governor Isaac Ingalls Stevens of the newly created Washington Territory to survey and determine a practical route linking Puget Sound to the Rockies, a missing link in the construction of a transcontinental railroad. In the exploration of the Pacific Northwest, "the [McClellan] expedition under the command of Isaac Ingalls Stevens, first governor of Washington Territory, was second in importance only to that of Lewis and Clark" (Overmeyer 1941:3). On the September 10, 1853, the McClellan expedition crossed the Cle Elum River and passed by Lake Cle Elum, camping near the lakeshore (Overmeyer 1941:36), a distance of approximately 20 miles from the study area. While McClellan narrowly missed the discovery of Snoqualmie Pass as a potential route, he knew of its existence as an Indian trail utilized year round (Overmeyer 1941).

The first large-scale economic enterprise undertaken in Upper Kittitas County was grazing. Grazing played a large role in the early settlement of Kittitas County, especially after the conclusion of the Yakima Indian wars of 1855-1858. According to Andrew Jackson Splawn, an early pioneer, everyone was in the cattle business in Kittitas Valley during the 1870s (Shideler 1986). Beginning in the 1880s, tens of thousands of sheep and cattle were shipped from central Washington to markets in Puget Sound and to stations in the Rocky Mountains, with Cle Elum being a major shipping station (Eckert 1976;

Glauert and Kunz 1976). Pasturage for horses, cattle, and sheep involved utilization of alpine ranges like those present in the study area, with intensive use of the eastern slopes of the Cascades (Luttrell 1992b:3.8). Grazing practices from this period altered the geophysical and ecological setting of the study area by the introduction of invasive species and habitat degradation in the fragile subalpine environments (Lillybridge et al. 1995). For example, sheep men burned much of the Cle Elum Ranger District over the years 1876-1896 to improve grazing due to the heavily overgrazed forestlands (Carter and Holstine 1992:7.7). As with fur trapping, historic grazing has left little discernable evidence in the archaeological record. Preexisting trails were utilized to seek out fresh pasturage and the camps that the herders used were transient in nature.

In the 1870s, the ranchers of eastern Washington sent most of their grain and livestock trade down the Columbia River and to stations in Portland, Oregon (Prater 1981). Realizing that transportation costs would be greatly reduced if products from eastern Washington could be shipped through a pass in the central Cascades to Puget Sound markets, both private and public plans for building a road began in earnest. Construction of a crude wagon road over Snoqualmie Pass would come in 1865, requiring the ferrying of wagons across Lake Keechelus (Prater 1981). Discoveries of gold in both central Washington and other fields to the north and the resulting rise in people and commerce necessitated an improved road that could be reliably traveled year round. It would come on July 1, 1915 when Snoqualmie Pass was declared Washington's first passable road linking Puget Sound and interior Washington (Prater 1981:49).

The Kittitas Valley was a virtual wilderness up until 1867, when the first land surveys were begun in order to prepare the region for entry under United States land laws (Interstate Publishing Company 1904:237-238). The land surveys correlate with the first permanent residents settling into the valley in the same year (Interstate Publishing Company 1904:238). Isolation was a major drawback to the region's initial settlement (Eckert 1976); a short-lived newspaper in the Teanaway Valley ran an advertisement in the first issue with the headline "PARTNERS WANTED! MUST BE FEMALES!! BEAUTY NO OBJECT!!!" (*Teanaway Bugle* 1883:2). In 1870, the first trading post, named "Robbers Roost," was erected near what would become present-day Ellensburg (Interstate Publishing Company 1904:240). Beginning in 1873 with the rediscovery of gold in the Swauk District at Discovery Bar (Operation Uplift 1955), the town of Ellensburg began its rise to prominence in Kittitas County due in large part to the growing demand of miners for supplies, such as fresh agricultural products and meat (Luttrell 1992b). As with gold discoveries elsewhere across the West during the advance of Fredrick Turner's Frontier (1894), merchants were not long in coming after the miners, in order to "mine the miners."

The completion of the Northern Pacific Railroad line through the Kittitas Valley in 1886, coupled with the discovery of the commercially exploitable Roslyn-Cle Elum coalfield by a survey team working for the railroad company in the same year, ushered in a new era of settlement and economic prosperity to Kittitas County (Operation Uplift 1955). By 1901 over a million tons of coal had been produced and shipped to markets around the globe (Kittitas Centennial Committee 1989:42). Coal production peaked during the 1920s and began to decline in the early 1930s. Coal mining also changed the demography of the region as men from other parts of the nation and world with developed coal industries flocked to the region to participate in the economic boom, resulting in a extremely diverse population (Shideler 1986:60). The towns of Cle Elum, Roslyn, and Ronald all owe their existence to the discovery of coal. Populations in the towns of Roslyn, Ronald, Cle Elum, and Ellensburg grew rapidly at the close of the nineteenth century, with the populations of Roslyn and Cle Elum doubling between 1890-1900 (Operation Uplift 1955:60). Agriculture, timber, coal mining, gold mining, and improved access to markets through the completion of the railroad line were all major contributing factors to the influx of capital and people that rapidly led to the conversion of the upper county from a hinterland to a thriving region into the 1930s.

Today, the study area is within the Okanogan-Wenatchee National Forest, owned by the United States Forest Service (USFS), and managed by the Cle Elum Ranger District administrative unit. The study lies completely within the Alpine Lakes Wilderness, which in 1976 became part of the National Wilderness Preservation System, and encompasses approximately 394,000 acres of land managed under guidelines set forth by the 1964 Wilderness Act (US-Parks.com 2012). Patented mining claims within the boundaries of the study area came back under USFS ownership on April 30, 1985 (Madden 2008a).

The study area vicinity has had a long history of recreational use. Fish Lake (today known as Tucquala Lake), was one of the most popular backcountry fishing destinations in the area until a slide off the flanks of Goat Mountain began filling the lake with debris in 1910, making it the marshy braided stream network it is today (Operation Uplift 1955:184). The study area and vicinity experiences large numbers outdoor recreationalists; the Alpine Lakes Wilderness having the distinction of being the third most heavily used wilderness in the nation (McCarthy-Ryan 1992:13.10). Hikers, backpackers, horse riders, and hunters are user groups that the study area is currently visited by, most heavily during the summer and fall seasons due to weather and accessibility issues during winter and spring.

CHAPTER III

BACKGROUND ON HARD ROCK MINING AND ITS MATERIAL TRACES IN THE ALPINE LAKES WILDERNESS

Culture of Hard Rock Mining in the Late Nineteenth Century

While mining in the study area has its own unique history, it also has had a history that is common to most other mining histories: "Once a mine has been discovered its development and exploitation, leading to eventual depletion and abandonment, seem to follow an inevitable course, though the size and richness of the deposit will determine the duration of its several stages" (Aschmann 1970:172). The typical progression of events throughout the history of mining in the American West began when a prospector discovered gold "colors" or "dust" (small particles of gold) while "panning" stream gravels, who was either shown the location by a Native American or checked it as a likely location based on personal knowledge. From there the prospector would follow the dust until paying quantities were located; if they didn't exist the pursuit was abandoned and richer deposits would be sought elsewhere.

If paying quantities were found, word spread quickly and a "rush" to the area would ensue. In the initial stage, only the richest accumulations of gold weathered away from its "parent rock", called placer, would be exploited. As the auriferous (gold-bearing) "pay dirt" began to yield less and less quantities, the parent rock from which the gold originated (called a vein, lead, ledge, lode, or reef; the terms are synonymous) would be located and mined. This "hard rock" mining ranged from a low-tech hand powered endeavor to expensive industrial scale operations that were extremely capital intensive. As new technologies were introduced and old technologies improved upon, efficiency increased until diminishing returns would cause the mining operation to be abandoned (Godoy 1985; Young 1954).

When a discovery of mineral bearing ore was made in an otherwise unpopulated wilderness, a "mining camp" would spring up. When more than a couple mineral claims were made, or if the diggings were particularly rich, a "mining district" would be established. In his book on interpreting America's historic mining districts, Francaviglia states:

> Mining districts are created when and where sufficient prospecting and mining activity has occurred to warrant the establishment of specific laws and agreements governing the mining of ores and the designation of claims. Thus, the establishment of a mining district occurs at the end of a period of pioneering and marks the beginning of serious colonization or settlement. The ultimate shape of a mining district is determined by the distribution and character of its ores and by the attitudes and backgrounds of the miners who initially develop and settle the place. The district is a kind of political-geographic reality that defines all economic and social activity [Francaviglia 1991:10-11].

Mining districts were initially conceived as a means to regulate the mining industry within its borders in lieu of a territorial or federal mineral law. The structure of the unofficial mineral law enforced by the mining districts across the West during the post-Gold Rush period (as the period beginning in 1860 is often described) were adopted from those developed in California mining camps at the onset of the Gold Rush. When these "yondersiders" (as the California immigrants were often called) spread north in search of other prospects they brought with them their system of rules and regulations (Trimble 1914). The unofficial laws established to making a claim on lands in the public domain recognized the right of discovery, the number and size of the claim an individual had mineral rights to, and it also required proof of active development and improvement, which implied a "use it or lose it" philosophy (Costello et al. 2007). These rules and regulations (in a relatively unaltered form) would go on to be codified into federal law with the passage of the General Mining Act of 1872 (Van Nuys 1940).

Placer Mining

The focus of this thesis is hard rock mining, but it is important have a brief discussion of placer mining techniques and technologies. More often than not both placer and hard rock mining methods of recovering precious metals were used within a mining district. The Cle Elum Mining District was no exception.

The primary means of separating gold from sediment is water and gravity. Gold's high specific gravity ensures that under normal conditions, as it travels it will settle to the bottom of a matrix within water. Since gold will settle to the bottom of a matrix in motion, the highest concentration of gold was usually on or near bedrock where the gold settled in between cracks (called a pay streak), requiring the removal of a large amount of overburden. One of the earliest forms of separating gold from auriferous gravels was panning. At the onset of the Gold Rush in the camps of California (and in the early years of mining camps in Washington) panning was utilized as a low-tech individual pursuit; fifty washed "pans" was considered a man's daily labor quota (Young 1970:109). Besides being a low-volume affair, only coarse gold was recovered and much (if not most) of the gold that existed as fine particles were lost. Panning was (and still is) used more for locating gold deposits than for recovering gold in a mining operation.

Having to deal with increasing quantities of low-grade pay dirt necessitated a more efficient means of extraction and recovery, which was answered by new technologies like cradles and Long Toms, both well described by Young (1970). On the top of a portable device called a “cradle” or “rocker” (Figure 3) sat a removable hopper. At the bottom of the hopper was a perforated sheet of metal that allowed the smaller sized material to pass through. The bottom of the device contained a "sluice" so that the gold would stay trapped within while allowing the lighter material to run over the top onto a tailings pile. An improvement upon the cradle was the "Long Tom" (Figure 4). Like the cradle, the Long Tom separated gold from other material utilizing a "classifier" (device that sorted material by size) in conjunction with a sluice. A sluice (also called a sluice box) was a sloped trough containing a series of horizontal riffle bars. Each riffle bar was tapered at a slight angle so that when water passed through the device, a rolling action was created, allowing the gold to settle to the bottom and the lighter materials to exit. Sluices took on many forms (earthen, timber, canvas, etc) but all sluices required an

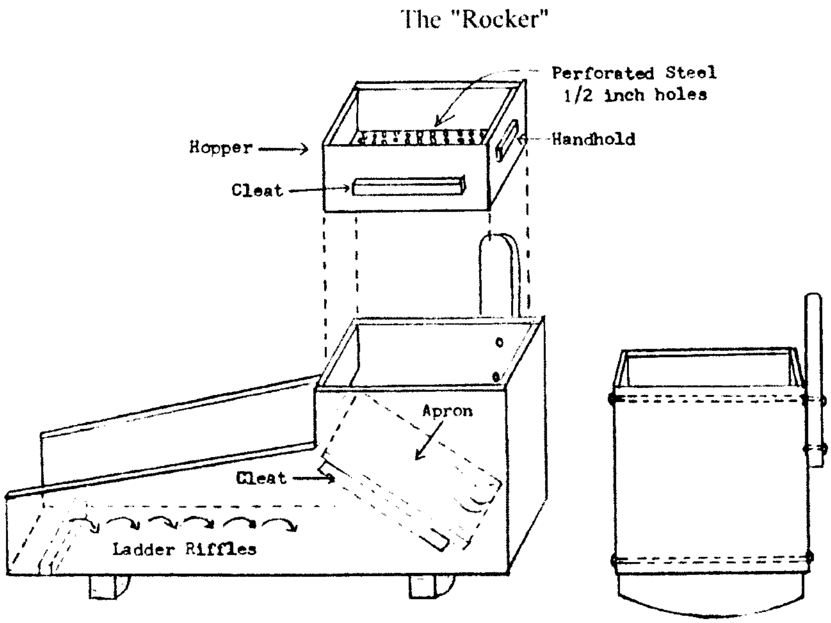

Figure 3. A typical rocker from the Gold Rush era (Martin and Martin 1995:111). The rocker was a great improvement over the gold pan both in terms of material processed and percentage of gold recovered.

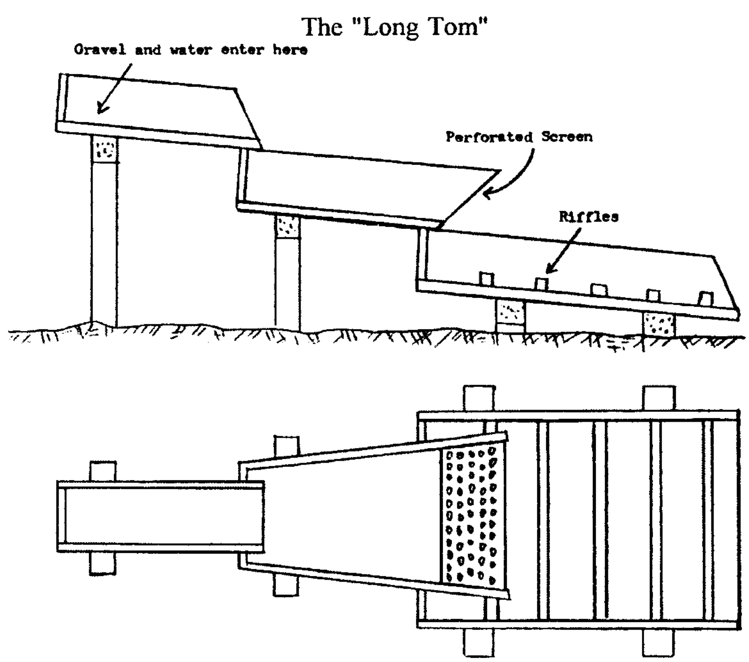

Figure 4. A typical "Long Tom"(Martin and Martin 1995:111). The long tom was more efficient than the rocker. A perforated screen prevented large material from entering the riffle box.

adequate supply of running water, often resulting in the construction of elaborate water conveyance systems (e.g. ditches, flumes, wing dams, and canals).

"Hydraulic mining" (Figure 5) transformed not only the scale of placer mining operations, but transformed the landscape as well. Hydraulic mining utilized water pumps and piping that brought water under high pressures where it was then forced through a nozzle at high velocities (akin to a modern fire hose). The resulting slurry, consisting of mud, sand, and gravel, proceeded on to a sluice where the gold would be deposited and recovered (Young 1970). The "chain-bucket dredge" (Figure 6) was placer mining on an industrial scale and also the largest of all historic mining devices (Woodhouse et al. 2002). The process of dredging began by building a pond large enough to float a barge on which the dredge was located. A suspended crane attached to a digging device excavated and delivered material to a conveyer and then proceeded on through a series of classifiers and riffles. When the pay dirt being extracted was depleted, the pond would be expanded in front and backfilled as the tailings were deposited behind (Woodhouse et al. 2002).

Hard Rock Prospecting

Although placer mining applies almost exclusively to gold mining, hard rock prospecting and mining apply to a number of metals, including gold, silver, copper, and iron. In most gold fields, after the placer workings became unprofitable, the parent rock from which the gold originated was pursued. Oftentimes, panning upslope would reveal gold particles that, over distance, increased in both size and angularity (Moen and Huntting 1975). The prospector would continue to follow this trail (called float, i.e. gold

Figure 5. Hydraulic mining operation in the Swauk Mining District ca. 1910. Central Washington University Archives, Identifier MS002-06-02.

Figure 6. The first and largest chain-bucket dredge to operate in Washington processing gravels on Swauk Creek ca. 1915. Central Washington University Archives, Identifier MS002-06-02.

near the surface) until the source was located (if it had not already been completely weathered away). In the absence of a trail of gold float, other indications were sought to reveal locations of *in situ* (primary) deposits. A basic knowledge of geologic formation processes was an important (if not essential) key to their discovery. Most metalliferous (a mineral deposit from which a metal or metals can be extracted by metallurgical processes) ore bodies in western North America were located on or near geologic contact zones of granitic batholiths (Rodman 1963). Tectonic activity created fissures and cracks by which metal- and mineral-containing solutions from the earth's interior up-welled and intruded (sometimes replacing) the country rock in a hydrothermal vent. As the solution traveled towards the earth's surface it cooled, resulting in the deposition of minerals along the fracture zones (Boyle 1987). The study of the composition and distribution of ore bodies within their respective geologic setting is extremely complex and beyond the scope of this discussion.

If a body of ore outcropped along an exposed contact zone and was not covered by vegetation, it could sometimes be detected by a visual investigation. A shiny brown staining on the surface of rocks located along a geologic contact stood out in stark contrast to the country rock of the area. Called "gossan" and composed of oxidized iron, it was a product of weathering and was located above an underlying sulfide deposit (Taylor 2011). The presence of weathered copper ore (called copper blossoms) was significant as well. These were the two initial geologic surface clues sought by miners searching for precious metal vein deposits in the absence of float, and these visual indicators tipped off the prospector indicating the presence of a ledge (Young 1970:149).

Hard Rock Extraction Techniques and Technologies

Throughout the historic hard rock mining regions of the American West, technologies employed in hard rock mining were patterned partly by the geology of the ore body and partly by engineering and logistical problems of gaining access to and removing an ore body (Hardesty 1988; Young 1970). The two methods employed in the removal of an ore body were open pit (also called open cut) mining and underground mining. Open pit mining was used when the ore body outcropped and did not dip too steeply or too narrowly. Underground mining was required when the ore body dipped steeply or was narrow. Techniques and technologies for open pit mining ranged in scale from small pits and trenches dug by hand with shovels and picks to large scale enterprises of exponential magnitude (e.g. copper mines in Anaconda, Montana), employing some of the largest machinery of the industrial age (Wyman 1979; Young 1970).

Unlike the simple methods and technology ensconced in the popular image of the bearded miner panning a mountain stream, underground lode mining required increasingly specialized technical engineering expertise both below and above ground as the scale, ore complexity, and depth of an operation increased (Johansen and Gates 1967). Complex problems were solved with high-tech solutions in the hard rock mines of capital intensive, large-scale, industrial operations (e.g. mines in Nevada's Comstock Lode, the Black Hills of South Dakota, the California Sierras, Colorado's Cripple Creek district, Arizona's Tombstone mines, etc.). Hardesty (1988) uses the term "deep mining" to describe this type of underground mining operation, as opposed to small-scale underground mining operations, which he labeled as "shallow mining." Most pertinent to this study are small-scale, shallow, and low-tech underground mining, which are discussed below in light of the events that took place within the study area and regional vicinity, as described in written accounts.

The simple low-tech "tools of trade" used in the extraction of material by early hard rock miners in shallow underground mining operations were hammers (i.e. sledges) and rock "drills" (called jacks) for making holes in a ore body; black powder (used until dynamite became available in the 1870s) for blasting the material from its parent rock; and shovels and picks to "muck out" the ore and waste rock that resulted from blasting (Paul 1963; Wyman 1979; Young 1970). Breaking up solid rock formations required drilling into the face of an ore body before blasting; accomplished by either "single jacking" (Figure 7) or "double jacking." Single jacking was performed by one miner using a three to four pound hammer and a chisel-bitted steel drill. The method was used to make holes that were usually two to three feet deep. After striking the drill with the hammer it would be rotated before being struck again. An exceptionally strong and practiced miner could "drill up" (create holes overhead) by swinging the hammer in a full circle with one hand while simultaneously rotating the drill with the other hand (Martin and Martin 1995).

Double jacking required two men; one to swing the hammer (usually eight to sixteen pounds) while the other rotated the drill between strikes. When driving deep holes, progressively smaller in diameter bits were used to fit the increase in taper of the hole, created by the continual wearing down of the chisel head. Dull drills were replaced with sharpened steel after only being driven a foot or two, the rate of which was dependent on the hardness of the rock and the integrity of the steel (Martin and Martin 1995). As the hole deepened it filled with dust and rock chips. To get the debris out of the hole a scoop at the end of a steel rod (essentially a long ladle-shaped spoon) would be used. When "drilling down" water was periodically poured into the hole creating a mud that could then be removed with either the spoon or a handmade suction pump.

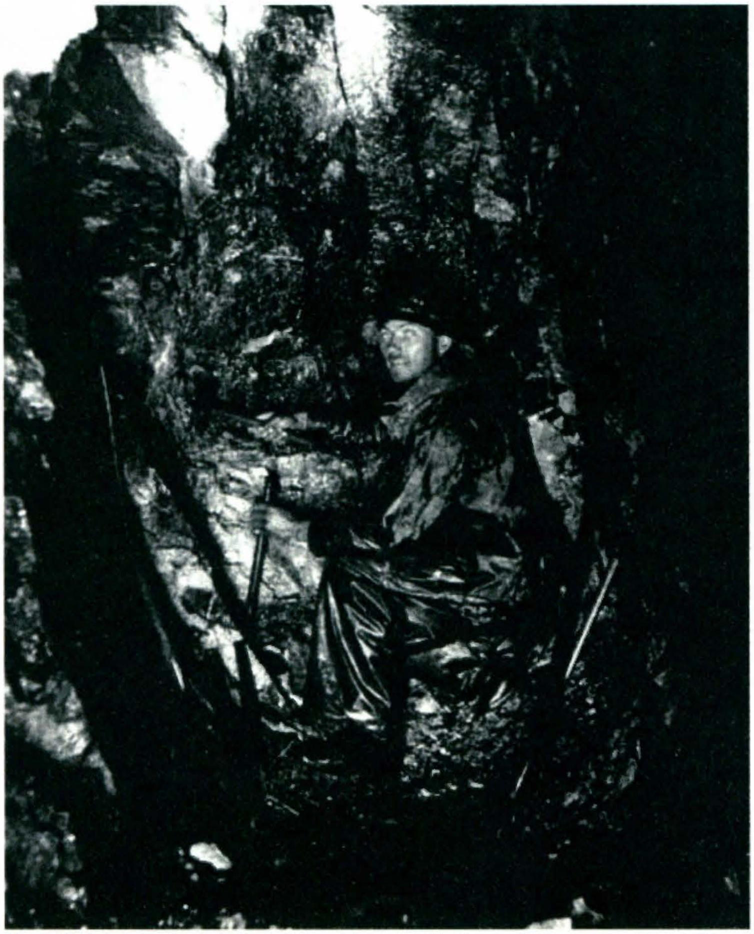

Figure 7. Miner using the single jacking method in the Esther Mine near Gold Creek, Kittitas County, 1898. University of Washington Special Collections, Repository Collection 548.

The two men would switch positions every few minutes so as not to fatigue and miss with the hammer in the cramped and dimly lit mines, "It was a tough job, and a dangerous job" (Elsner 1972). The miners of the late nineteenth century took great pride in their rock drilling abilities, holding well-attended competitions for prizes (Martin and Martin 1995:38). The introduction of power drills driven by compressed air by the Burleigh Rock-Drill Company in 1870 (soon followed by numerous competing companies and versions) revolutionized the mining industry, replacing jacking in larger operations (Wyman 1979). Power drills could advance through solid rock at six times the rate as could be done by hand (Hoffman 1999). Power drills were both difficult to transport into remote rugged areas and expensive to operate, representing up to three-fourths of a mining venture's operational costs (Peele 1918).

Adequate lighting was needed in underground workings. Three of the earliest solutions were the "candleholder," the "bug light," and the carbide lamp (Figure 8). A miner from the Cle Elum Mining District gave a description as follows (*sic*):

> [I]ts [a miner's candleholder] got a sharp point on it, got a round hole with a candle on it and a handle, it's got a hook. . . . You stuck it in a timber and all you could see was the top of your drill . . . shine on the other guy in the dark, turn your drill, drill all day, you never miss. That was double jack days, but then the carbide lamp came out, that was wonderful. Then of course they got batteries now in the mines. The carbide lamp sure was a good thing. I used a one cylinder . . . gas lantern when I worked, but the little bugger gets too hot, you start sweating to beat the band, the heat gets in there. Really a nice light, boy you could see everything [Elsner 1975:28].

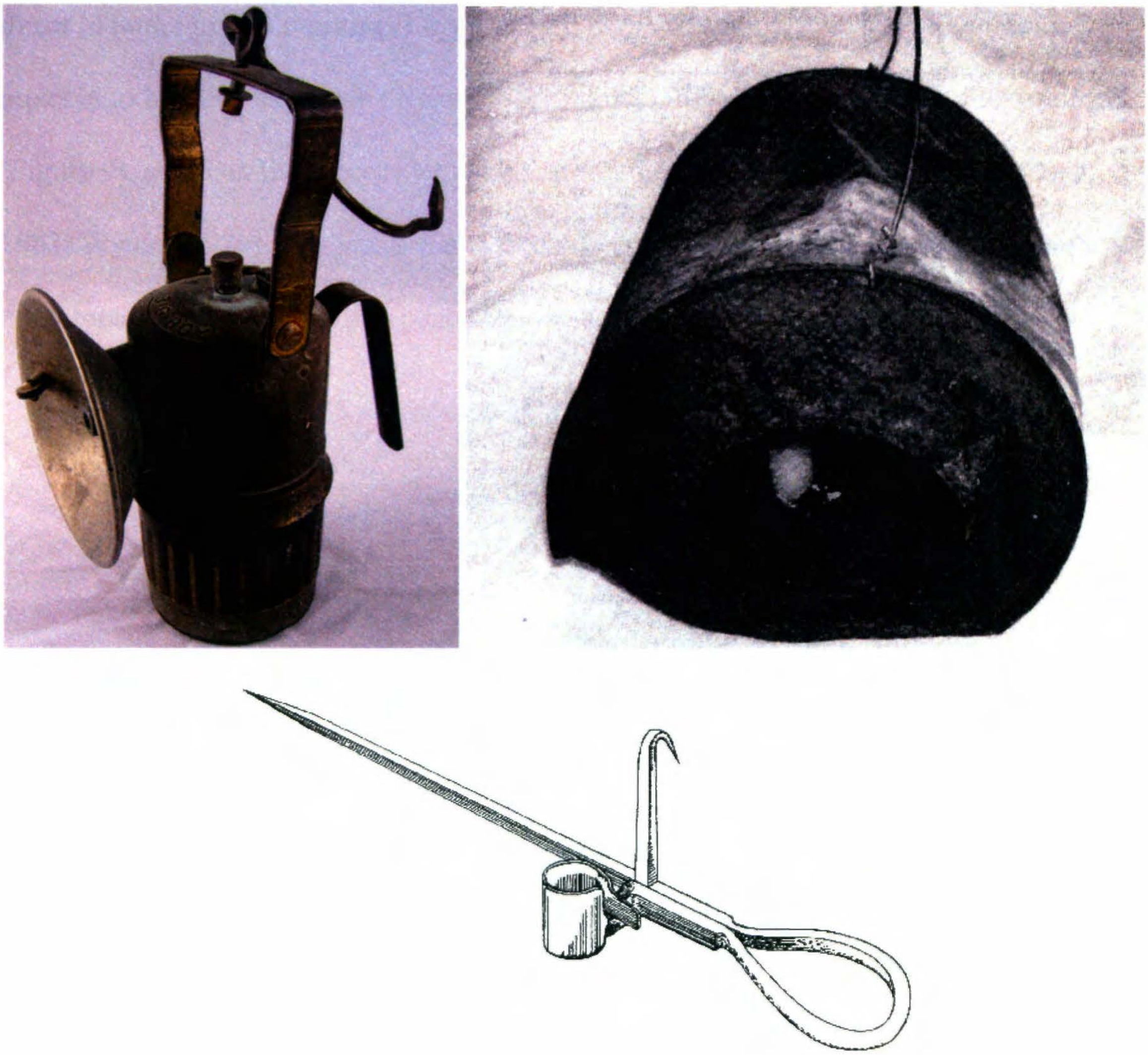

Figure 8. Underground lighting artifacts of the 19th century. Upper Left: The carbide lamp could be worn on a hat or hung from timbering (The Gemmary 2012). Upper Right: The bug light was made from a steel can with a large opening at one end with a candle placed inside near the back (Martin and Martin 1995:31). Bottom: The candleholder was either driven into timbering or a rock crevice (Ventura Gem and Mineral Society 2010).

After a hole was drilled in the rock face black powder or dynamite charges would be placed inside and tamped down with a wooden rod, primed with fuses and detonators then "spit" (lit). It was a complicated and dangerous process that requiring knowledge and experience (Young 1970). After the dust cleared (poor ventilation was a constant threat in underground workings) from the "shot" (detonation), muckers would quickly move in to breakup any large pieces of rock, shovel the ore and waste rock into ore carts (Figure 9), and then the process would be repeated (Martin and Martin 1995; Rodman 1963; Wyman 1979). The jacks, picks, and other steel tools used by the miners were often repaired, forged, and sharpened on-location by a blacksmith (Figure 10).

Figure 9. Ore cart on tracks in Kittitas County. Its position shows how rock would be unloaded through hinged door. Ellensburg Public Library Photographs, Identifier MNG-035.

In shallow mines, a single portal (opening) accessed a "shaft" (vertical or inclined passage) or an "adit" (horizontal passage or tunnel). Miners would follow the ore body through a network of "drifts" (horizontal passages in, around, and parallel to the long axis of the lode), "cross-cuts" (horizontal passages running at sharp angles to the long axis of the lode), "winzes" (a vertical passage driven downward connecting two levels within the

Figure 10. A hard rock miner and makeshift blacksmith shop near Snoqualmie Pass in 1899. The "ducks nest" was a small portable forge and clay pot that was used in many remote mining camps. University of Washington Special Collections, Repository Collection 548.

mine), and "raises" (a vertical passage driven upward connecting levels within the mine). Timbering was often required at a portal and to support "stopes" (large underground opening left after ore is removed) in areas where the country rock was highly fractured. A "stope" is where the actual mining of ore occurred (Young 1970). A "windlass" (Figure 11) was often used to remove ore and waste rock from a vertical shaft. Ore carts or wheel barrels were used to remove ore and waste rock from an adit (Figure 12).

Ore Processing

When a lode deposit was excavated, the precious metals sought within a body of ore needed to be separated from the "gangue" (the valueless but unavoidable rock that the metal is embodied within) before it could be recovered. With gold ores the gangue

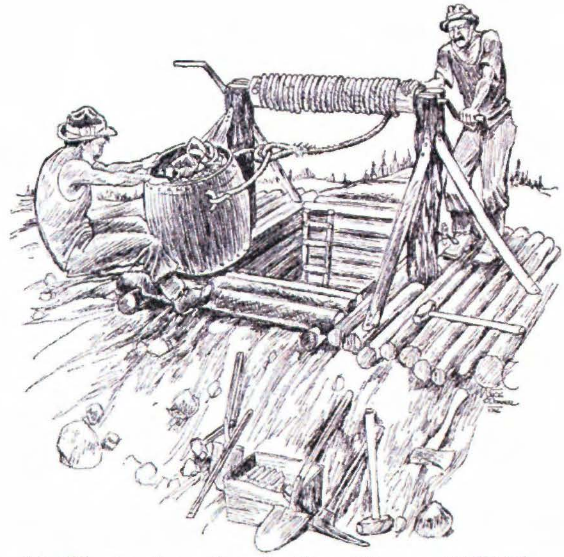

Figure 11. Illustration of a windlass (Young 1970:Figure 38).

Figure 12. Photograph of a miner in northern Kittitas County at the entrance to an adit. Ore carts were designed to run on tracks or bare earth. Low-grade ore was often stockpiled at the entrance to the mine (left). Ellensburg Public Library Photographs, Identifier MNG-004.

usually consisted of quartz, hence the use of the term "quartz vein" or "quartz ledge" (Woodhouse et al. 2002). The surface deposits that prospectors encountered and exploited during the initial discovery phase of a mining operation had become enriched by weathering and erosion over time. This weathering process (akin to decomposition) not only freed the gold from the complex chemical bonds in which it originated, but also produced a gold that was easily accessible and pure (when not disseminated throughout the ore body it occasionally concentrated into "wire" or "leaf" gold). This "free-milling" gold could be processed and recovered by low-tech methods. Before technological advances allowed for the exploitation of "complex ores," it was the only type of auriferous ore that the average hard rock miner could exploit (Lingenfelter 1974; Paul 1963; Wyman 1979).

The "arrastra" (Figure 13), a Spanish-American device introduced at the onset of the Gold Rush, was the first device used by miners for pulverizing free-milling gold ores into a fine powder (Van Buren 2004). Horses, mules, or water wheels (Figure 14) powered the device. It consisted of a flat or dished, circular, horizontal stone (sometimes concrete) floor up to twenty feet in diameter. A vertical axle in the center rotated by a horizontal arm attached to a stock animal or waterwheel on one side would drag a stone attached to a shorter arm on the other side in a circular motion across the floor of the device, gradually crushing and grinding the ore into the consistency of flour, thus freeing the gold from the quartz (Woodhouse et al. 2002). Most arrastras were disassembled upon abandonment to retrieve any gold that had fallen between the cracks of the stone floor (Costello et al. 2007).

Figure 13. Arrastra with base made of concrete located in the Swauk Mining District. Large stones or steel balls would be dragged or rolled in a circular motion around the inside perimeter of the base. Ellensburg Public Library Photographs, Identifier MNG-034.

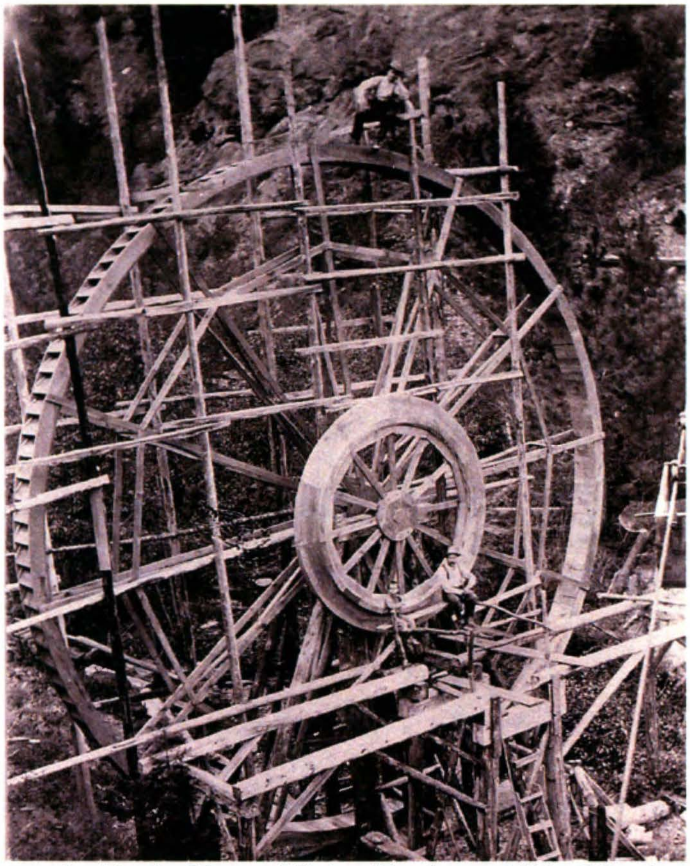

Figure 14. A large waterwheel in the Blewett Mining District ca. 1890s. Ellensburg Public Library Photographs, Identifier MNG-014.

After the ore had been crushed to a powder it was treated with mercury. Mercury (also referred to as quicksilver) has a chemical affinity for gold and when the two are brought into contact with each they mix together forming an "amalgam." The extraction of gold and other precious metals from their ores using mercury is called amalgamation. From there the gold would be separated from the mercury by "retorting," or cooking off the mercury in a "retort," which would be reinstated to its original liquid state for later use. The gold left behind is "sponge gold" and the retorting process was very dangerous due to the very real possibility of inhaling mercury vapors. Devices used for amalgamation and retorting ranged from the basic (cooking in a potato) to complex (copper plated amalgam tables), depending on the scale of operation and technology available at the time (Hodges 1967; Jordan 1964).

In terms of efficiency, milling machines were a drastic improvement upon the arrastra and were widely used at the turn of the nineteenth century. Taking on various forms and designs, the most common type of mill was the "stamp mill." Powered by steam or a waterwheel, they reduced ore to the consistency of sand using heavy "stamps" (pestles connected by cam shafts) that repeatedly struck an iron anvil-type device housed in a mortar box. After crushing, simple ores would then be fed onto amalgamation plates or other devices where the metals would be recovered (Rickard 1901). Stamp mill buildings were usually located on hillsides to take advantage of gravity (Figure 15). "Breakers" crushed ore before entering the mill, "sizing screens" and "classifiers" made sure that no big pieces of ore left the mortar box before being reduced to proper size and consistency, and "concentrators" used vibration and shaking to separate the metals from gangue. Flotation, chlorination, cyanidation, amalgamation, and lixiviation were some of the numerous chemical processing techniques used by miners to recover metals from concentrates (Hardesty 1988; Hodges 1967). When ores were really complex (such as those chemically bonded to lead compounds like galena) they had to be smelted. Major transportation networks had to be built in order to the get ores to a (often far away) smelter, an expensive proposition for small and remote mining operations.

Figure 15. A stamp mill located in the Blewett Mining District. Note how building is built on slope to take advantage of gravity. Ellensburg Public Library Photographs, Identifier MNG-018.

CHAPTER IV

METHODS

Historical Research Methods

The development and identification of the historic context for this thesis followed guidelines from Noble and Spude (1992), placing emphasis on extant and associated historic mining properties likely to be encountered during field survey. Due to the complicated nature of mining sites, and the fact that mining-related National Register nominations all too often do not fully consider the importance of the role once played by "unglamorous" features and objects (Noble 1989; Noble and Spude 1992:3), research was carried out in order to identify "feature systems." A feature system is defined as: "a group of archaeologically visible features and objects that is the product of a specific human activity. Identification of the feature system begins with documentary accounts of the morphology and activity of mining" (Hardesty 1988:3). In other words, the potential information value contained within an archaeological property may be revealed by the development of a historical context: the analytic framework within which the property's importance can be understood (Hardesty and Little 2000:13).

The first step in creating the historic context involves the identification of relevant research themes, time periods, and geographic limits. Some examples of important scholarly research themes that encompass a variety of approaches are (but are not limited to) technology, settlement, individuals, households and communities, labor, transportation, ethnicity, gender, economy, ecology, and policy (Costello et al. 2007;

Hardesty 1988; Little et al. 2000; Neumann and Sanford 2001; White 2003). Defining the period of significance should attempt to span the time period from the region's initial discovery to its decline or abandonment (Noble and Spude 1992). The geographic component of the historic context can relate to political boundaries (e.g. town, county, federal land management unit, etc), the mining district boundary established during a miner's meeting and recorded at the county courthouse, geological boundaries, geographic extent of mining activity, or by other means (Noble and Spude 1992; Seifert et al. 1995). Most sites within mining districts experienced cycles of occupation and abandonment (Hardesty 1988; Hardesty and Little 2000). Therefore, it can be extremely difficult to confidently identify the appropriate research themes, time periods, and geographic boundaries that make up the historic context of the study area.

Historical research for this thesis began with an investigation of existing contexts, utilizing a broad spectrum of sources. Some of the categories were cartographic, pictorial material, professional and technical journals, personal letters, government publications, newspaper accounts, oral histories, books, archaeological site forms, and cultural resource reports. While there is a wealth of information pertaining to mining in the study area (both broad and narrow in scope) available for research, much of it was scattered and difficult to locate and subsequently access.

Cartographic sources included townsite plats, General Land Office [GLO] survey maps, USGS 7.5 and geologic maps, maps of regional mining districts, and archaeological site maps. Published cartographic sources came from mining- and geological-related theses, USGS *Bulletins* and *Annual Reports*, Washington State

Geological *Bulletins*, and U.S. Bureau of Mines *Information Circulars*. Unpublished cartographic sources were located at Central Washington University's Brooks Library (and from other library repositories via interlibrary loan)and Washington State Department of Archaeology and Historic Preservation's [DAHP] online resource the Washington Information System for Architectural and Archaeological Records Data [WISAARD]. Pictorial material, consisting of illustrations, photographs, and postcards, came from published material in books, the Internet, the Ellensburg Public Library, Central Washington University Brooks Library.

A variety of published journals and textbooks were consulted that provided a wealth of information about mining technology and historical developments at a regional and national scale. A few of the most useful were Peele's (1918) *Mining Engineers Handbook*, Hodges' (1967) *Mining in the Pacific Northwest*, and various issues of the *Journal of the Northwest Mining Association*. A plethora of sources exist concerning every facet of mining technology, techniques, and historical developments.

Published secondary accounts and general histories of mining in the American West, Washington State, and Kittitas County were consulted in order to establish a firm grasp on the available background information. Young's (1970) *Western Mining*, Paul's (1963) *Mining Frontiers of the Far West*, and Wyman's (1979) *Hard Rock Epic* were used to explore themes on a national level. Essential contemporary readings (at a state level) were Martin and Martin's (1995) *Gold Mining Washington State: Yesterday and Today*, and *Discovering Washington's Historic Mines: Volume 2* (Woodhouse et al. 2002). A great resource for locating material for mining research is Lingenfelter's (2003)

The Mining West: A Bibliography and Guide to the History and Literature of Mining in the American and Canadian West, which devotes over twenty pages to bibliographic entries covering various Washington titles. At a regional level, Interstate Publishing Company's (1904) *An Illustrated History of Klickitat, Yakima and Kittitas Counties: With an Outline of the Early History of the State of Washington* provides a great overall historic background and includes a vast array of pioneer biographical information. Tozer's (1965) historic analysis of gold mining in Kittitas County's major mining districts prior to the twentieth century outlines major trends and developments in the region's mining history.

To obtain unpublished documentary material, I consulted a number of regional libraries and archives. These included, but are not limited to, Central Washington University Brooks Library Special Collections, Ellensburg Public Library, Kittitas County Courthouse, all in Ellensburg; the Washington State Department of Archaeology and Historic Preservation in Olympia; and the online WISAARD system. These sources are too numerous to discuss in detail, but a few deserve attention, as they were crucial in the development of a research design. Accounts in historic newspapers (available through a variety of sources and in many formats) offer the most detailed information available, but were often embellished for promotional purposes (Hardesty 1988). Personal (e.g. dairies, correspondence, oral histories, etc), town, and family histories were located in the "special collections" of the city and CWU libraries. Mining claims recorded and filed at the Kittitas County Courthouse provided individual names, geographic descriptions, and a time stamp that proved essential in the development and refinement of the historic context. The above list is far from exhaustive but it does highlight the most important unpublished documentary sources that were utilized in this thesis.

Other potential resources were consulted (for a variety of relevant documentary sources), but the material housed in their collections was either redundant or inaccessible. They included: Northern Kittitas Historical Society's Carpenter House Museum in Cle Elum, Roslyn Public Library in Roslyn, USFS Cle Elum Ranger District Station in Cle Elum, Kittitas County Historical Museum in Ellensburg, Washington State Archives' Central Washington Branch (Bledsoe Building) in Ellensburg, and the Washington State Department of Natural Resources Library in Olympia.

Archaeological Methods

Extensive background research was carried out during the pre-fieldwork phase of this study. It involved examination of both primary and secondary historical sources, and review of previous archaeological research in similar areas (e.g. archaeological, architectural, and historical site inventory files, cultural resource reports, and site distribution prediction models, etc.). The background research design was adopted and modified from *National Register Bulletins* (Derry et al. 1977; Little et al. 2000). The research prepared the field crew to identify the presence, extent, and location of features and artifacts within the study area. Field survey goals were based on the initial historic context that was developed, and then subsequently adjusted as new historic contexts were identified and others refined.

A review of pertinent historic archaeological sites and report files from DAHP's WISAARD database was completed before field survey began. A search of all non-mining related historic cultural resources within a one-mile radius revealed one isolate, 45KT3022, Clark Marten Set #1, which consists of a single marten set (i.e. a cubby-hole cut in a tree where a baited trap was placed) in a western hemlock. A search of recorded mining-related cultural resources revealed within the boundaries of the Cle Elum Mining District revealed 31 sites, 2 of which are located within the thesis study area. Some of the features that were recorded at the sites are mines, mills, can scatters, cabins, tramlines, culturally modified trees, trails, and roads. Some of the artifacts recorded at the sites consist of glass, porcelain, metal cans, cookery, cable, tobacco tins, and fragments of stove. Much of the machinery once used in mining operations in the area was sold for scrap during World War II (Elsner 1972).

On August 28, 2009 a reconnaissance trip was made to the study area vicinity in order to define study area boundaries and determine logistical issues. From this trip it was determined that a systematic pedestrian survey across the study area with a set transect interval of 20 meters would be conducted. (A discussion of the selection of the study area boundaries is given in Chapter V.) For areas where either exceedingly steep slopes or cliffs were encountered (the majority of the study area), a "gang dispersal" technique (King 1978) was used to cover as much terrain as possible. This technique involved following the topography and most likely areas for archaeology, but not necessarily even spacing or survey direction. While "surviving . . . features in underground mines are often closer to being true 'time capsules' than anything else encountered by archaeologists"

(Hardesty 1988:25), any encountered shafts or adits were not entered due to their hazardous and potentially deadly nature. The generally north-south survey transects while on survey were recorded with a Trimble GeoXT Global Positioning System [GPS] with one-meter accuracy. While surveying, if GPS position data was not available, field personnel referenced true north by handheld compass set with a declination of 17° east.

As artifacts or features were identified during transect while on survey, field crew would attempt to find additional features or artifacts within a 30-meter radius, placing a pin flag at each newly found location. The scatter of artifacts and features was expanded until the density dropped below one per 30 m, at which point a boundary was placed around this "activity locus" (Binford 1972). Only historic cultural materials and features were observed within the boundaries of the study area.

All encountered features and diagnostic artifacts were mapped as points, concentrations, lines, or polygons using the GPS, with a minimum of 10 readings each. Limited sky visibility and vegetation made satellite reception difficult, preventing getting more readings in a reasonable time. Visual documentation of every find was carried out using an Olympus Stylus 1030 SW 5.1 mega pixel digital camera. All measurements of distance were recorded in miles or meters. All artifacts and features were recorded in a descriptive narrative, with dimensional measurements recorded in inches or feet. The recorded artifacts and features, including trails, mining features, structures, and artifacts, were aggregated into loci of activity using the cultural material density cutoff noted above. For the three resulting loci, additional records were made as if they were separate sites, including pertinent environmental (e.g. vegetation, soils, slope, aspect, etc) and archaeological data (e.g. artifact or feature attributes, material type, dimensions, etc).

CHAPTER V

MATERIAL CULTURE OF MINING ACTIVITY IN THE STUDY AREA

Previously Recorded Cultural Resources within Study Area

Knowledge about previous field survey and documented historic mining archaeological properties within a one-mile radius of the field study area came from a review of existing archaeological site records, cultural resource inventories, and cultural resource report files from DAHP's WISAARD database. Pertinent environmental, geological, historical, and methodological literature was reviewed to create a knowledge base after which a preliminary field study area boundary was generated. Based on the above, a reconnaissance survey was conducted on August 28, 2009 and pedestrian survey boundaries were defined, taking into account factors such as time and budget limitations.

The search of DAHP's WISAARD revealed that during the time between when this thesis was proposed (2006) and when it was formally approved (2008), two sites (45KT3015 and 45KT3016) had been recorded inside the boundaries of the proposed study area in response to a federal undertaking (Madden 2008b). The undertaking was a proposed project called Abandoned Mine Closures that consisted of closing open mining sites (vertical shafts, tunnels, and trenches) that were deemed a public safety hazard under the Abandoned Mineral Land program. Closure of the sites and features could consist of several methods: polyurethane foam plugs, corrugated steel culvert with a grate, steel gate, and filling with earth.

As part of the Abandoned Mine Closures project, known mines that were identified as a public hazard were surveyed between August 31, 2007 and September 19, 2007 by a Forest Service [FS] cultural resource technician (Madden 2008b). The survey identified four historic sites (45KT3015 through 45KT3018), two of which were located within my originally (2006) proposed study area (45KT3017 and 45KT3018). The Abandoned Mine Closures report (Madden 2008b) states that there had been no prior cultural resource surveys in the project area. In addition to the above, two other sites (FS Field Number 17-03-28 and FS Field Number 06-17-07-34) were identified on WISAARD within one mile of the proposed survey area.

Site 45KT3015 (FS Site 03-666–Lynch Mines) is located in the center of the study area. According to the report (Madden 2008b), the site consists of a large mining complex that covers 235 acres with boundaries covering the patented mining claims of the Aurora Mining and Tunnelsite Company. John Lynch was listed as president and mine manager with patent being issued in 1913. A total of 29 features and one artifact were recorded. The features were recorded as six adits, one rock adit, three cabins, one cabin/barn, one platform footprint, one fire ring, one outhouse, two vertical shafts, three vertical shaft/depressions, one mineral survey, two trenches, two depressions, one rock depression, one adit and tailings pile, and one portal. The one artifact recorded is a purple glass octagon bottle base. The site was determined ineligible for NRHP based on lack of physical integrity of site features.

Site 45KT3017 (FS Site 03-664–Lynch Mill) is located downhill of the survey area. According to the report (Madden 2008b), it includes two mill sites built ca 1891 that were owned and operated by John Lynch. The site consists of eight features in all. There are two stamp mill footprints, one collapsed cabin with square and round nails present, three cabin footprints, a shallow depression, and a tailings pile measuring 35 ft x 50 ft and approximately 4 ft high.

Site 45KT3018 (FS Site 03-0663–Lynch Homestead Cabin) is located downhill of the survey area. According to the report (Madden 2008b), it is a cabin site location with a few fragments of colored glass and orange crockery. It was noted "it is highly probable that buried deposits exist as it was the practice to burn and/or bury these old abandoned cabins" (Madden 2008c:4). This site was recorded earlier as Cultural Resource Inventory FS Field Number 17-03-28, with a site form dated October of 1977 and titled "Lynch Cabin." At that time it was still in good condition and deemed historically significant based on transportation and mining associations (Faria 1977).

Site 45KT3016 (FS Site 03-665) is located in the center and downhill of the thesis study area. According to the report (Madden 2008b), it is a historic trail linking Site 45KT3015 to Site 45KT3018 and Site 45KT3017. Towards the summit of the ridge the trail branches in two directions. The trail was determined ineligible due to it being modified over the years by general trail maintenance and lack of character-defining elements and features.

FS Field Number 06-17-07-34 (French Creek Cabins) is located about 0.8 mi from the study area on the other side of the mountain crest. According to the site form (Thompson and Rader 1990), this site consists of three log structures and three leveled areas. Located at a historic trail junction on a tributary to the Icicle River, the site was dated ca. 1901. It was determined that the cabins were probably associated with mining activity of the Great Scot Mining Company.

2009 Survey and Its Findings

Based on a synthesis of the background research, it was realized that undocumented material traces of historic mining activities linked to individuals significant in the development of the Cle Elum Mining District still existed in the general field study area in addition to these previously recorded sites. This resulted in the field survey being split into two separate geographical units, designated as Area A (Figure 16) and Area B (Figure 17), to either side of the recorded 45KT3015 "Lynch Mines." The field survey conducted to the northwest and to the southeast of 45KT3015 was carried out on September 12, 13, and 28 of 2009. The result from this survey was the identification of three loci of activity; two loci were in Area A and one locus in Area B (Figure 18). The objects recorded consisted of artifacts, linear features, and non-linear features that were interpreted as being associated with historic mining activities.

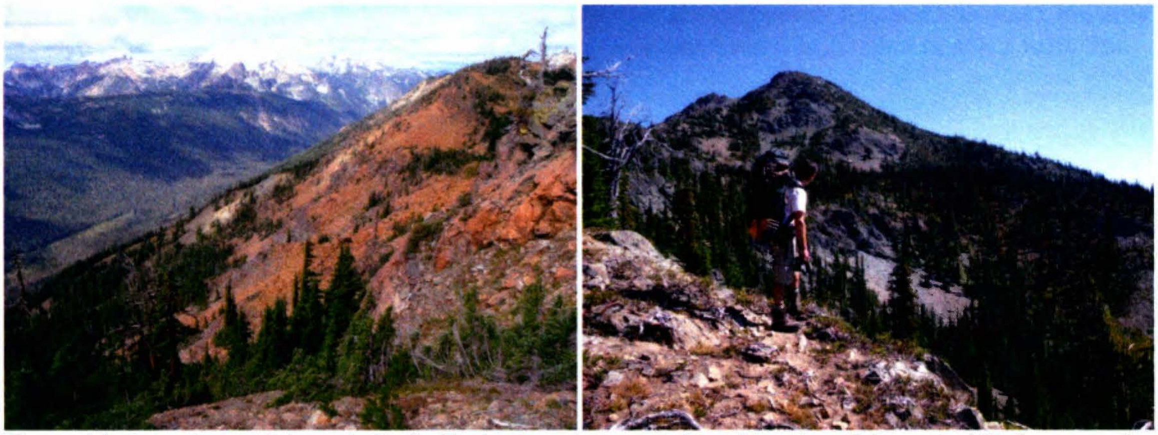

Figure 16. Overviews of Area A. Left: Facing northwest at the mid-point of Area A. All photographs taken by author in September 2009 unless indicated otherwise. Right: Photograph of author facing southeast at the mid-point of Area A. Taken by Brandon Sybrowsky in September 2009.

Figure 17. Overviews of Area B. Left: Facing northwest near the mid-point of Area B. Right: Facing northwest near the southeast boundary of Area B from approximately 700 vertical feet above photo on left.

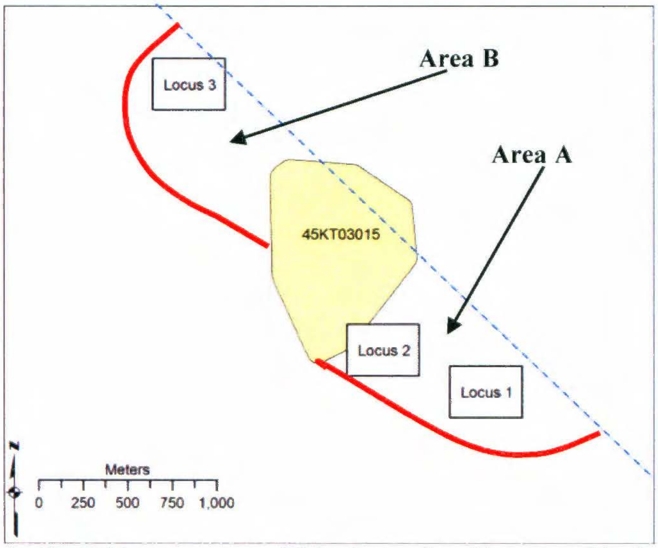

Figure 18. Map of loci in the field survey area. This shows the ridge crest (dashed blue line), the area surveyed (between red lines and ridge crest), and Area A and Area B in relation to 45KT3015. The boundaries and ridge crest locations are approximate.

Locus 1 is located in Area A of the field study area (Figure 19). Locus 1 consists of two features and four artifacts (Table 1 and Figure 20). Feature 1 is a cabin footprint with logs present in the west wall and large angular cobbles stacked along the north wall (Figure 21). The cabin appears to have been burned down. Amber glass, sheet metal, and round nails are scattered throughout a rock pile located along the north wall. Feature 2 is

Figure 19. Overview of the southeast portion of field survey Area A. Feature 1 of Locus 1 is located on a flat and narrow bench (red arrow).

Table 1. Locus 1 Features and Artifacts

Feature/ Artifact	Type	Description	Dimensions	Setting
F1	Cabin footprint	Cobbles along north wall are from what is presumably a fire hearth	19 ft Long x 17.5 ft wide	8° Slope and 283° aspect
F2	Trail	Trail leads to cabin	~220 m Long	Varying
A1	Cartridge base	12 Gauge "high brass" with datable head stamp and primer	N/A	18° Slope
A2	Amethyst glass fragment	Non-descript other than color attributes	1 in x 1.75 in	Slope
A3	Aqua vessel fragment	Thick pale-aqua glass fragment with green hue and air bubble inclusions	1.5 in x 2 in	Slope
A4	Can	Hole-in-cap	4.75 in. Long x 4 in. wide	Slope

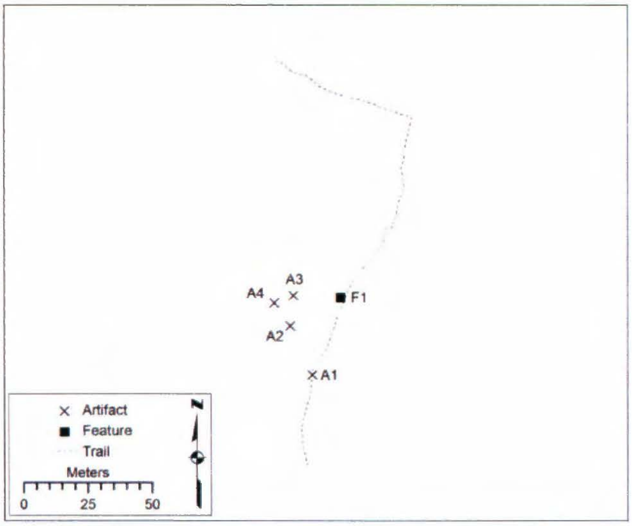

Figure 20. Map of Locus 1. This demonstrates the spatial relationship between linear feature (trail) to non-linear feature (cabin footprint).

Figure 21. Overview of F1 (cabin footprint) facing west. Note cobbles along north wall.

a trail that accesses the former cabin. Of the artifacts found, four were recorded that provide age estimates (Figure 22). Artifact 1 is a cartridge base from a paper-hulled shot shell embossed with "1901 No. 12 LEADER" on the head stamp and "WRA …EW…" on the primer and was manufactured by the Winchester Repeating Arms Company between 1901 and 1920, based on this head stamp (Steinhauer 2011). Artifact 2 is a fragment of amethyst glass and was manufactured prior to ca. 1917 (Intermountain Antiquities Computer System [IMACS] 1992). Artifact 3 is a fragment of thick pale-aqua glass from a round vessel with blisters (large air bubble inclusions), most likely manufactured prior to ca. 1910 (IMACS 1992). Artifact 4 is a hole-in-cap can and suggests a date of occupation prior to 1914 (Horn 2005; Rock 1984).

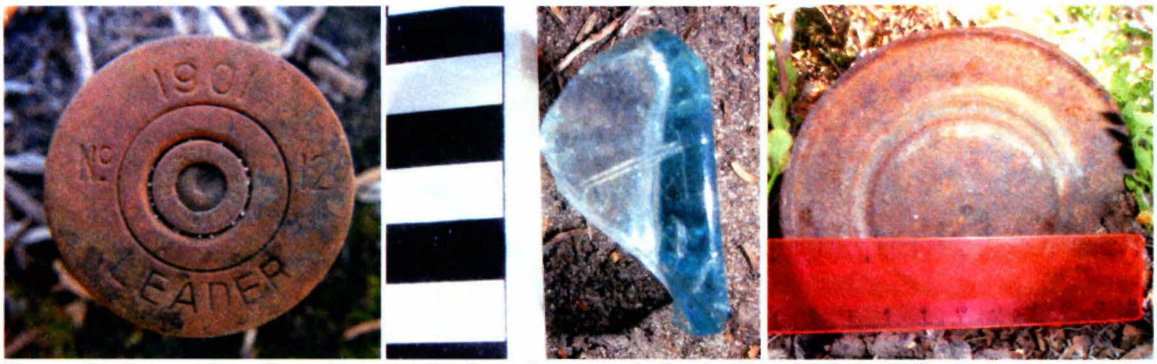

Figure 22. Selected artifact photographs from Locus 1. Left: Artifact 1 (shot shell) shows preserved detail of both head stamp and primer. Middle: Pale-aqua glass fragment (Artifact 3) with a centimeter bar shown for scale. Right: Artifact 4 is a hole-in-cap can.

Locus 2, located approximately 400 m northwest of Locus 1, consists of five features, two artifact concentrations, and five artifacts (Table 2 and Figure 23). Objects within Locus 2 include the remains of a collapsed cabin, a trail, earthen pads with rock cribbing, a large trench and tailings pile, the remains of a stove, and artifact concentrations containing colored glass fragments. The trail links the features of Locus 2 to the southeast border of Site 45KT3015 and the linear feature that is Site 45KT3016.

Feature 1 of Locus 2 is a collapsed cabin and was constructed of both milled lumber and logs with an entryway located on the southeast wall (Figure 24). Flattened cans and other metal lay strewn about the vicinity of Feature 1 and Feature 2 that may be the remains of metal sheeting used in roofing. Feature 2 is a fire ring located five meters

Table 2. Locus 2 Features and Artifacts

Feature/ Artifact	Type	Description	Dimensions	Setting
F1	Collapsed cabin	Cabin is constructed of both milled lumber and round logs.	26 ft Long x 20 ft wide x 2.5 ft high	4° Slope and 136° aspect
F2	Fire ring	Fire ring, stove pieces, and glass fragments	3 ft Diameter	4° Slope and 138° aspect
F3	Trench	Trench is most likely a collapsed shaft or adit.	66 ft Long x 36 ft wide x 10 ft deep	90° Aspect
F4	Earthen pads	Three rectangular-shaped footprints adjoining one another were interpreted as tent platforms. Outside dimensions are given. Pads cut out of a 30° Slope with a 170° aspect.	P1: 10.5 ft Long x 5.5 ft wide P2: 8 ft Long x 6.5 ft wide P3: 8.7 ft Long x 6 ft wide	~6° Slope and ~266° aspect
F5	Trail	The trail connects the other features in Locus 2	625 m Long	Varying
A1	Glass fragment	Amethyst-colored glass fragment. In Floor of Pad 1.	0.8 in x 1.25 in	See F4
A2	Can	Hole-in-top can in floor of Pad 1	Unobtainable due to condition	See F4
A3	Metal pail	Flattened metal pail with wire handle and top rolled upper seam in Pad 2.	10 in Wide x 6 in high	See F4
A4	Rubberized textile	Textile has deteriorated beyond recognition as to function. Floor of Pad 2	6 in x 8 in	See F4
A5	Metal pail	Galvanized steel pail that is heavily rusted with a wire handle and riveted fixtures. 10 m down-slope from Pad 3	1 ft Diameter	209° Aspect
C1*	Glass fragments	~20 Pieces of brown and amethyst glass fragments	1.5 m Diameter	4° Slope and 138° aspect
C2	Broken bottle	~30 Pieces from large dark amber bottle of thick glass with a push-up base. Fragments of metal present in boundary of concentration. In floor of Pad 3.	Fragments range from less than 1 in to 3.25 in	See F4

* C= artifact concentration

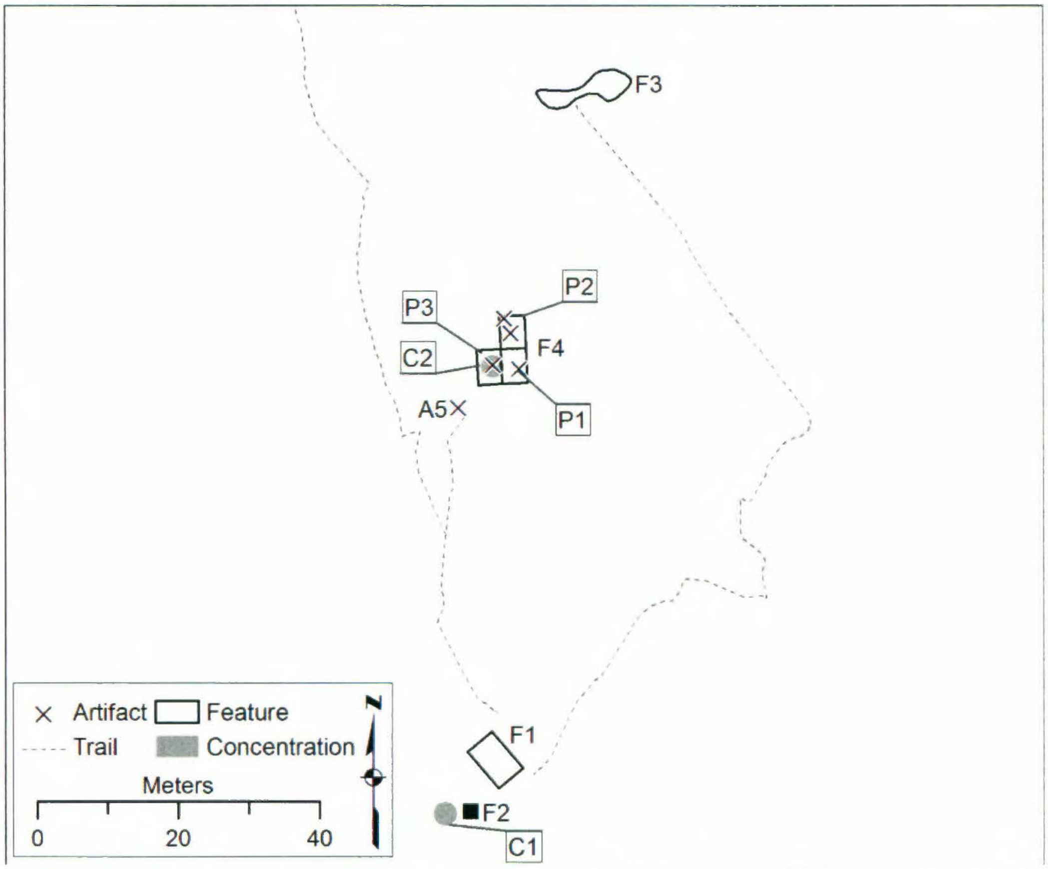

Figure 23. Map of Locus 2. The full 625-meter length of the trail (Feature 5) is not shown on this map, where it continues on to the northwest. It links site 45KT3012 to the earthen pads (Feature 4), the collapsed cabin (Feature 1), and the mine (Feature 3).

Figure 24. Two views of Feature 1 in Locus 2. Left: Overview (facing south) of Feature 1 (collapsed cabin) with Feature 2 (fire ring) and Concentration 1 in the background. On the left of the photo is the cabin's entryway. Right: Photograph of same cabin taken facing north.

from the south wall of the cabin at a 190° bearing. Rusted stove parts and an artifact concentration (Concentration 1) of amber and amethyst colored glass fragments of approximately 20 pieces lie in close proximity. While the amber glass fragments lack datable attributes, the amethyst glass was manufactured prior to ca. 1917 (IMACS 1992). Feature 3 is a large trench and waste rock pile over 60 ft long and 10 ft deep that appears to be a collapsed shaft or adit. Saw-cut logs are located in the bottom of the trench and a large amount of material appears to have been excavated during operations.

Feature 4 (Figure 25) consists of three connected earthen pads (labeled Pad 1 through Pad 3) and was interpreted as tent platforms that were used by miners working at Feature 3 (the mine). All individual artifacts recorded in Locus 2 were found within a 10 m radius of Feature 4 (Figure 26). The pads were cut out of a ridge with a 30° slope on which the pads are sloped an average of 6°. The back wall of Pad 1 consists of a large tree and boulders. An amethyst-colored curved glass fragment (Artifact 1) and hole-in-top can (Artifact 2) were found in the floor of Pad 1. The amethyst glass fragment was manufactured prior to ca. 1917 (IMACS 1992) and the hole-in-top can was manufactured beginning in 1900 (Rock 1984). Embedded in the floor of Pad 3 are fragments of thick amber glass from a large round bottle. Down-slope, Pad 2 has cobbles and at least three courses of rock cribbing for a back wall that is a maximum of three feet in depth. Two pieces of timber, rubberized textile (Artifact 2), and metal pail (Artifact 3) were in the flooring of Pad 2. The back wall of Pad 3 has a maximum height of three feet, consisting of boulders, cobbles, and earth. Artifact 4 is a galvanized steel pail located down-slope of Pad 3.

Figure 25. Two views of Feature 4 in Locus 2. Top: Looking east at Feature 4 (earthen pads), Pad 3 is in the foreground (enclosed in yellow rectangle) and above the vertical back wall is Pad 1. Pad 2 is on the left but only its south wall is visible. Pin flags mark artifacts. Bottom: Overview facing south with Pad 2 in the foreground. Photographed by Brandon Sybrowsky, the author is standing in floor of Pad 1 near its west wall, which is the back wall of Pad 3.

Figure 26. Selected artifacts from Locus 2. Left: Amethyst glass (Artifact 1). Middle: Hole-in-top can (Artifact 2). Right: Flattened metal pail (Artifact 3).

Locus 3 is in Area B of the field survey area and consists of 20 features, 3 artifact concentrations, and 6 artifacts (Figure 27 and Table 3). The trail (Feature 20) links mining Features 1-18 over a distance of 360 m, located along a northwest to southeast-trending narrow bench enveloped by an extremely steep (up to 39°) slope both uphill and downhill. Feature 19 is located off of the trail approximately 100 m below the mid-point of the bench.

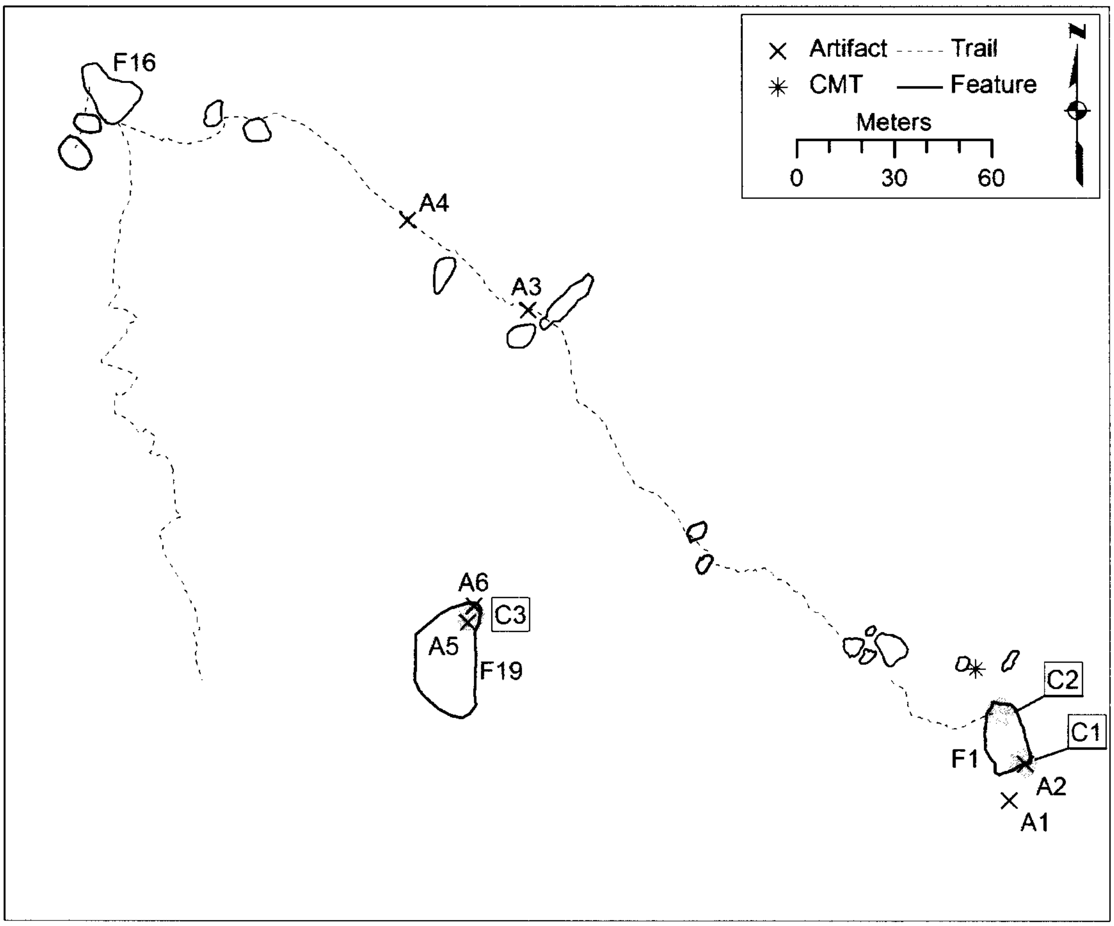

Figure 27. Map of features and artifacts in Locus 3. This map depicts the distribution of objects recorded during field survey in Locus 3 within Area B. Whether labeled on this map or not, the features (polygons and asterisk) are numbered counterclockwise, commencing with F1 and ending with F19. The trail is F20.

Table 3. Locus 3 Features and Artifacts

Feature/ Artifact	Type	Description	Dimensions	Setting
F1	Adit	Open adit, waste rock pile and flat platform located in front of adit. The amount of material present indicates extensive underground workings. Gualtieri and Simmons (1989) thought the paying-ore was taken from a winze 70 ft from the adit portal.	Adit: 5.77 ft wide x 7 ft high Waste rock pile: 39.5 ft wide x 40.5 ft long Waste rock platform: 17.5 ft wide x 29 ft Long	35° Slope and 162° aspect 29° Slope and 162° aspect 3° Slope and 160° aspect
F2	Trench	Located above F1, most likely a caved adit or shaft. There appears to be a pile of sulphide ore stockpiled on the dump	10 ft Wide x 30 ft long	28° Slope and 85° aspect
F3	Tree	Metal lid and flattened tin can on whitebark pine tree	Tree is 1 ft in diameter	30° Slope 340° aspect
F4	Trench	Appears to be a collapsed adit or shaft. Located due-west of CMT	11 ft Wide by 12 ft long x 6.5 ft deep	30° Slope
F5	Vertical shaft	Rotted timbers cover shaft entrance and rock waste pile on two sides. Dimensions include waste rock.	29 ft Wide x 35 ft long x 5.5 ft deep	F5-F8: ~8° slope and ~170° aspect
F6	Prospect pit	Small prospect pit with discernable overburden off to all sides	4.5 ft Wide x 5.5 ft Long x 1.5 ft Deep	See above
F7	Trench	F7 and F8 are connected with waste rock piled off to either side	13.5 ft Wide x 16 ft long x 3.5 ft Deep	See above
F8	Trench	Dimensions include waste rock	16 ft Wide x 25 ft long x 4.5 ft deep	See above
F9	Trench	F9 and F10 are located parallel to each other on bench	5 ft Wide x 14 ft long x 3 ft deep	~12° Slope and 210° aspect
F10	Trench	Both trenches are narrow and shallow	3.5 ft Wide x14 ft long x 3 ft deep	220° Aspect
F11	Trench	Long trench with A3 (hole-in-cap) located 3 m to the west of feature	3 ft Wide x 70 ft Long x 2.5 ft Deep	6° Slope and 215° aspect
F12	Depression	Deep pit/depression cut into solid bedrock. Overgrowth made determining dimensions impossible	7 ft Deep	220° Aspect
F13	Trench	One of a series of trenches along the bench	2.5 ft Wide x 20 ft long x 2.5 ft deep	170° Aspect
F14	Depression	Another depression similar to F12 but not vegetated	8 ft x 8 ft x 5 ft deep	245° Aspect

Table 3. Locus 3 Features and Artifacts (Continued)

Feature/ Artifact	Type	Description	Dimensions	Setting
F15	Trench	Long and narrow trench	27 ft Long x 5 ft wide x 3 ft deep	11° Slope and 258° aspect
F16	Collapsed shaft	Extensive amount of material removed as evidenced by waste rock	~25 ft x 30 ft x 5.5 ft deep	215° Aspect
F17	Depression	F17 and F18 are small depressions to the south of the collapsed mine (F16) and are located in close proximity to each other	3.5 ft Deep	230° Aspect
F18	Depression	See above	2.5 ft Deep	230° Aspect
F19	Adit	Large adit with extensive waste rock pile and a concentration of artifacts (C3) near the adit entrance	Adit: 5.5 ft wide x 4.1 ft high	Adit: 35° slope and 212° aspect Waste rock pile: 34° slope
F20	Trail	Trail linking mining features	~480 m Length	Varying
A1	Wheel	Steel wheel has 8 spokes and is riveted. Located downhill from F1 at 146°	16 in Diameter with a 1.5 in wide rim	160° Aspect
A2	Metal pail	Galvanized steel pail with riveted hinges to handle in C1	Crushed and oxidized beyond measuring	168° Aspect
A3	Can	Hole-in-cap can located 3 m West of F11	Crushed: measurements unobtainable	6° Slope and 215° aspect
A4	Can	Soldered seam tin can, cannot positively, located on Bench 20 m northwest of F13	Crushed: measurements unobtainable	170° Aspect
A5	Amethyst vessel base	Base has no maker's marks	2.5 in x 1.25 in	34° Slope and 212° aspect
A6	Shovel	Size 2 riveted steel Shovel head located in C3 at Adit Portal (F19)	11 in Wide x 8.5 in long	212° Aspect
C1	Metal artifacts	Concentration is near F1 southern boundary and consists of fragments of unidentifiable cans, stove, etc	1.5 m Diameter	160° Aspect
C2	Wood and metal	The concentration continues into the mine an undetermined distance. Consists of barrel hoops, a funnel with soldered seams, milled lumber and round logs, etc.	Mapped as a 1 m circle,	162° Aspect
C3	Metal artifacts	At the portal to F19, consists of barrel hoops, a shovel, metal piping, etc.	~2 m diameter	212° Aspect

Feature 1 is an adit with a large waste rock pile located on a ledge of rock outcrop that gives way to talus below (Figure 28). At the portal to the adit there is an artifact concentration (Concentration 2) consisting of a funnel, barrel rings, 25+ pieces milled lumber within a 1-meter radius, and other metal fragments that are unidentifiable. A level platform situated on top of the waste rock pile provides access to the trail and flat bench to the west. At the toe of the waste rock pile is a concentration of artifacts (Concentration 1) that are spread in a semi-circle along the perimeter of the toe consisting of metal stove fragments, a crushed galvanized metal pail (Artifact 2) and other various metal fragments that are unidentifiable. Two artifacts were recorded near Concentration 1. Artifact 1 is a metal wheel that is presumably from a wheelbarrow or ore cart. Feature 2 is a trench located directly above Feature 1 and appears to have been excavated in an attempt at reaching the same vein as the more extensive excavation below (Figure 29). Directly east of Feature 2 is a culturally-modified tree (Feature 3) and adjacent to it is Feature 4, another trench or collapsed adit. The culturally-modified tree is what is presumed to be a dead whitebark pine tree (*Pinus albicaulis*) that shows evidence of axe chopping and has partially healed. Interpreted as a mineral claim boundary marker, the side of the tree exhibits a round metal cap above a flattened piece of tin can with a solder seam.

Figure 28. Overviews of Feature 1 (adit) in Locus 3 and associated remains. Upper Left: Looking into the adit in F1 and C2 at a 341° aspect. Upper Right: Overview of F1 facing east. Middle Left: This is a culturally-modified tree and was probably a claim marker. Middle Right: The steel wheel (A1) below F1. Bottom: Waste rock pile taken from C1.

Figure 29. Overview from Feature 1 to Feature 2. Taken from the adit portal in Feature 1 facing uphill with a 13° aspect to Feature 2 located directly above. To show scale and relief, Brandon Sybrowsky stands on the southeast rim of the trench, as indicated by the red arrow.

Feature 5 through Feature 8 constitutes another grouping of features in Locus 3 (Figure 30), consisting of a collapsed shaft (Feature 5), a prospect pit (Feature 6) and two trenches (Feature 7 and Feature 8). The features are clustered on the narrow bench where many of the trees within a 10 m radius of the features were likely cut for mine timbering (structural supports). Heading further up the trail to the northwest is Feature 9 and Feature 10, two trenches that run parallel to each other.

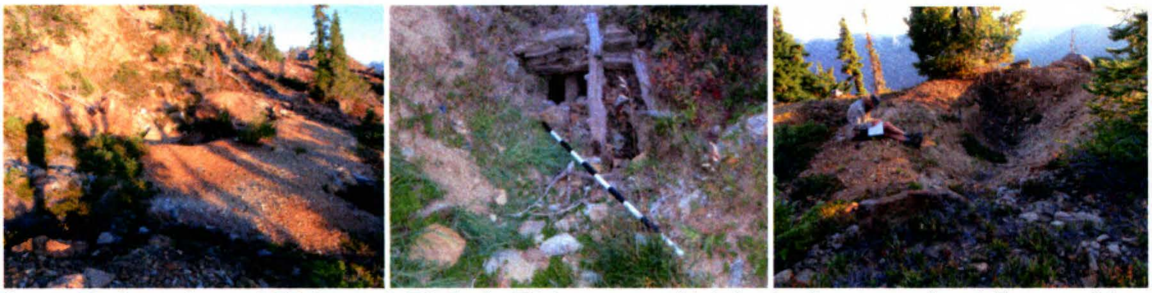

Figure 30. Overviews of F5 through F8. Left: F6 (prospect pit) is in the foreground and Feature 5 is in the background. Middle: Looking into mine shaft in F5. Right: Overview of F7 and F8 facing southwest.

Artifact 3 is a hole-in-cap can located on the trail (F20) between a long, shallow, and narrow trench (F11) and an overgrown depression (F12). The can suggests a date of occupation prior to 1914 (Horn 2005; Rock 1984). Continuing on the trail is another shallow and narrow trench obscured by heavy vegetation (F13). Artifact 4 is a solder-seamed tin can that has deteriorated beyond further identification and was located before reaching a cluster of mining features in the far northwest of the survey area. Feature 14 through Feature 18 make up the furthest northwest extension of mining features identified during the survey (Figure 31). The most extensive excavation is Feature 16, which appears to be a collapsed mineshaft. A thin scattering of metal artifacts lie about the waste rock pile in F16 and all were deteriorated beyond recognition excepting for a few pieces of barrel bands. Feature 19 consists of an adit, large waste rock pile, and an artifact concentration (C3) located at the portal to the adit (Figure 32). On the waste rock pile was slag from blacksmithing. Two artifacts were mapped. Artifact 5 is an amethyst colored bottle base and was manufactured prior to ca. 1917 (IMACS 1992). Artifact 6 is a shovel blade embossed with "June...2..." and was updatable despite my best efforts.

Figure 31. Overviews of F14 through F18. Left: F14 (depression) Right: Brandon Sybrowsky at Feature 15 (trench) with waste rock of F16 directly behind him and the approximate location of F17 and F18 indicated by the red arrow.

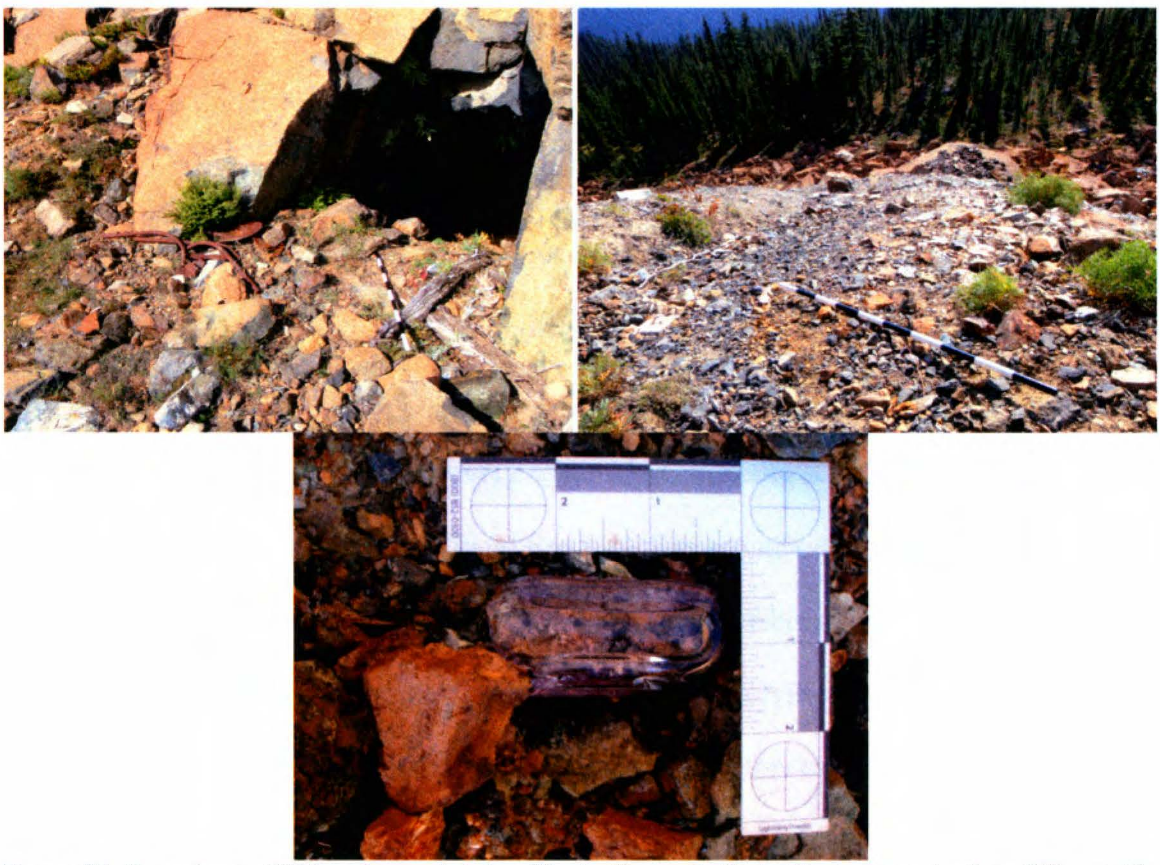

Figure 32. Overviews of F19 and associated artifacts. Upper Left: Artifact concentration (C3) outside of adit portal. Upper Right: Facing southwest looking down waste rock pile. Bottom: Amethyst bottle base (A5).

CHAPTER VI

HISTORY OF MINING IN THE STUDY AREA

Even small mining camps had significant ramifications for the development and character of their respective regions. Despite its geographical remoteness and small size, the Cle Elum Mining District was linked into a vast economic, demographic, communications, and transportation network on a national and international scale (Hardesty 1988; Wallerstein 1988). While the history of the study area could be limited to a discussion of events and activities that took place within its boundaries, any meaning or significance it may have would be lost if not placed within a broader context. This section will be a discussion of relevant events and developments at different scales in an attempt at placing the history of the study area within its rightful place.

Early Events in Central Washington's Gold Mining History

Within ten years of the discovery of gold in California at Sutter's Mill in 1848, which marked the beginning of the Gold Rush, miners spread out in search of new riches and the Pacific Northwest was no exception. In eastern Washington, miners came in waves, the first being with discoveries of gold near Fort Colville in 1855 at the mouth of the Pend d'Oreille River (Trimble 1914). In 1857, prospectors explored north and discovered gold on the Fraser River in British Columbia, which started a stampede of miners from California where much of the surface gold had already been worked out (Martin and Martin 1995). Other contemporaneous gold discoveries throughout eastern

Washington and beyond brought increasing numbers of people through the region as miners went in search of better diggings, often returning to where they had left when rumors proved false or the paying ground had already been claimed by others (Martin and Martin 1995). The early miners en route from California to the various gold fields of northeast Washington and interior British Columbia traveled up the Columbia River prior to an established route over the Cascade Mountains (Scott 1917; Trimble 1914).

Native Americans recognized the threat of the increasing Euro-American presence on their lands. A writer of a contemporary newspaper reported that, while "there is considerable gold being taken out on the Yakima. . . . The country is inhabited by Indians, who appear to have used every effort to prevent the whites from examining it" (*The Weekly Oregonian*, 22 April 1854). The miners themselves often incited hostilities. M. Robertson, a major for the Yakima Expedition wrote in 1864:

> I believe this is to be the best plan to kill these rascally Indians off, viz: set themselves fighting each other. At any rate if we can get them fighting amongst themselves, we will be enabled to either mine in their country or pass on to the Thompson without molestation. However, most of my men seem eager for a fight with them, and I am disposed to think their desire will be gratified before one week has elapsed [Kittitas Centennial Committee 1989:58].

The hostile encounters that ensued between miners and Native Americans resulted in the intervention of the US Army, which quickly brought an end to what became known as the

Yakima Indian wars of 1855-1858 (Trimble 1914). During the war, General Wool, the military leader of the campaign, issued an order that "No emigrants or other whites . . . will be permitted to settle or remain in Indian country" (Trimble 1914:21). After the wars had ended and Native Americans were removed to reservations, miners in the interior Pacific Northwest returned to existing mines and began prospecting for new deposits with the confidence of military protection (Bruce 1992; Tozer 1965; Trimble 1914). In the Wenatchee Mountains, the Yakima Indian wars may have indirectly delayed the eventual discoveries of the Peshastin mines upwards of two years and the Swauk mines by as many as fifteen (Meschter 1980:64).

The first documented firsthand account of the discovery of gold by Euro-Americans in Washington was in September 1853 by the McClellan Expedition (Martin and Martin 1995; Trimble 1914; Woodhouse et al. 1995). While camped along the banks of the Yakima River near present-day Ellensburg, McClellan wrote in his journal, "our people have found gold in the sand all around this place—not in large quantities—many have the gold fever highly developed" (Overmeyer 1941:37). After sending members of his party out in a fruitless search for new locations, he wrote in his report to the Secretary of War that the deposits in the area were not "sufficiently rich to justify working" (Overmeyer 1941:38). Within the month his men would go on to find gold in both the Wenatchee and Columbia River (Overmeyer 1941). News of McClellan's discoveries spread quickly and prospectors soon had found gold on both sides of the Cascade Mountains within a few years.

The three most important centers of mining activity in the Wenatchee Mountains were in the Cle Elum, Swauk, and Peshastin (sometimes called Blewett) districts (Figure 33). Tozer (1965:100) estimates the total value of the gold produced in these three districts from ca. 1875 to 1900 is $3 million. While $3 million spread over 25 years does not seem like a great amount of money, it provided direct and immediate benefits, as all of it was pumped right back into the region's economy. From an economic perspective, the Cle Elum was the most inconsequential of the three (Tozer 1965:100).

The three mining districts, although in close proximity to one another, differed in both the geologic nature of the deposits and the methods used to recover the gold. In the Swauk, the values sought were strictly gold, whereas in the Cle Elum and Peshastin mines, other base metals such as copper, silver, and iron would contribute to their histories and development (Martin and Martin 1995). Common to all their histories was the inescapable impact of economic and political events beyond the miner's realm of control. The intensity of regional mining activity escalated in times of economic depression (Shideler 1986).

Gold brought the first Chinese to eastern Washington where they would either work placer deposits considered unprofitable by white miners or rework abandoned placer tailings left by the white miners. They were considered some of the hardest workers willing to endure the roughest conditions (Cassel 2002). Chinese placering occurred in virtually every gold field. At one time, four or five hundred Chinese men lived in the Swauk camps (Jordan 1964:73). The Chinese Exclusion Act of 1882 sealed

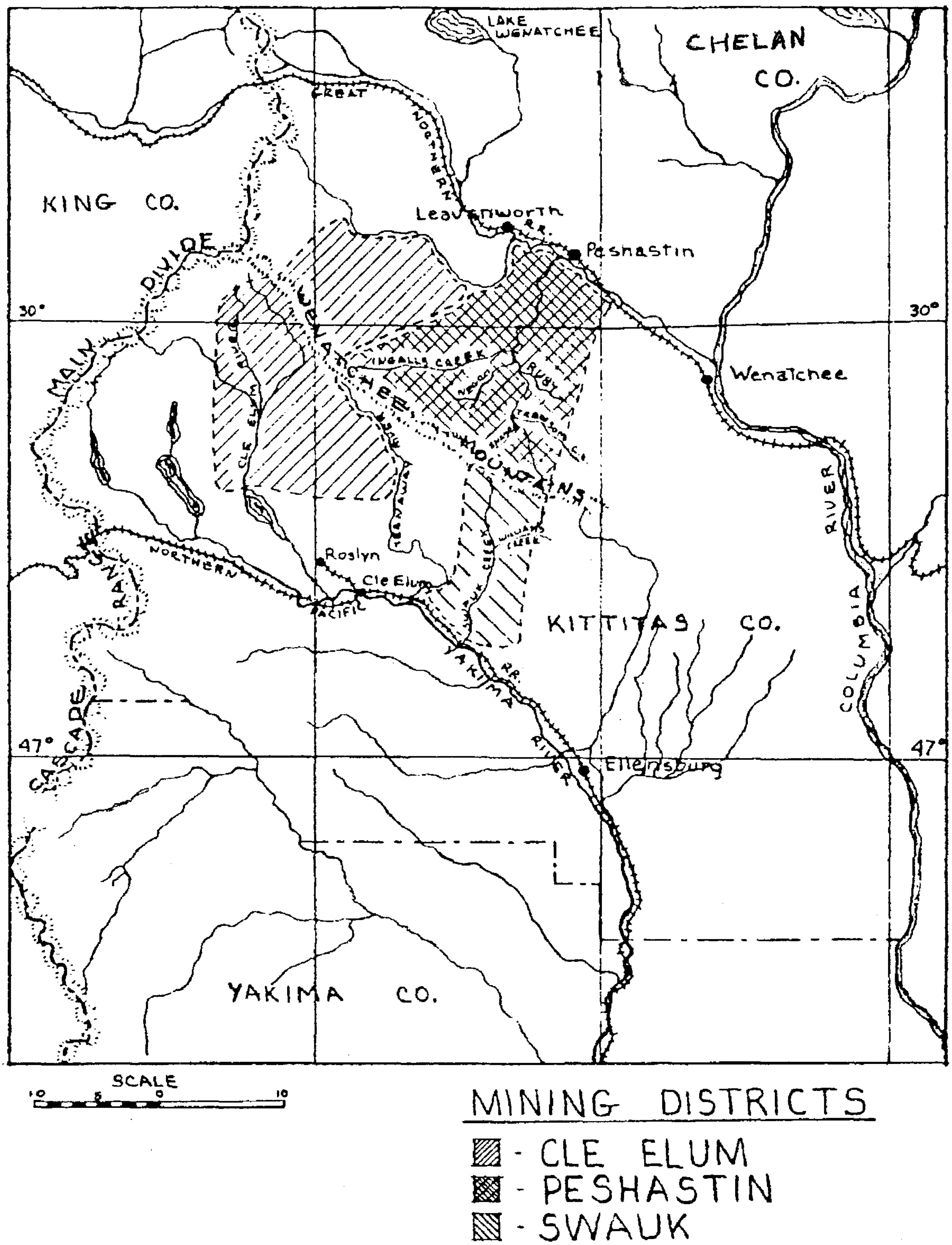

Figure 33. Illustration of Cle Elum, Peshastin, and Swauk mining districts in the Wenatchee Mountains. Tozer (1965:Figure 1), with Okanogan County label corrected to Chelan County.

their fates in the mining fields. Those that could not prove that they had come to the United States legally were subject to immediate deportment. The Chinese were subject to brutal treatment by the Euro-Americans. Regarding the Chinese placer miners, "old timers did not hesitate to say, 'They got him and then the river got him and good riddance'" (Smith 1976:19). All three districts would have a Chinese presence prior to the twentieth century and all three districts would eventually see to their expulsion through various acts and legislation (Shideler 1986).

In Tozer's (1965) often-cited analysis of the mining history in the Wenatchee Mountains, he identified three distinct periods prior to the close of the nineteenth century based on fluctuations in the intensity of mining activities. The period of 1853-1861 is marked by the initial gold discoveries, their impact on Native Americans, and the conceptual advance of the "Frontier" in the West (Turner 1894) as a mining frontier. The period of 1861-1872 represented a lull in mining activities. The period of 1873-1899 represented a flourish of activity within the Wenatchee Mountains. Over time, mining would go on to become more and more of a capital-intensive industrial pursuit and would continue in all three regions up into the present. Fluctuations in the intensity of activity would be dependent on many of the same factors as they had in the past, dictated by market prices, economic conditions on a regional and national scale, policy, and law.

The initial discovery of gold in what would become known as the Blewett Mining District is disputed amongst scholars and historians, but it is accepted that in August 1860, placer gold in paying quantities had been located on Peshastin Creek and its tributaries (Meschter 1980). The discovery of the placer deposits triggered a rush to the area that would have profound economic influence in Washington Territory; when news of the discovery hit Seattle it sent real estate prices there skyrocketing (Martin and Martin 1995:28). Lode deposits in the district were located in 1874, which quickly replaced the placer mines in terms of production. In 1883, the Peshastin mines became known as the Blewett mines after Mr. Blewett bought the Cooper and Lockwood mines and put in a stamp mill (Smith 1976). Production from the lode deposits began to decline in 1884 as the ore became increasingly complex with depth (Woodhouse et al. 2002). It was estimated that production for the Blewett mines between 1870 and 1910 was $1,700,000 (Woodhouse et al. 2002:135).

Gold was discovered in what would become the Swauk Mining District by a party of prospectors returning from the Cariboo strike in British Columbia in 1867, but not in quantities worthy of exploiting at the time (Thomson 1973). In 1873, members from the original party relocated the placer deposits and hit a pay streak at what became known as Discovery Bar (Woodhouse et al. 2002). Word got out and a rush ensued, fueled in part by the unusually large nuggets that began to be recovered from the ancient river channels (Thomson 1973). Beginning in 1881, lode deposits began to play an increasing role in the total production of the mines and outnumbered placer claims within a year. The largest gold dredge in Washington operated at Swauk Creek in the years 1926-1929, and along with capital-intensive hydraulic mining, transformed the placer mining operations on an industrial scale (Bruce 1992; Martin and Martin 1998).

History of the Cle Elum Mining District

George A. Bethune, Washington's first state geologist, assigns very early dates for the initial discoveries of metals in the upper Cle Elum River (Bethune 1892). He departs from the usual format of geological reports by giving "a brief *résumé* of a remarkably interesting history" (Bethune 1892:130) of the Cle Elum Mining District. Bethune claims that in the winter of 1837 a small party of Hudson Bay Company men inquired about iron components in fish spears (Figure 34) and medals worn by the Upper Kittitas Indians:

> [T]he Indian said it was taken from the hills near by, 'cooked' by them, allowed partly to cool, and then hammered into the shape of spears, medals, hammers, and other implements of use to the tribe. Astounded, the captain decided to see this hill of iron. . . . He gathered specimens, carried them to the company's fort on the Columbia, and there the first iron ore found in Washington was first exhibited. Samples of both ore and crude materials fashioned from its product were afterward sent to England, and are said to be on exhibition to-day in the British museums [Bethune 1892:131].

Bethune (1892) went on to report the first Euro-American discovery of gold in 1846, the discovery of silver in 1847, and the discovery of copper in 1851 in the Cle Elum Mining District. If accurate, all would be first known occurrences in the State of Washington.

Figure 34. Unknown pioneer and Native American with fish spear like that mentioned in Bethune's (1892) text. The fish spear depicted here is interpreted by reference to Bell's (1972, 1975) description. Date unknown. From Northern Kittitas County Photographs, Ellensburg Public Library, Identifier NKP-048.

S. S. Hawkins and Mose Splawn made the first hard rock mineral claims within what would become the Cle Elum Mining District in 1881 (Boyle 1892). They named the location the Cle Elum Iron Lode, located on the flanks of what would become known as Hawkins Mountain, discovered while prospecting for richer diggings after having left the Peshastin mines (Bethune 1892). Placer gold was discovered about the same time that the hardrock mines were located (Tozer 1965), but it was very fine-grained and hard to recover (Hodges 1967). Previously, prospectors had followed the Yakima River to its headwaters looking for rich deposits, as implied in this 1874 newspaper excerpt: "No person has any idea how many men are in the mountains....One party returned last week after an absence of a month. They were up the Cle Elum" (Kittitas Letter 1874). A variety of minerals were found in the upper Cle Elum area. Various assays and reports revealed the presence of copper, gold, chromium, tin, iron, manganese, silver, lead, antimony, mercury, molybdenum, nickel, cobalt, uranium, bismuth, and platinum (Centennial Committee 1989; Elsner 1972; Hodges 1967). The diversity was recognized shortly after initial discoveries were made. In 1882, William Splawn and George Carey of Yakima were supposedly shown a location by a Native American where they made claims on the King Solomon ledge of galena ore (Tozer 1965:32). Numerous other discoveries in the region were made that year: "the quartz lodes of gold, silver, galena and iron ore have been discovered. Quite a number of claims have been located in that district" (*Walla Walla Union* 1882). Interest and capital investment came from outside the region at an early date, as illustrated by the following 1883 quote:

> The new camp [located near Camp Creek] was subsequently visited by Messrs. Boyls, Stevenson, Flint, Morrison, Wilson, Splawn and others. . . . [T]he general impression prevalent is that with depth the mines in question will yield large returns in silver bearing ore. . . . Several desirable claims . . . have been grouped together and sold to the Tacoma mining people, who are making preparations to prospect their property thoroughly during the coming winter [*Yakima Signal* 1883].

In response to "glowing reports of the extent and value of the ore bodies [which] brought hordes of prospectors into the upper Cle Elum" (Kittitas Centennial Committee 1989:43) and the increasing number of mineral claims in the region, the miners of the Cle Elum Mining Camp established the Cle Elum Mining District (Figure 35) on September 19, 1883 (Kittitas County Auditor's Office 1883:1). The district boundaries were described as (*sic*):

> Commincing at the head of Cle Elum Lake, Thence running East to the Teanaway River. Thence in a northerly diriction to the west side of Mt. Steward, thence to continue in a northerly diriction to the mouth of the Iscicle Creek. Thence westerly to the head of the Cle. Elum River. Thence west to the summit of the divide between the Cle-Elum River and the Catches Lake. Thence in a southerly course along the sumit of said divide to a point west head of the Cle-Elum Lake (Kittitas County Auditor's Office 1883:1).

The focus of the early work of Cle Elum District mining activity was located adjacent to the confluence of Camp Creek and the Cle Elum River, to the west and downhill of Mount Hawkins. From this early focal point, further settlement and mine development expanded along the ridgeline of the mountains up and down the Cle Elum River valley. This pattern of growth from a geographical central point in close proximity to the earliest mineral discoveries is common in western U.S. mining history and is called nucleation (Francaviglia 1991:78-85). By the late 1880s, claims and activity were most

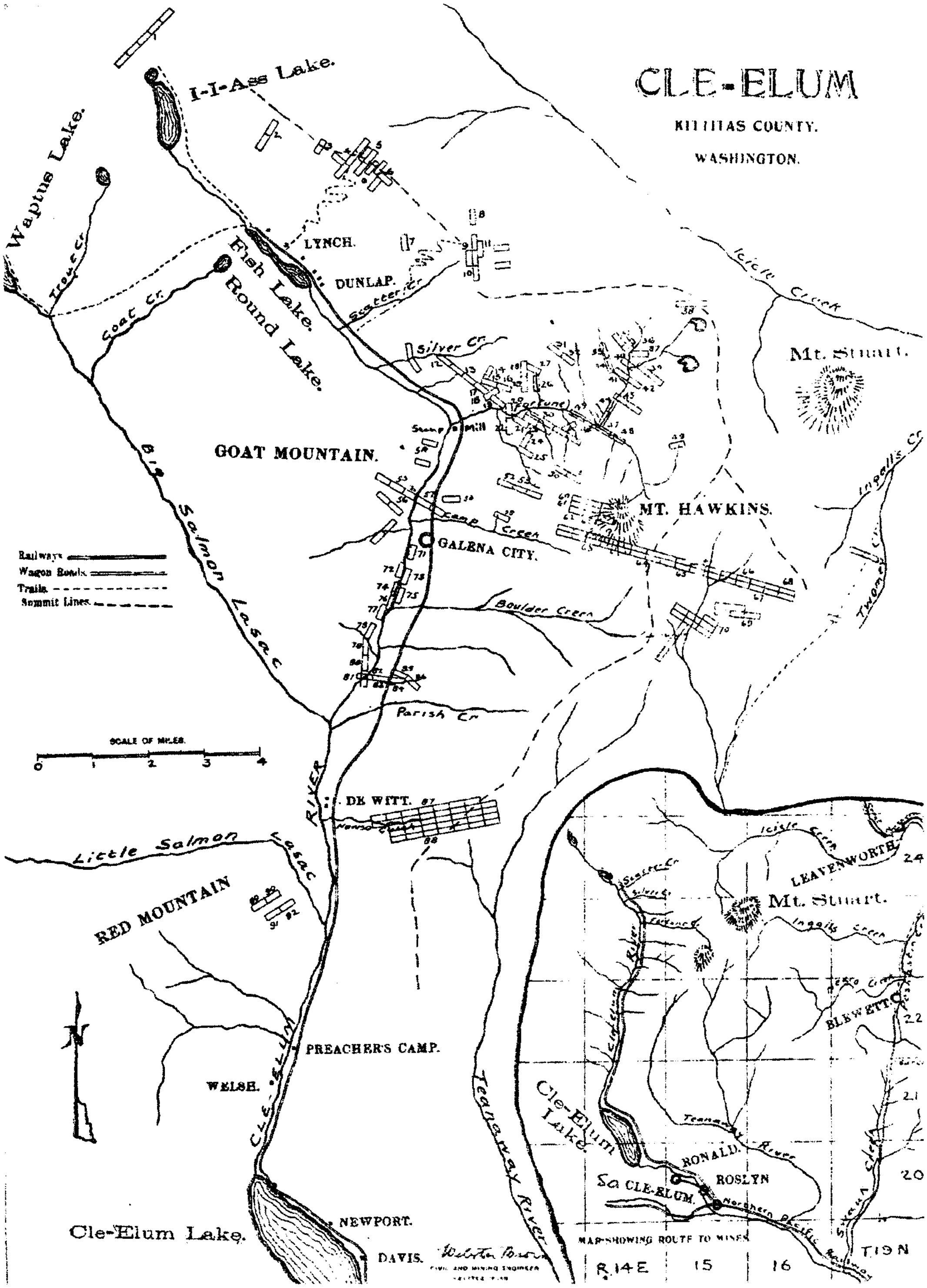

Figure 35. Map of Cle Elum Mining District ca. 1896, with inset showing "route to mines" from Hodges (1967). The names running from the west bank of Cle Elum Lake and along the river bottom on up to Fish Lake indicate mining camps, while the numbered rectangles indicate active mining claims. Note especially the mining claims numbered 3-7 northeast of Fish Lake, which constitutes the thesis field study area.

concentrated northeast of Fish Lake, and in the Fortune Creek and Camp Creek drainages. The district had no major mining camp, just a string of small ones that stretched from Lake Cle Elum up river and along the valley floor to Fish Lake.

The first serious attempt made at exploiting the known iron ore deposits located along the river valley floor near Boulder Creek was in 1889 (Woodhouse et al. 2002:249). In 1890, another venture was undertaken by an English syndicate named the Pacific Investment Company, which purchased 18 claims iron claims between Boulder Creek and Camp Creek (Woodhouse et al. 2002:250). The anticipation of industrial-scale development work led to the platting of a 35-block townsite of Galena City in May of 1890. Located near the mouth of Camp Creek, it was the proposed terminus for a railroad route that would take the iron ore out of the mountains and be the official mining town of the upper Cle Elum (Interstate Publishing Company 1904).

The failure of both iron mining ventures led to the abandonment of the proposed railway and Galena City never materialized into the metropolis it was intended to become (Stancik 1994). However, it would go on to be the main mining camp and center of social activity in the Cle Elum Mining District. A formal post office was established in 1905 that only lasted 6 months; although Jack Greaser, a miner and packer, went on to provide mail service as a courtesy to the miners (Martin 1967:6). In the early 1920s, there were three general stores and three boarding houses operating at Galena City (Stancik 1994:6). Miners from all over would come down to pick up mail and supplies twice a week, as well as on holidays and special celebrations (Elsner 1972).

The promotional campaign embarked upon by both the media (Figure 36) and the miners themselves began shortly after the initial development of the mines in the Cle Elum District. It was an integral component to, and had a profound effect on, historical developments beyond the confines of the district, demonstrated succinctly in a report to the Secretary of the Interior from the Governor of Washington Territory. Quoting from "an interesting article," he related:

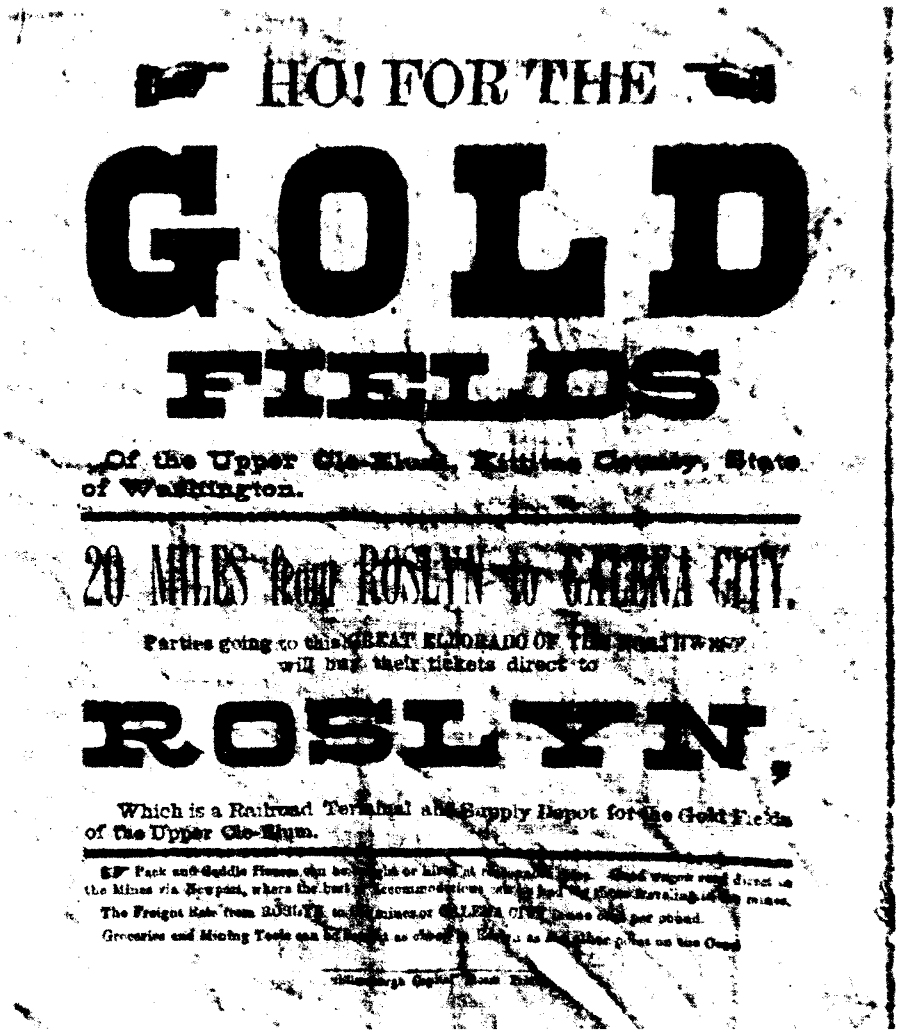

Figure 36. Cloth notice printed in Ellensburg advertising the mines of the upper Cle Elum (Glauert and Kunz 1976:149). Date unknown, but likely ca. late-1890s to early-1900s. The text near the bottom promotes the "good wagon road," nearby supply centers for groceries and mining tools, "the best of accommodations" available locally, and lists freight rates at 1 cent per pound if traveling from Roslyn to Galena City.

> Instead of being jealous of the cities situated in the mines, Ellensburgh is interested in promoting the prosperity of each because each additional person employed in or about the mining regions is an additional consumer of the products of her surrounding area of rich agricultural lands and is in consequence an indirect patron, at least, of her mercantile houses [Moore 1889:36-37].

Tozer (1965:110) labels the mines of the Cle Elum Mining District as "poor man's diggings," that is, if a miner worked hard enough he would probably break even and might even come out with a little profit. Once an operation grew in scale beyond an individual pursuit, it required capital investment, furnished by investors and speculators in the east (i.e. the East Coast), the west (the metropolitan centers of the Puget Sound region), and local sources. In order to justify investment, promotion played a key role in bringing financial interest into the region. Regarding the financial disposition faced by small-scale operations, a newspaper article lamented that the average miner was simply "too poor to work them" (*Ellensburg Localizer* 1889). Within a decade, many had become aware of and critical of the over-zealous nature of reports. An example from an informed source stated:

> The tendency of some of the so-called mining experts who have visited the district to give rainbow reports, has resulted in a rising of prices on undeveloped claims, that will retard the development of the district very much more than

> conservative statements made on the same property that would bear investigation would have done [Northwest Mining Association 1897:157].

In terms of mineral production, the remoteness of the mines is cited by virtually all primary and secondary sources as an ever-present limiting factor to the district's development and economic prosperity (Elsner 1975; Interstate Publishing Company 1904). The need for heavy outside investment not only applied to the development of the mines, but it applied to the miner's transportation systems as well. An article in a local paper exemplifies the need when it stated, "Capitalists have been prevented from going in there because there was no road. . . . Purdy Flint and others have done considerable work, but...has amounted to very little and has been a heavy expense to the owners" (*Ellensburg Localizer* 1889).

In many respects, the development of transportation networks seen in larger-scale mining districts in the American West (Francaviglia 1991:72) unfolded along similar lines in the Cle Elum Mining District. What started out as an Indian trail utilized by early prospectors (Elsner 1975:3) developed over time into a maintained wagon road (Figure 37). Alternatively called a "mine-to-market" road, the Fish Lake road linked miners to the outside world by creating a route between the Northern Pacific Railway's Roslyn Branch and a termination at the Fish Lake mines, the entire length of which was built and maintained by local miners using picks and shovels (Elsner 1972). The stage took two days to travel the full length, with the halfway point being Galena City (Elsner 1975:8). Various sources give different dates for the establishment of service, but it does seem

Figure 37. Stage along the Fish Lake road ca. 1911. From Connell Family Volume 1, Ellensburg Public Library, Identifier CON-262.

highly probable that the stage began running twice a week during the mining season beginning in 1903, with ownership changing hands repeatedly (Stancik 1994:6). The construction of the wagon road was resented by some of the district's miners and the improved access it provided (Denny and Denny 1973). The packing of supplies (Figure 38) was an integral facet in the miner's world; from mills to pianos, everything needed to be packed in (Watt 1978). Entrepreneurs capitalized on the passengers traveling from the mining regions to the supply centers of Cle Elum, Roslyn, and Ellensburg (Figure 39). The final stage in the maturation of transportation networks in historic hardrock mining districts would be the completion of a railroad. Rail transport allowed for cheap and fast transport of supplies to the mines and it took ores out for processing.

Figure 38. Example of packing of supplies. This undated photograph, with the title on the back reading "Supplies for the Miner's" shows heavily loaded mules and horses packing supplies into the high mountain camps in upper Kittitas County, ca. late 1890s. From Pautzke Collection Vol. 3, Ellensburg Public Library, Identifier PZMN-0018.

Figure 39. Example of high country entrepreneurs. Located in the mountains in upper Kittitas County, the sign nailed to the right of the cabin door states "KITTITAS RESTAURANT: MEALS AT ALL HOURS," undated photograph ca. late 1890s. From Ellensburg Historic Photograph Collection, Ellensburg Public Library, Identifier BLS-053.

The Cle Elum Mining District almost got a rail line when a plan to run an electric railway extension from Roslyn to the Fish Lake mines was initiated in 1908 (Stancik 1994:8). The Kittitas Railway and Power Company, owned by a French syndicate, began surveys for the line towards the mines of Fish Lake in 1909, and completed construction of a depot at Salmon la Sac in 1911 (Stancik 1994). In June of 1912, construction of a grade began with the goal of reaching Fish Lake before the snow fell, and they also started building a road to Waptus Falls, the proposed location of a hydroelectric station (Stancik 1994:9). As World War I threatened in the same year, the French capitalists withdrew their funding and the project was abandoned (Kittitas Centennial Committee: 1989:43). In 1912, instead of the highly anticipated rail line going into the mining region, the first trip up past Salmon la Sac in an automobile was taken along the partially completed grade (Community Development Committee 1955:99). Rugged is an apt word to describe the conditions that the hardrock miners endured.

The daily exposure to hazardous conditions in the shafts and winzes (tunnels) was one of the heaviest burdens of the hardrock miner's work (Jordan 1964; Lingenfelter 1974). Not only were the mines dangerous, the miners faced many hardships outside of the mines. In an interview regarding mining in the Salmon la Sac area, the wife of a former hardrock miner from the upper Cle Elum mentioned, "[T]he life of a miner was tough. [We] lived on potatoes and berries to survive for 14 years" (Denny and Denny 1973:2). Miners in the upper Cle Elum often depended upon one another for resources and support in the remote mountain backcountry. They used each other's cabins, brought one another mail, and shared provisions, especially tobacco (Elsner 1972). They also protected each other's interests in the absence of effective law enforcement. Two of the rare instances of claim jumping in the Cle Elum were dealt swiftly and effectively by local miners; one claim jumper was shot in the foot, and the other was forced to walk his horse from deep in the mountains out to Salmon la Sac while carrying his horses' saddle (Elsner 1972).

In stark contrast to the ethnic diversity of the coal miners in nearby Roslyn, hardrock mining in the upper Cle Elum was almost an exclusively white-male pursuit. The only documented African American presence in the district's history (Elsner 1975) was "Cascade Bill" McCasson, who worked his claims on Goat and Red Mountain (Hodges 1967:65). Like other mining districts with placer deposits, Chinese were the exception. A group of approximately twenty-five Chinese were brought into the upper Cle Elum ca. 1887 (the exact date varies between 1873 and 1887 from descriptions in both primary and secondary accounts) to work placer mines, located at what is today known as China Point (Woodhouse et al. 2002), where they lived at what would become known as China Camp (Shideler 1986). There are conflicting reports as to the ultimate fate of these Chinese placer miners (Elsner 1975; Engstrom 2008; Operation Uplift 1955; Shideler 1986; Woodhouse et al. 2002), but it does seem highly probable that all but one were massacred by Euro-Americans sometime in the mid to late 1880s, and the blame was placed on Native Americans. Robert Bell, a hard rock miner of the Cle Elum Mining District, recalled in the 1970s that the sole survivor of the massacre afterward moved to Ellensburg where he helped open and operate a restaurant:

> I knew him. We called him Challie Sam. . . . Challie said [referring to the attack] he ran all through the black night, stopping sometimes to rest. He says one time after he stopped after day light, he sat down on an old log on a hill side. He looked up and saw a big bear smelling the ground right where he had come down. Challie thought the bear was smelling his tracks, so he said, "All light, Mr. Bear, you likie tracks, me going to makee more" [Operation Uplift 1955:183].

Adolf Elsner (1975), another local miner, "panned up" several Chinese coins in the river gravels below China Camp decades after the event was said to have had occurred.

The Cle Elum Mining District reached its pinnacle of activity around the turn of the nineteenth century (Tozer 1965) and continued at a slower pace until it underwent a precipitous decline in the 1930s (Kittitas Centennial Committee 1989:43). There were flurries of renewed interest and activity during the great depression and when strategic minerals were sought for during both World Wars (Kittitas Centennial Committee; Woodhouse et al. 2002). When asked if any miners ever got rich, "the last old-time miner of the area to pass away" (Kittitas Centennial Committee 1989:43) responded, "If they would have put the money in the ground instead of their pockets, they could have opened that country up" (Elsner 1972).

The Fish Lake Hardrock Mines and Miners

The most significant mining in the vicinity of what was then known as Fish Lake (today known as Tucquala Lake) began ca. 1886 and focused on the extraction of free milling gold and complex ores containing gold, silver, and copper from veins near the summit of what was then known as Mammoth, Lynch and Eagle Mountain. While some structures were near the mines (Figure 40), most of the cabins and ore processing associated with the mining in the field study area were located on the valley floor near Fish Lake (Figure 41). Out of the hundreds of lode claims that were filed in the area most were mere prospects and insignificant. However, the Aurora Gold Quartz Lode (found by John and Timothy Lynch), American Eagle (found by E. P. Gassman and Hodges), Vidette (found by E.P. Boyles), Mammoth Copper Lode (found by James Grieve), and Bronco (found by Phil A. Stanton and James Grieve), clearly were significant and I could find compelling evidence of a connection to the field study area.

Figure 40. Undated photograph of a miner cabin in the high country. From Northern Kittitas County Photographs, Ellensburg Public Library, Identifier NKOD-046.

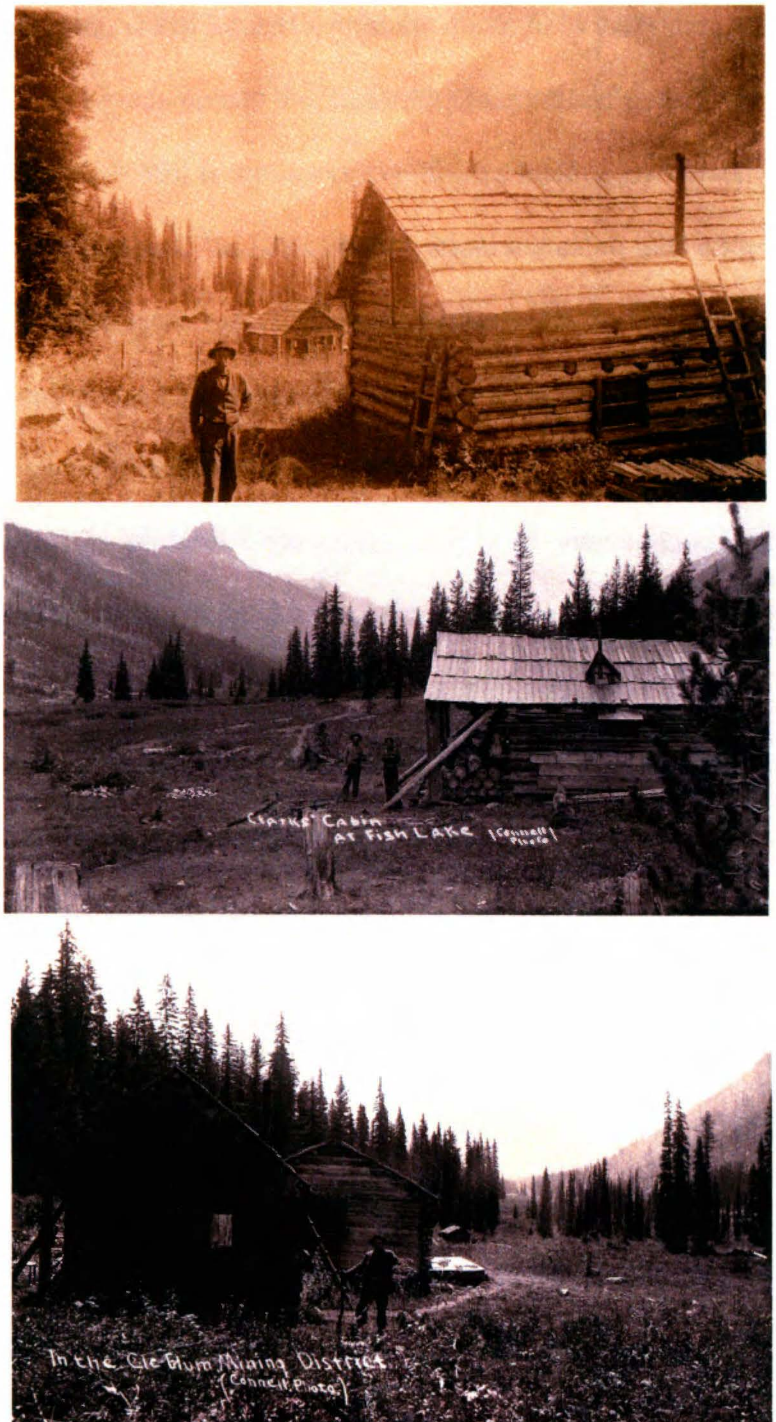

Figure 41. Cabins in Fish Lake mines area along the valley floor. Top: Unknown cabin at Fish Lake. Note the cabins in the distance (Connell Family Volume 2, Ellensburg Public Library, Identifier CON-299). Middle: Originally, this was probably Anthony Stoves' cabin later taken over by Jack Clark. The back of the photo reads "August 8, 1911." (Connell Family Volume 1, Ellensburg Public Library, Identifier CON-42). Bottom: The back of the photo reads "Dick Lewis Cabin at Fish Lake" (Connell Family Volume 2, Ellensburg Public Library, Identifier CON-231).

The first mineral claim located within the thesis field study area was discovered in July of 1886 by John Lynch, named the 'Kockshit Quartz Lode' (Cle Elum Mining District Records, Book B:80). In a transcription from a handwritten letter written on August 7, 1916, Lynch stated, "In 1887 I built a small log cabin with a view of claiming [a] 1/4 section of land as a homestead [under the Homestead Act of 1862]. . . . In 1891 or 1892 I moved to my present location and located the Mountain Sprite Mill Site" (Madden 2008a:4). John Lynch (in partnership with his brother Timothy) went on to locate, buy out, and patent some 15 hardrock claims covering 234.61 acres of land in the study area, culminating in the formation of the Aurora Mining and Tunnelsite Company (Madden 2008a; Thompson and Radar 1990).

An appraisal of the Cle Elum Mining District given at the height of activities reported, "The best developed property is the Aurora group of five claims on Mammoth Mountain, owned by John and Timothy Lynch" (Hodges 1967:61). That level of development was exemplified in 1902, when a tunnel was driven 1700 feet directly into Mammoth Mountain in an attempt to drain Sprite Lake (located on the other side of the ridge) in order to provide good drainage to mines (Woodhouse et al. 2002:296). Elsner (1972) relates that at the height of operations, Lynch employed 6 men who earned $3 a day plus board, but the employees had to cook their own meals. Before Lynch brought in the stamp mill complete with amalgamation plates, ore was processed using an arrastra powered at first by a homemade water wheel and later by a larger Pelton water wheel (*Yakima Herald* 1891).

Regarding the profitability of Lynch's operation, Elsner (1972) commented that, "He made pretty good on the stamp mill." The ore from the mines was transported by horse down the mountain at a freighting expense of $4 a ton (Northwest Mining Association 1896b:50), processed in the stamp mill containing four 320 pound stamps and one four foot concentrator (Hodges 1967:62). The mill was powered at first by steam and later by a high-pressure water wheel, where the free-milling gold was recovered before the remaining more-complex ores in the tailing would be shipped to Roslyn by stage, then by rail to the smelter in Tacoma (Elsner 1972). The ores from some of the other mining operations on in the vicinity were processed in his mill as well (Woodhouse et al. 2002).

A big hindrance to realizing profits was the need to send ores to smelters. The Tacoma Smelting and Refining Company processed a large quantity of the ores from various regions throughout the Pacific Northwest; which can be appreciated by the figure, "Month of Dec. 1895: seven thousand one hundred bars bullion weighing 730,185 pounds" (Northwest Mining Association 1896a:54). The Tacoma smelter would not take ore if it had a high arsenic content (called mispickle) that might release toxic gases into the air during the smelting process. Unfortunately for the miners and investors, once the free-milling gold had been removed from the surface, the occurrence of mispickle ore proved the rule rather than the exception throughout the hardrock mines in the field study area and Cle Elum Mining District (Elsner 1972).

West of Lynch's properties was the America Eagle property, discovered in 1891 by E.P. Gassman and Harry Hodges (Boyles 1892:1); it consisted of four claims: the

American Eagle, Boss Lode, Ledger and Silver Bull. According to Woodhouse et al. (2002:300), the American Eagle started out with a 60-foot tunnel on a six-foot vein, with a 1 and a half-foot pay streak. The Boss Lode, Ledger, and Silver Bull properties were extensions of the American Eagle that branched off in a northwesterly direction towards the summit of the Wenatchee Mountain ridgeline. The claims were worked throughout the entire winter in 1891 to pay for expenses during development in hopes of drawing investments. The main workings were 40, 70, 90, and 130 feet long; the 130-foot adit tapped a ledge of ore 600 feet below the surface (Woodhouse et al 2002:300).

As best as can be deciphered from the contradicting primary sources, the Vidette claim was located and claimed by John Lynch in 1890 (Cle Elum Mining District Records, Book B:80). It was then relocated and claimed by Judge E.P. Boyles again in 1890 (Boyles 1892:1; Hodges 1967). It was located to the west of the American Eagle claims and had similar ores (Woodhouse et al. 2002:301).

In the west portion of the field study area were the Mammoth Copper Lode and the Bronco claim. The Mammoth Copper Lode was discovered by James Grieve in July of 1886. The description of its location was recorded as being, "a half mile from fish Lake, Then quarter of a mile from the N[North] Fork of Scatter Creek on what is known as Cayuse flats. on top of the mountain mammoth mineral lode" (Cle Elum Mining District Records, Book B:460). The Bronco claim (Figure 42) was found by Phil Stanton and James Grieve (Woodhouse et al. 1892:295). The Bronco's location was 1000-feet across the west slope from the Aurora claims owned by John Lynch. By 1896, the mine had shown enough promise to justify the creation of the Bronco Mining

Figure 42. Connell family at the entrance to the Bronco mine ca. 1910s. Undated photograph from Northern Kittitas County Photographs, Ellensburg Public Library, Identifier NKOD-099.

Company. From an 80-foot tunnel a specimen of ore was assayed (tested for content of valuable metals) that reported values as high as $690 to the ton (Woodhouse et al. 2002:295).

Complications in Connecting Ground Evidence and Recorded Mines

The exact mine locations are difficult to assign to specific claim holders due to geographical and claim name changes over time as well as ambiguous location definitions. In a study of mining claims in the Alpine Lakes Wilderness and vicinity undertaken between 1971 and 1975, it was revealed that during a search of records of Kittitas, King, and Chelan counties and the US Forest Service, more than 1900 unpatented claims were listed within their study area (Gualtieri and Simmons 1989); most of these could not be found in the field due to poor location descriptions. A good example of the ambiguous language is a claim that may or may not be in the field study area, the Fish Eagle No 1, described as, "at the end SouthEast by South end line of Fish Eagle Copper Mine No. 1 and about one and a half mile from Fish Lake or about six miles from Mount Stewart" (Cle Elum Mining District Records, Book G:206).

Many place name changes came about as part of surveys undertaken by USGS Forest Service topographers in the early twentieth century. Beginning in 1908, the supervisor of the Wenatchee National Forest, Albert Sylvester, was responsible for assigning many of the names seen on maps today (Sylvester 1943:241). Sylvester explained in a personal letter written to friend:

> [Miners and prospectors] may seem synonymous when it comes to place naming. Actually they are not. I think no prospector who did nothing but prospect ever got his name on a map, but if when prospecting he found something that looked good to him and settled down to develop it, ran some tunnel . . . then he became a miner even though his mine never proved of value. It is from such men that we get some place names, their own perhaps if bestowed by fellows like you and me, some charming or happy ones if the result of their own caprice or whimsy. Some we have in the later class are Sprite Lake, Paddy-Go-Easy Pass, Cathedral Rock, . . . [and] Lynch Glacier [Sylvester 1943:250].

The place names listed by Sylvester (1943) all come from miners who either owned or worked the mines in the field study area. This "caprice or whimsy," is demonstrated by the following. After discovering a particularly rich vein of free-milling gold worth $3,000 while working in the Fish Lake mines, Pat Kelley (or perhaps his brother) headed to the town of Roslyn where he hired a band for 24 hours, filled a wheelbarrow to the brim with beer and whiskey, and treated the town to free entertainment (Bell 1972; Elsner 1972). It is thought that Paddy-Go-Easy Pass is named after Kelley. Then again, just as the names of claims and the people who owned them changed over time, this version of a place-naming story may be far from the real story.

CHAPTER VII

DISCUSSION AND CONCLUSIONS

Synthesis

As a result of the pedestrian survey for this thesis, three loci of activity encompassing 27 features were recorded and linked to previously recorded sites in the study area through both space and time in a vast network of feature systems. In the field study area the time period of historical significance dates from 1886 to the late-1910s. The Cle Elum Mining District's period of significance is much harder to identify, but it surely spanned a longer period of time. It could be persuasively argued that it began in 1880 and ended in the mid-1950s with the last federal investigations pertaining to strategic mineral occurrences. The scale of investigation for my research ranged from narrow to broad and from small to large. The fate and history of the mines and miners, as well as their material traces, would be shaped by what was revealed with the next swing of the pick and by events transpiring on the other side of the globe.

A synthesis of the results from the pedestrian field survey and documentary research provided an informed knowledge base from which an educated guess was made in regards to assigning the three loci that I identified to known historic mines in the field study area. Locus 1 is most likely connected to mining activities that took place at what was known as the "Fish Eagle" and its associated claims. I make this connection because of similarities in the location between what I observed at the site and location descriptions in the Cle Elum Mining District records at the Kittitas County Auditor's

Office. Locus 2 is most likely connected with mining activities that occurred at what was known as the "Bronco" and its associated claims. I make this connection using location descriptions from both the Auditor's Office records like for Locus 1 above, and also from company records described by Woodhouse et al. (2002). Locus 3 is most likely associated with mining activities that transpired at what was known as the "American Eagle" and "Vidette" and their associated claims, based on location descriptions from the Auditor's Office and Woodhouse et al. (2002). The location of what was known as the "Mammoth" and its associated claims remains undetermined, as the documentary evidence is so contradictory that assigning it to a specific locus would be arbitrary at best. (I do think it is associated with one of the loci, but I do not know which one.). Although these designations were arrived at through the analysis of compelling evidence, they are by no means irrefutable.

Future Research

In this thesis research, I recorded archaeological remnants of historic mining activity in a small portion of the Wenatchee Mountains, and spent considerable time in archival research regarding local mining claims, newspaper history, and historic context. Although my work was extensive both in fieldwork for the study area and archival research, I would not say it is complete. To build on my thesis work, I have some suggestions for future research in history, archaeology, and related disciplines for documenting historic mining sites in the western United States.

For any historic mine archaeology project, I have three major suggestions based on my own experience in this thesis. First, a well-developed historic context should be a high priority in research design prior to fieldwork. This would really help in the interpretation of the remains found on the ground, as I noticed myself as I wrote up my results. Secondly, the identification of mining feature systems and their interpretation should incorporate a landscape approach. This avoids a myopic view of individual features that does not allow the full appreciation of how individual components fit into spatially expansive mining areas. Thirdly, field personnel should have highly developed mapping skills, both for in-field mapping (like having well-charged GPS units and good compasses) and for the lab (e.g., good knowledge of GIS).

In addition to the practical suggestions given above, several broader research themes and questions should be explored. For example, a potentially important research question to address in future archaeological investigations would be an examination as to what extent trails in mining districts on historic GLO maps correspond to the visible archaeology that exists today. The study of intrasite transportation property types like trails would help in accurate and appropriate identification and interpretation of feature systems in historic mining landscapes in order to develop a historic context that could be used during evaluation of National Register significance. In the study area, the GLO maps show numerous trails that ran between known mining operations. If these GLO maps had been employed in the field, greater success in relocating extant segments would have been realized.

In the absence of time-sensitive artifacts, innovative approaches to the dating of archaeological remains could be employed. For instance, the tree stumps (that most likely were the by-product of material needed for the timbering of underground mining structures) present in Locus 3 could be analyzed using dendrochronology or tree-ring crossdating, as was done by Hattori and Thompson (1987) in their investigation of the Cortez Mining District in central Nevada. Dendrochronology is based on several factors (e.g. suitable species, a tree-ring chronology databank, acceptable level of preservation, etc.) and many of the prerequisites for this technique to be employed effectively are met within the environmental setting of the study area.

Another line of future research should consider the extent to which relic hunters have diminished the frequency (i.e. relative abundance) and integrity (i.e. location, setting, feeling, association, etc.) of diagnostic artifacts in the study area and vicinity. Even the former president of the Upper County Heritage Council unwittingly has been responsible for the destruction of the archaeological record: "For years, [name omitted] has been collecting relics in the Cle Elum River area. Mining tools and equipment from abandoned mining tunnels, home-made snowshoes, and a Sibly stove" were listed as some of the items taken (*Ellensburg Daily Record*, 29 June 1976).

While the physical isolation of the study area limits current impacts to some degree, potential impacts to its archaeology have increased in recent years through the publication of site locations in book series such as Northwest Underground Exploration's "Discovering Washington's Historic Mines" series (e.g., Woodhouse et al. 2002). Although these books do include a section in the introduction alerting the reader to the illegality and immorality of looting and vandalism, they also essentially advertise the location of interesting historic mining artifacts. With the skyrocketing price of gold in recent years, coupled with a rise in off-trail backcountry use by both traditional (e.g., mountaineering) and non-traditional user groups (e.g., geocaching, ice climbing, hunting in designated wilderness areas) it is fair to assume that threats (i.e. looting and vandalism) to the resource will only increase in the future. An adit containing a visitor's log (Figure 43) with numerous recent entries illustrates the issue.

Figure 43. Visitor's log inside an adit entrance in the study area. Photograph by author in summer 2009.

Discussion and Interpretation

In terms of production and economic importance, gold mining in Washington State has played a small role in comparison to states such as California, Nevada, Arizona, Alaska, and Montana. At a regional level, gold mining has played an important role in the settlement and development of the area in what would become Kittitas County, and along with coal, was the primary contributing factor for settlement in upper Kittitas County, as demonstrated by, "The commerce resulting from development of the great diversity of mineral wealth of central Washington will prove a prize worthy the best endeavors of the great business centers, and prosperity will attend the cities most vigorously" (Moore 1889:36). The presence of gold and coal played a major role in historical developments beyond the regional level as well, albeit more indirectly than directly. In the first geological report of Washington Territory, the author proclaimed, "All early settlers in the Pacific Northwest will easily recall that famous exodus of miners from all over the Pacific coast to that newest 'El Dorado' of the time, the Frazier [sic] river in British Columbia" (Bethune 1891:5). Many of the first Euro-Americans (both miners and merchants) to pass through central Washington were on their way to, or coming back from distant gold fields; when they found gold in the local rivers, streams, and mountains along the way, many stuck around to help shape the development and character of the region into what it is today. In many ways, the Cle Elum Mining District is important because it is a microcosm of the history of extractive industry in the Pacific Northwest and historic mining in the American West.

In the geology of central Washington's Cascade Range, most gold ore deposits contained free-milling gold near the surface, which quickly turned to low-grade complex ores as depth increased. Occasionally, extremely rich veins were encountered (Woodhouse 1979), but they were neither extensive in depth nor distance. Furthermore, contrary to most of the geologist's and mining engineer's reports of the time, the high yielding deposits that did exist were inconsistent due to the heavy faulting and folding that the Cascade Mountains have been subjected to (Northwest Underground Explorations 1997). The complicated geologic setting in which the study area is located provides a glaring example (Frost 1973; Tabor et al. 1982). Thousands of short prospect tunnels and shallow prospect pits exist throughout the central Cascade Mountain region, standing as testaments to the disseminated nature of the ore bodies.

In a discussion highlighting development of research themes in the field of mining archaeology, the HARD (Historic Archaeology Research Design) Mining Sites Team emphasized that during a weeklong National Park Service-sponsored historic mining conference, an attendee pointed out, "the mining district has been recognized by most researchers as an ideal study unit for mining activities" (Costello et al. 2007:56). The mining district should not be confused with a National Register Historic Mining District, which is defined as "a significant concentration, linkage, or continuity of sites, building, buildings, structures, or objects united historically or aesthetically by plan or physical development" (Hardesty and Little 2000:15).

In 1986, the Cle Elum Mining District was evaluated for its inclusion as a Historic District in the National Register of Historic Places. Four inventoried sites (Forest Service Temporary Field ID 06-17-03-31, 06-17-03-32, 06-17-03-34, and 06-17-03-36) were placed within their larger context of the mining district and the district was determined ineligible "because of the minor role it played in the history of Washington State in combination with the overall lack of integrity of its parts" (Carter 1986:6). In defense of this determination, the economic contributions of gold mining in the Swauk and Peshastin mining districts, as well as the development of the Roslyn-Cle Elum coal industry are cited as having a more profound influence on the region than the Cle Elum Mining District. Regarding the archaeological record, Carter asserted:

> Today, the litter of those early decades is liberally dispersed along the slopes above the upper Cle Elum River. Very little is intact, however. The camps, millsites, and residences are represented by scattered and charred wood, rusted pieces of broken equipment, and dumps comprised of deteriorated cans, broken glass and fragments of crockery. Adits are visible here and there, as are an occasional tramline, wagon road, or remnant log cabin. However, no single area stands out as pivotal in the development of the mining industry within the Wenatchee Mountains nor as a noteworthy or exceptional component in the larger pattern of Kittitas County history. Furthermore, because of the great number of unpatented claims (many of them tied to now forgotten landmarks) which were worked over the years, it is extremely difficult to associate the physical evidence seen today with a specific person or claim. Instead, these remnants appear to merge into an indistinguishable succession of similar but unidentifiable prospects [Carter 1986:6].

The above statement proved very true during the archaeological field survey, inventory, and documentary research phase of this thesis.

A different perspective on the historic mining resources in the Cle Elum Mining District is that they are very representative of most historic hardrock mining ventures within the Cascades. Although they are common and abundant, such mining sites can be important (Hardesty 1988; Hardesty and Little 2000; Little et al. 2000; Noble and Spude 1992). That being said, most Cultural Resource Management (i.e. contract archaeology) endeavors undertaken today do not have the personnel who have the financial or time budget to undertake the extensive background research necessary to develop a historical context that might demonstrate the significance of the archaeological mining remains in question, especially when source material is hard to both locate and access (if it exists in the first place). Oftentimes, the average archaeological field technician will arrive in a project area with no background knowledge except for having read a recently released proprietary report; if the report is discordant or inappropriate for the cultural setting in which field work is being conducted, then what cultural resources get recorded and their subsequent interpretation may be ill-suited for the scope of work.

I did not record cultural resources encountered during the pedestrian survey and analysis phase of this research project as "sites," thereby liberating myself (partially) of the ontological, epistemological, and theoretical problems associated with site definitions and rationalizations (Dunnell 1992). Instead, I chose a synthesis of frameworks adopted from prominent historical archaeologists (Dunnell 1992; Francaviglia 1991; Hardesty 1988) and amalgamated it with the Binfordian "activity locus" in order to develop a "siteless" or "nonsite" view of the multifaceted and complex activity in interpreting mining archaeology. From this I derived a "locus of activity" concept; defining and rationalizing boundaries proved to be one of the most challenging aspects of this thesis. Not only does the term "site" have functional connotations, it has legal implications as well. Alternatives to my locus of activity could have been the creation of many small sites, one large site linking linear features to non-linear features that I encountered, or an aggregate of previously recorded sites coupled with the data that I recorded; all of these classifications could be justified and deemed equally valid. I do not propose that I have come up with the best method for classifying the material remains of historic mining operations in the Cle Elum Mining District. Having had no prior experience and an elemental knowledge (at best) in the archaeology or history of hardrock mining in the Cle Elum Mining District (or for that matter, any other mining district) imposed severe limitations on this study.

Francaviglia (1991) emphasized that the material remains within historic mining operations are neutral and the people that view (and therefore interpret) them are not (that is, aesthetic and moralistic judgments are intrinsic). In the popular imagination, most mining landscapes bring to mind connotations of an ugly wasteland. To me, the mining landscape of the study area is somewhat the "antithesis" to this collective imagination. While the study area definitely represents "man over nature," it is also a strikingly beautiful landscape and exudes a feeling that is hard to describe. Part of this comes from being truly historic (mining activity began there over 120 years ago) and part of it comes from its environmental setting. In stark contrast to the setting of the field study area is the feeling exuded from another location of historic mining activity in the Cle Elum Mining District. The numerous and recently built vacation homes at the confluence of Little Boulder Creek and the upper Cle Elum River, situated in an otherwise residentially undeveloped landscape, does bring to mind connotations of an ugly wasteland.

While the archaeological remains in the study area have inherently suffered from their geomorphic setting (i.e. extremely steep slopes), the extant "manmade topography may serve as the ultimate artifact in describing the transformation of mining districts" (Francaviglia 1991:149). Employing a landscape approach to correctly identify and interpret (the process is part art and part science) artifacts, features and feature systems is critical because "Although these individual components may appear to lack distinction, the combined impact of these separate components may enable the property to convey the collective image of a historically significant mining operation" (Noble and Spude 1997:19). In other words, the whole is greater than the sum of its parts.

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